The Moderating Role of Psychological Climate in Relationships Between Age and Work Role Performance

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A thesis submitted in partial fulfilment of the requirements of Nottingham Trent University for the degree of Doctor of Philosophy

March 2023

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Acknowledgements

I owe a debt of gratitude to so many individuals who have stood by me on this journey. Prof. Thomas Baguley, your wisdom, patience, and support have been invaluable. Prof. Maria Karanika-Murray, your passion and expertise have consistently inspired me to elevate my work. I also extend my thanks to the staff of the doctoral school for navigating me through the many administrative challenges along the way.

To my partner, Hayley, I owe the preservation of my sanity to your unwavering support and love. Your patience and understanding have pulled me through my most challenging times – this journey would have been impossible without you by my side.

To my parents, Lynne and Paul, thank you for always being there to support me, no matter what. To the other family and friends that have encouraged me along the way, I appreciate you all. And finally, a heartfelt thanks to my four-legged companions who fill my life with boundless joy.

Abstract

Defined by falling birth rates and a rise in life expectancy, population ageing presents notable challenges for financial institutions, healthcare systems, and labour markets. As a result of this, there has been a push for workers to postpone retirement and continue working into their later years. Despite legislative and institutional reform, there have been sustained reports of age-related discrimination and biases, often based on a flawed assumption that workers are unable to perform as effectively in later life.

While there is a vast body of literature examining the relationship between age and performance, the empirical evidence is inconclusive. Several factors contribute to this perspective, including the empirical overlap in performance dimensions and the traditional reliance on calendar age to explain changes in needs and motives across the lifespan. In the workplace, contextual elements play a pivotal role in driving motivation, but how these factors influence performance patterns throughout the working life remains unclear. While research indicates that job-related motives change with age, there is scant evidence on the reasons behind the changing experiences of work characteristics as one ages and how these might influence performance behaviours.

To this end, this thesis investigates the interplay between dimensions of psychological climate and age conceptualisations in predicting proficient, adaptive, and proactive performance behaviours. Using data obtained from

two samples, this thesis tested for the moderating role of psychological climate in relationships between age and performance and examined the differential effects of age on performance ratings in employee-supervisor dyads. Data gathered from a sample of 393 employees working in the United Kingdom were used to test relations in a series of structural equation models and latent interaction models. The direct effects of age and moderating role of psychological climate dimensions were tested in 9 models, each representing an individual dimension of work performance. Data obtained from a sample of 56 employees and 6 supervisors from organisations in the United Kingdom were used to test the differential effects of age on work performance in employee-supervisor dyads using a series of one-way repeated measures ANOVA tests and hierarchical linear models.

In keeping with previous research, evidence did not support a main effect for calendar age on proficiency, adaptivity, or proactivity. Despite this, findings showed that supervisors typically rate older workers lower on proficiency and adaptivity in core tasks. Being physically and mentally healthy are stable, positive predictors of proficiency, adaptivity, and proactivity for all aged workers. Allowing for role flexibility in job roles also reinforces the positive effects of physical health on adaptive behaviour in core tasks. Additionally, higher levels of work planning positively fosters adaptive and proactive behaviours in core tasks as individuals age. Feeling younger or older does not have a noticeable effect on performance behaviour, but feeling young acts as a protective resource when managers are not supportive in tasks that demand adaptive behaviour. Similarly, feeling young is beneficial to team-member

proficiency and adaptivity when community and belonging is low. Conversely, individuals that feel young perform less effectively when a high sense of community is threatened by changes to the team dynamic. Autonomous working practices positively predict proficient, adaptive, and proactive performance behaviour for all employees, while sense of community is positively associated with proficiency.

These findings build on occupational and lifespan development literature by providing evidence to support distinct relationships between dimensions of age, psychological climate, and performance. In doing so, this thesis reinforces the need for future research to examine unique relationships between constructs of age and performance to avoid calendar age being used as a proxy. In the same way, it suggests that collapsing dimensions of age, psychological climate, and performance is not conducive to an optimal exploration of age-performance trajectories and instead may lead to spurious support. Finally, it contributes much-needed insight on the moderating role of psychological climate dimensions in relationships between age and performance.

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List of Abbreviations

ONS	Office for National Statistics
DWP	Department for Work and Pensions
SOC	Model of Selection, Optimisation, and Compensation
MTLD	Motivational Theory of Lifespan Development
MI	Multiple Imputation
WHO	World Health Organisation
OECD	Organisation for Economic Cooperation and Development
BLS	Bureau of Labour Statistics
CIPD	Chartered Institute of Personnel and Development
EWCS	European Working Conditions Survey
SPA	State Pension Age
ILO	International Labour Organisation
HSE	Health and Safety Executive
SHRM	Society for Human Resource Development
HRM	Human Resource Management
HR	Human Resources
MOJ	Ministry of Justice
JD-R	Job-demands Resource Model
JD-C	Job-demands Control Model
OCB	Organisational Citizenship Behaviour
CDT	Career Development Theory
FTP	Future Time Perspective

SST	Socio-Emotional Selectivity Theory
SDT	Self-Determination Theory
WPDQ	Workplace Design Questionnaire
WPCM	Workplace Characteristics Model
SCP	Sustainable Career Paradigm
SF12	Short-Form Health Survey
SAIS	Subjective Age Identity Scale
WRPS	Work Role Performance Scale
ISCO	International Standard Classification for Occupations

Chapter 1: Introduction

The first chapter of this thesis introduces the challenges associated with the ageing workforce and presents a background on the relationship between age and work performance. Several promising areas are identified that would benefit the body of literature on ageing at work, including the examination of contextual factors in lower-level relationships to better understand how and why chronological and subjective conceptualisations of age are important to performance behaviours.

1.1 Ageing at Work: The Generational Shift

Due to advances in medicine, technology, and changes to working habits, the populations of industrialised nations have experienced significant demographic change characterised by a decline in birth rates and an increase in life expectancy. In 2014, the median age of the UK population surpassed 40 for the first time, a significant demographic shift from 34 in 1974 (ONS, 2014); and, for the first time ever, five generations are working alongside each other (SHRM, 2022).

The previous 30 years in workforce participation research has likewise evidenced a gradual increase in the mean age of the workforce across Europe and the US (OECD, 2022; BLS, 2022). Demographic trends show that the largest working age group has shifted from 30-34 in the 1990's to 40-44 in 2005, and that the number of workers aged 50 and over are expected to

continue increasing such that those aged 55-64 will equal one quarter of the global labour force by 2030 (ILO, 2020; Eurofound, 2021; BLS, 2023).

These issues bring with them significant financial, healthcare, and workplace challenges (ILO, 2020, 2022; WHO, 2022). Already global economies are experiencing labour shortages for both skilled and unskilled workers and employment rates are significantly lower than before the pandemic, while vacancies are significantly higher (ILO, 2020, 2022; Francis-Devine & Powell, 2023). Furthermore, participation rates remain most depressed among those coming out of high school without any further qualifications, and baby boomers contribute less to economies because they control the majority of household wealth and therefore have the option to retire early (ILO, 2020, 2022; BLS, 2023; Francis-Devine & Powell, 2023). With populations ageing and participation rates declining, government institutions and organisations are faced with one of the biggest labour market challenges of the last century.

Adding further complication to these challenges is the global disruption associated with the conflict in Ukraine and the Covid-19 pandemic, both of which have affected adjustments to remote working, migrant worker numbers, childcare options, resignation rates, and supply chain issues (Visier, 2021; 2022; Fortmeyer, 2022; Turpin, 2022). Such unprecedented circumstances have changed the nature of work for many who now seek a better work-life balance and are less likely to tolerate work dissatisfaction, issues with burnout, and the negative impact of customer-facing roles (Turpin, 2022). Reports have shown a 55% increase in resignations among employees with tenures

between 5-15 years in 2021 compared to 2020, with increases also observed for in males aged 25-54 and the 40-50 (38%) and 50-60 (14.5%) age groups (Visier, 2021; Turpin, 2022).

Recent research shows that two of the largest increases in economic activity (not in work and not looking for employment) were for those aged between 50 and 64 and for those reporting ill-health, both physically and mentally (McCurdy, 2023; Francis-Devine & Powell, 2023). Specifically, over half of individuals aged 50 – 70 that retired earlier than expected also reported no desire to return to work (Francis-Devine & Powell, 2023). Given the negative associations made between increasing age and health impairment (Karasik et al., 2005), there are doubts as to whether those who are - or who feel - older are capable of returning to work.

There are two momentous challenges emerging from the combination of lower labour participation and unemployment rates, increasing vacancies, and a gradual increase in the mean age of the largest working age group, which is also comprised of economically inactive individuals who are more likely to take early retirement (McCurdy, 2023; Francis-Devine & Powell, 2023). First, labour market challenges only intensify the need for organisations to optimise employee performance (Kunze et al., 2013; Eurofound, 2021). Second, the largest working age group is becoming increasingly older (OECD, 2019), so institutions and organisations must find a way to incentivise older workers to remain at work (Rudolph et al., 2018).

These two problems are not mutually exclusive. Workplace research has indicated that colleagues and supervisors hold negative assumptions about older employees with regards to their willingness to participate in training, resistance to change, and ability to adapt to changes in work processes and technology (Kite et al., 2005; Posthuma & Campion, 2009; Truxillo et al., 2012; Kunze et al., 2013). These assumptions lead to a halo effect where the competence and ability of older workers is regularly questioned, despite not possessing the necessary information to make such assumptions (van der Heijden & Nijhof, 2004; Posthuma & Campion, 2009). Employees are more likely to internalize these assumptions when subjected to ageist connotations and toxic work environments, resulting in feelings of incompetence, reduced motivation, and less deserving of workplace opportunities (Vickerstaff & van der Horst, 2019).

In response, governments have introduced legislation and guidance concerned with supporting workers as they age (e.g., third-age learning, Phillipson, 2013). However, many argue that these changes do not go far enough in supporting the active development of suitable workplaces which facilitate an extension of working life (Macleod, Worman, Wilton, Woodman, & Hutchings, 2010; Eurofound, 2021). On the contrary, there has been a sustained increase in age-discrimination claims at work, despite a decline in claims associated with disability, maternity, religion, and sexual orientation (MOJ, 2021). Instead of facilitating age-friendly work environments, policies appear only to be shining a spotlight on the biases faced by older workers.

1.2 Ageing at Work: The Research Gap

These issues are deep-rooted in the view that older workers do not perform as effectively as younger workers (e.g., Van Dalen, Henkens, & Schippers, 2010; Bal et al., 2011) with little regard for intraindividual variability in the ageing process. This is reflected in a large body of research which measures performance effectiveness using personal resources, without recognising the role of contextual work factors in facilitating performance (Schalk et al., 2010; Zacher, 2015; Zacher & Yang, 2016). For the most part, ageing and organisational research has not found evidence to support a relationship between calendar age and performance, but there remains ambiguity. Early investigations into the relationship yielded mixed results, with evidence supporting both increases (e.g., Hunter & Thatcher, 2007) and decreases in performance associated with age (e.g., Sparrow & Davies, 1988).

More recently, performance has been investigated as a multidimensional construct and nonlinear effects of age on performance have been modelled between, for example, tenure and task performance (e.g., Ali & Davies, 2003), calendar age and task performance (e.g., Ng & Feldman, 2008), calendar age and proactivity (e.g., Karanika-Murray et al., 2022), amongst others. These studies challenged the traditional notion that performance declines with age by providing evidence to support the moderating role of work characteristics such as job complexity and job design (e.g., Sturman, 2003; Chung & Butler, 2011; Karanika-Murray et al., 2022).

The advancements made in work performance literature are vast, but significant attention over the last two decades has resulted in significant empirical overlap in ostensibly distinct constructs which has made it difficult to distinguish and operationalise individual performance behaviours (Rotundo & Sackett, 2002; Griffin, Neal, & Parker, 2007). The lack of contextual investigation and empirical overlap has contributed toward mismatches in the perceived and actual performance of older workers in, for example, physical capability (Fung, Lai, & Ng, 2001), psychological aptitude (Avolio & Waldman, 1994), training (Chiu, Chan, Snape & Redman, 2001), creativity and adaptivity (Posthuma & Campion, 2009), and overall productivity (Waldman & Avolio, 1986; van Woerkom, 2020). It also raises questions with regards to other aspects of the ageing process and how this may differentially affect performance behaviour (e.g., physiological age and adaptivity; Cleveland et al., 2019).

Indeed, there is also no 'typical' older person – individuals experience declines in physical and mental capabilities at different ages and rates, so the capabilities of generations cannot be typically compared (WHO, 2022). Despite this, the ageing process is most commonly associated with a decline in physical and cognitive functioning, even though research shows that decrements associated with ageing are only noticeable in excessively demanding roles (HSE, 2011; Davies, Matthews, Stammers, and Westerman, 2013). Further, older workers possess experiential knowledge, crystallised intelligence, and are able to maintain positive affective states and regulate emotions more effectively than younger employees (e.g., Carstensen & Lang,

2002; Feinsod & Davenport, 2006; Kramer & DePryck, 2010; Scheibe & Zacher, 2013; Doerwald et al., 2016).

Being able to distinguish between an individual's capabilities, needs, and motives is important for the design of jobs and workplaces, and can serve to impair or improve work outcomes (Cavanagh, Kraiger, & Henry, 2020; den Boer, van Vuuren, & de Jong, 2021). This is especially true for those working into later life, because research has shown that interindividual variability increases with age such that the needs and motives of similarly aged adults become increasingly variable over time (Nelson & Dannefer, 1992; Staudinger & Bowen, 2011; Jonsson, Hasselgren, Dellve, et al., 2021; Nagy, Fasbender, & North, 2019). This indicates that traditional motivational frameworks that advocate for certain need fulfilment (e.g., self-determination theory, Deci & Ryan, 1985; 2000) could be extended or complemented by accounting for changes in motives that occur over the lifespan which alter the way in which meaning is attached to work characteristics. Instead, there remains a prevalent assumption of linearity in that calendar age is identified as a proxy for changes in performance, rather than assessing whether needs are satisfied (Clark, Oswald, & Warr, 1996; Lang & Carstensen, 2002; Roberts, Walton, & Viechtbauer, 2006; Ng & Feldman, 2008; Kramer & DePryck, 2010).

In response, an increasing body of research has recognised the adaptability of the work environment in addressing the changing needs of ageing workers, tap into their motives, and help to promote inclusivity and well-being (Kooij et al., 2011; Edge et al., 2017) and, as a consequence, encourage extended

labour participation and maintain performance as individuals work into later life (Finkelstein et al., 2015; 2018). For instance, flexible HR practices that support ageing workers both contractually and in the work environment have a positive effect on performance (e.g., Kunze et al., 2015), role design and allocation (e.g., Perry, Kulik, & Bourhis, 1996; Shore et al., 2009), wellbeing (e.g. Kooij et al., 2014), development opportunities (e.g., Maurer & Rafuse, 2001), subjective age (Schalk et al., 2010), and overall treatment at work (Lossbroek, Lancee, van der Lippe, & Schippers, 2017). By doing so, organisations provide reassurance to employees that the organisation is making efforts to support their needs and equality within the workplace (Kunze, Boehm, & Bruch, 2013), rather than allowing opportunities for workplace ageism and discrimination (Cadiz et al., 2022; SHRM, 2022). Failing to foster age-friendly working practices is negatively associated with affective commitment, job satisfaction, and early retirement intentions (Snape & Redman, 2006; Schermuly, Deller, & Busch, 2014).

Despite all of this, there remains a lack of contextual investigation in relationships between age and performance that can uncover how work characteristics satisfy needs and facilitate certain performance behaviours across the working lifespan (Schalk et al., 2010; Zacher, 2015; Goštautaitė & Bučiūnienė, 2015; Zacher & Rudolph, 2017; Chen & Gardiner, 2019).

This forms the basis of this thesis, which proposes that work characteristics are an under-researched mechanism in relationships between age and performance, and that further investigation is required to shed light on their

role in needs satisfaction and performance behaviours. If needs are satisfied, then work is perceived to be meaningful and sustainable, thus enabling workers to perform better and for longer.

1.3 Aim and Objectives

The aim of this thesis is to examine the moderating role of psychological climate in relationships between age and work role performance. Four objectives have been developed to achieve this aim and are addressed through a review of the literature on age and performance (chapter 2), psychological climates for work motivation (chapter 3), and empirical analyses (chapters 5 and 6), which investigate meaningful relationships among subdomains of age, psychological climate, and performance.

1. To simultaneously examine the chronological, physiological, and subjective effects of ageing on individual performance

Calendar age and ill-health are two key drivers of economic inactivity. Increasing age is also associated with health impairments, so distinguishing between *being* and *feeling* old is important both for needs satisfaction and in performance behaviour. This can also help to investigate the assumption that performance declines with age.

2. To investigate relationships between dimensions of age and a clearly defined taxonomy of proficient, adaptive, and proactive behaviours that contribute toward individual, team, and organisational effectiveness.

Research has indicated that older workers differentially exhibit performance behaviours, such as an increase in organisational citizenship behaviours (Ng & Feldman, 2008). However, this does not necessarily represent a comprehensive understanding of the performance behaviours which are required in modern work environments. An increasing reliance on older workers means that they will also be expected to engage in these performance behaviours.

3. Determine whether psychological climate characteristics relating to autonomy, competence, and relatedness differentially moderate relationships among age and performance constructs.

Research has evidenced that needs and motives change across the lifespan. At the same time, work and job characteristics have a profound impact on satisfying worker needs and motives. Thus, psychological climate - or the views that an employee holds towards characteristics of their work environment - is investigated in relation to the three fundamental psychological needs necessary for autonomous motivation as proposed by self-determination theory (Ryan & Deci, 2000).

4. Explore whether the effects of age on performance differs between employees and their supervisors.

Finally, research has shown that older employees face biases in the work environment and are often perceived to be less competent than younger employees. These ageist assumptions underpin workplace discrimination, particularly when supervisors are the culprits. It is therefore important to continue measuring the role of age in self and supervisor ratings of performance.

1.4 Thesis Structure

The second chapter of this thesis – the literature review – is divided into two sections. The first section examines conceptualisations of age and lifespan theories of development, providing evidence that being and feeling old have distinct relationships with work outcomes. The more traditional conceptualisations of age are discussed, before moving on to physical, psychological, and social components of age. The second section examines performance behaviours and provides a taxonomy that is grounded in the demands of modern work environments. Each construct of age is considered for differential effects on proficient, adaptive, and proactive performance behaviours directed toward individual, team, and organisational effectiveness.

The third chapter contextualises associations between age and performance by examining work attributes for motivation. Self-determination theory is considered in synchrony with lifespan theories to understand how workplace characteristics can determine needs satisfaction, and the degree to which age-related changes in motives and needs could result in differential preferences for certain characteristics depending on the type of performance behaviour

being exhibited. Chapter 3 concludes with a series of conceptual frameworks which form the basis of empirical analyses carried out in chapters 5 and 6.

The fourth chapter describes the research design and methods adopted for sample A and B, including the survey design and instruments, sample descriptions, research rigour, and a brief overview of the analytical procedures, for which a more in-depth account is presented in chapters 5 and 6.

The fifth chapter firstly presents a framework for analysing sample A data to address research objectives 1 – 3 and to test hypotheses 1 – 11. The reasons for using confirmatory factor analysis, structural equation modelling, and latent interaction modelling are presented. Data preparation techniques including multiple imputation are described, before presenting preliminary results such as bivariate correlations. Next, the hypotheses formed in chapters 2 and 3 are tested in structural models and parsimonious models of age, psychological climate, and performance are presented for each of the nine dimensions of performance.

The sixth chapter presents a framework for analysing sample B data to address research objective 4 and to test hypotheses 12 and 13. First, a description of the data preparation techniques used to facilitate dyadic data analysis is provided. Next, the procedures for testing hypotheses 12 and 13 are outlined shortly before the results are presented, including a series of one-way repeated measures ANOVA tests and hierarchical linear models to test

for age-differential effects in self-ratings and supervisor ratings of performance.

Chapter seven explores the key findings from the fifth and sixth chapters, which are interpreted in light of existing research on age and performance at work. Possible explanations are offered for expected and unexpected findings.

Chapter eight presents the conclusions and contributions drawn from the research and discusses their implications for theory and practice. Next, attention is drawn to the limitations of the study and directions for future research, before giving some final thoughts on the thesis.

Chapter 2: Literature Review: Age and Performance

The relationship between age and performance has been thoroughly researched but has often failed to provide solutions to challenges associated with the ageing workforce. This literature review will explore the relationship between age and individual work performance firstly by presenting trends associated with workforce ageing and the challenges this poses for industrialised nations. Second, the way that we conceptualise age has often been limited to calendar age; this review will investigate a range of physiological, psychological, and psychosocial changes that characterise the ageing process. Finally, the relationships that these age constructs hold with proficient, adaptive, and performance behaviours will be analysed.

2.1 Trends in the Ageing Workforce

During the past 30 years, workforce participation research has evidenced a gradual increase in the mean age of the workforce across Europe and in the US (Ng & Feldman, 2008; Schalk et al., 2010; EWCS 2016; OECD, 2019). The declining population of working age adults and the increased proportion of older workers therein has challenged the financial sustainability of welfare states and organisational personnel strategies (Hedge, 2012; Naegele, De Tavernier & Hess, 2018) in two ways. First, a concurrent decline in labour participation and unemployment, and an increase in vacancies and workers taking early retirement threatens both organisational performance and economic activity (McCurdy, 2023; Francis-Devine & Powell, 2023). Second,

such labour participation rates can be remedied by encouraging older workers that work is sustainable, enjoyable and fulfilling, but this remains a problem because of ageist assumptions regarding their motives and capabilities (Posthuma & Campion, 2009; Hanrahan, Thomas, & Finkelstein, 2022). These issues are grounded in a generational shift that is expected to persist such that such that population growth is now being encouraged, rather than discouraged (e.g., China, Guinto & Ng, 2023).

There are a number of reasons for the increase in working age. Firstly, the mean age of the population is increasing, particularly in westernised countries (EWCS, 2016; ONS, 2020). The percentage of people in Europe aged 60 or older is expected to increase from 24 percent currently to 34 percent in 2050 (United Nations, 2015). Carone and Costello (2006) forecasted that the number of older workers aged 55-64 will grow to 60% by 2050, while Schalk et al. (2010) anticipated that workers under the age of 50 will continue to decline. The International Labour Organisation (ILO, 2005) pinpointed the 30-34 age group as the largest segment of the working population in 1990; by 2005, those aged 40-44 represented the largest proportion (ILO, 2005). The European Working Conditions Survey (EWCS, 2016) confirmed the direction of these trends by highlighting gradual increases in the 50+ age group from 24% in 2005 to 31% in 2015. During the same period, there was a 7% decrease in the proportion of workers aged 50 or under (EWCS, 2016). Employed adults aged 55-64 increased by almost 16% to 66.3% between 2000 and 2019 in the UK (OECD, 2019), while a comparable increase was seen for the same age group in France between 2003 and 2019 (OECD, 2019).

Second, due to declines in fertility rates and gains in longevity, the trend of early retirement to unlock employment opportunities for younger workers that was prevalent between 1970 and 1990 has now been reversed (Bal et al., 2011; Phillipson, 2013; Hofacker & Unt, 2013). As a result, older workers are increasingly considering future employment opportunities because they are unable to retire early without taking a significant cut to income (Euwals, Van Vuuren, & Wolthoff, 2010).

This has contributed towards a demographic shift which has altered the operationalisation of younger and older workers. Bertolino, Truxillo, and Fraccaroli (2013) define younger and older workers as 24-34 and 55-65 respectively, whilst Schalk et al. (2010) categorises young adults in the 25-39 age bracket, with older adults aged 55 and over. Collins (2003) presents a broader age range and outlines 40-75 as the older age category but acknowledges that the definition is dependent on the job role and purpose of the organisation. Attitudinal research by Zacher and Rudolph (2023) elaborated on how ‘old’ and ‘young’ workers are operationalised through attitudes and beliefs toward physiological functioning, experience, wisdom, career opportunities, and time until retirement. For the most part, young workers (18-39), midlife (40-54), and older workers (55 or older) comprise the core categories of ageing at work (Infurna, Gersthorf & Lachman, 2015; Zacher & Rudolph, 2023). Workforce participation research usually refers to older workers as being age 50 or above, typically due to the decline in workforce participation of those aged 50-55 (de Lange et al., 2021).

As a result of the prolonged increase in the workforce age, government institutions have created legislation to support alternative and sustained pathways into employment; for instance, developing entitlements for ‘third age learning’ (Phillipson, 2013) for workers who are near or above state pension age (SPA) (Davies, Jones, & Lloyd-Williams, 2016). Similarly, anti-discrimination legislation within the Equality Act (2010) has encouraged organisations to actively employ older employees by incorporating age as a protected characteristic. Similarly, the abolition of the default retirement age and equalisation of the SPA (66 for both men and women by 2020) in the 2011 Pensions Act protects older employees that wish to stay in work and provides control to the employee over retirement plans. In line with this, the UK government have announced plans to bring the timetable forward to increase the SPA to 67 as early as 2026 (DWP, 2023). Workers aged 65 and over have increased by around 1.2% between 2010 and 2019 (ONS, 2020). Many argue that these changes do not go far enough in facilitating the transition to an extended working life (Eurofound, 2021). This is in some way substantiated by the sustained increase in age-discrimination claims at work, despite a decline in claims associated with disability, maternity, religion, and sexual orientation (MOJ, 2021).

Organisations that are highly dynamic and fast-moving are more likely to experience ageist stereotypes, prejudice, and behaviour within the workplace (Mulders & Henkens, 2019). Individuals within this environment can be considered ‘old’ earlier in the life course than in other industries. This is

because technology is continuously evolving and so programming skills can rapidly become outdated or obsolete, so one may be considered ‘old’ in their early 40’s (McMullin & Dryburgh, 2011). This differs from, for example, smaller craft companies, which depend on experience and specialist skills to perform effectively and thus may view older workers more positively (Kunze et al., 2013). Each work environment may be unique, so understanding the individual needs of employees as they work into later life is crucial in constructing a work environment that is operationally and intrinsically supportive.

For instance, research signals that larger organisations are more active in implementing age-management strategies for extending working lives (Oude, Mulders, Henkens, & Schippers, 2017), possibly because smaller organisations have a comparatively lower proportion of older employees within the workforce (Mulders & Henkens, 2019). Additionally, smaller companies may have older employees in more senior positions within the hierarchy which makes relevant different skills, such as wisdom and cooperation, which are more often attributed to older employees (Mulders & Henkens, 2019). Adding to the economic challenges is that those older workers making the transition to retirement may drop to part-time or temporary work prior to retiring altogether (Mulders & Henkens, 2019). Both older employees and those in part-time and temporary employment receive less opportunities for training and development (Humphrey et al., 2003; Lissenburgh & Smeaton, 2003; Naegele et al., 2018), posing a significant risk for uptraining to help ageing employees extend working lives or re-enter the workforce (Canduela, Dutton,

Johnson, Lindsay, McQuaid, & Raeside, 2012; Wanberg, Kanfer, Hamann, & Zhang, 2016).

For these reasons, both the government and employers need to adapt to the ongoing demographic changes, financial provisions, and address the psychological and emotional wellbeing of their employees by meeting their workplace needs (RSPH, 2018). These changes prompted the Cridland Review of state pension age in 2017. Since then, the DWP have committed to collaborating with employers to develop a mid-life MOT, which will provide advice to older workers about the extension of working life, maintaining health, continuous learning and training, and retirement (RSPH, 2018). This notion was further supported with 69% of the public agreeing that employers should provide training, planning, and transition support from mid-to-later life (RSPH, 2018). By providing more age-friendly support, employers will be able to anticipate changes that occur with age to manage the working life cycle, help refute negative stereotypes on older workers, and better prepared to engage, retain and support workers (Schalk et al., 2010).

In 2017, European parliaments proclaimed the European Pillar of Social Rights, a framework to facilitate labour markets in addressing challenges associated with the multigenerational workforce and to make it easier for older individuals to actively participate and remain in work. The message conveyed is underpinned by fairness, inclusion, and the right to a working environment that is dynamic and adaptable to the needs of employees so that they may extend their working lives (Kucharczyk, 2021). Nevertheless, it remains

unclear how organisations will be mandated to uphold these commitments because legislation must be adopted at institutional level to be enforceable.

Some governments have, however, begun working towards addressing challenges associated with the ageing workforce. The UK government appointed the Business in the Community Age at Work leadership team – a voluntary, unpaid, and non-political entity – as Business Champion for Older Workers (BITC, 2021). This team continues to facilitate policy implementation regarding the support and guidance for pathways into and maintenance of employment, which is aimed at both older workers and HR professionals.

The combination of an ageing workforce alongside legislative alterations should have improved strategies to facilitate work continuation, such as succession planning, pension benefits, health insurance and medical benefits (Beehr & Bowling, 2002; BITC, 2021). In contrast, Eurofound (2021) discovered that prospects for career advancement significantly decline with age, particularly for those aged over 50. Despite being expected to plug workforce gaps, older workers are less likely to be offered and participate in training and career development activities (Ng & Feldman, 2012; Canduela, Dutton, Johnson et al., 2012; Eurofound, 2021). This is of detriment to organisational performance and also contributes to the feeling that older workers do not deserve development opportunities (Vickerstaff & van der Horst, 2019).

Collectively, these trends draw significant attention to the concept of career sustainability and continuity. This concept has recently been stressed as one of the key challenges in societies nowadays because of the economic and healthcare implications associated with the alternative (van der Heijden et al., 2020). Key determinants of whether work is sustainable over the life course include work–life balance, health and wellbeing (both objective and subjective), job prospects, future time perspectives and the perception that one can work to and beyond 60 years of age given these factors (Eurofound, 2017; 2021). These determinants are noticeably similar to those that predict other work outcomes, such as performance. Thus, the way that work characteristics are experienced not only influences the performance of employees, but also whether they will continue participating in the labour market.

Holistically and collaboratively, lifespan perspectives of ageing can benefit career sustainability by providing viable solutions to challenges associated with the ageing workforce. The sustainable career paradigm (SCP) provides a bridge from other perspectives of ageing to the work context systemically by recognising that dynamic interrelations between employees and the work context continually changes over time, manifesting as antecedents to workplace behaviours and providing the foundations of sustainable careers (De Vos & van der Heijden, 2015; De Vos, van der Heijden, & Akkermans, 2020; de Lange et al., 2021).

SCP proposes two forms of employability: competence-based and labour market-based. The former focuses on the antecedents of employability, such

as knowledge, skills, attitudes, and competences; the latter views employability as an output variable and thus refers to the self and social perceptions of job retention, hierarchal positioning, and transition capabilities as indicators of employability (Vanhercke et al., 2014; Veld et al., 2015; Nelissen, 2016). This is important because theories for successful ageing at work reflect a higher number of losses in terms of physical and mental resources (Baltes, 1997; Heckhausen, Schulz, & Wrosch, 2010), ageist discrimination (Voss, Bodner, & Rothermund, 2018), and restricted work opportunities (Shore, Cleveland, & Goldberg, 2003; Cadiz, Pytlovany, & Truxillo, 2017). As a result, older employees are more likely experience diminished career sustainability than their younger colleagues (de Lange et al., 2021).

Nevertheless, scholarly work also evidences growth in areas such as experience, knowledge, and wisdom competences across the lifespan, resulting in mixed relationships between constructs of age, motives, and workplace outcomes (De Vos et al., 2017; van der Heijden et al., 2020; de Lange et al., 2021). For example, van der Heijden (2009) conducted research that uncovered a negative relationship between supervisor-rated career sustainability and likelihood of promotion for older employees, yet self-rated career sustainability was positivity related to promotability. Moreover, some studies have calendar age and functional age to be positively related to productivity, career sustainability and employability in one's current job role, but negatively related in others, particularly when confronted with job mobility and vertical mobility (Van Vuuren and Marcelissen, 2017). A clear proposal on

what this means for employees as they age is needed because employees working into later life may encounter situations that require employability activities and dynamicity to change industry, occupation, or job role, which has been evidenced to become increasingly difficult for employees with higher job tenure (van der Heijden & Thijssen, 2003; Van Dam, 2004).

Although the negative relationship between calendar age and career sustainability has been established (de Lange et al., 2021), the scholarly evidence investigating other conceptualisations of age remains inconclusive, both methodologically and in eminence (De Vos & van der Heijden, 2015; De Vos, van der Heijden, & Akkermans, 2020; de Lange et al., 2021). The way that individuals experience the ageing process can be influential in the resources that they direct toward pursuing present and future-oriented behaviours, and so extending our understanding of this process can help to better shape workplace practices in areas such as training and work design to promote a longer future-time perspective (Frerichs et al., 2012; de Lange et al., 2021).

Facilitating sustainable work over the lifespan enables employees working into later life to feel as though they are engaged, valued, and supported at work, thus leading to higher levels of commitment and self-efficacy supporting the maintenance of performance levels (Eurofound, 2015). Implementation, however, necessitates a work environment that fosters perceptions of fairness, equality, and mutuality in the relationship between employee and employer in order to perform optimally (Eisenberger et al., 1986; Mossholder, Richardson,

& Settoon, 2011). Employers averse to this may encounter pervasive discriminatory behaviour between age subgroups and declines in organisational recruitment and performance (Kunze et al., 2011; 2013; Rothenberg & Gardner, 2011).

The following section will address the lack of diversity in age conceptualisation research in relation to workplace behaviours and how they can provide a deeper and more accurate understanding of the ageing process, including the capabilities and motives that change across the life course.

2.2 Conceptualisations of Age

The previous section evidenced trends in, and challenges associated with the ageing workforce, the most pertinent of which is the ability to maintain the performance levels of employees as they age. These studies outlined demographic changes in the workforce, associated responses in organisational and governmental policy, and the need for additional efforts in supporting employability and career sustainability for ageing workers. This chapter will outline and define various conceptualisations of age and how they facilitate the understanding of physiological, psychological, and social changes across the lifespan including health, needs, motives, and desires. Although age and generational differences are socially constructed within the workplace, this section is limited to the dimensions of age that can be measured by the participant. Age-inclusivity research is discussed in section 3.3.1.

Age has been conceptualised and defined in a number of ways, including *chronologically* (calendar age), *psychosocially* and *psychologically* (self, emotional, and social perceptions of age), *functionally* and *physiologically* (physical and cognitive changes with age), and *organisationally* (job and organisational tenure) (Cleveland & Shore, 1992; Kooij et al., 2008; Schalk et al., 2010; Schwall, 2012). These concepts stem from gerontological research, which draws from biological, social, and psychological aspects of ageing to better understand the multifaceted changes that occur across the lifespan (Baltes, Rudolph, & Bal, 2012; Luszczynska, 2020).

Biological ageing – also referred to as physiological age – refers to the physical changes that occur during the normal ageing process (Baltes, Rudolph, & Bal, 2012; Zacher & Kooij, 2017). These physical changes are underpinned by functional and cellular declines that occur with age, such as muscle atrophy or reduced resistance to diseases (Baltes, Rudolph, & Bal, 2012). Sociological theories of ageing can refer to macro-level issues, such as the influences of government institutions on changes across the life course; or micro-level issues, such as social interactions with colleagues in the work context (Zacher & Kooij, 2017). Psychological ageing is concerned with how these age-related changes (e.g., physical ability, memory recall, perceived retirement age) affect the motives and subsequent behaviours of individuals (Zacher & Kooij, 2017). The most popular psychological theory of ageing – lifespan development theory – states that human development is affected by biological and social factors and therefore provides a robust framework for understanding the multifaceted nature of ageing (Baltes et al., 2012).

This section will begin by exploring lifespan development theory in more detail, before exploring individual and measurable constructs of age with reference to the biological, social, and psychological changes that occur and how this can impact work performance. Using these theories as a lens allows for deeper exploration into changes that occur with ageing beyond calendar age, which can often be considered a proxy measure for these changes (Zacher et al., 2018).

2.2.1 Lifespan Perspectives of Ageing

Lifespan perspectives of ageing stem from lifespan development theory and have evolved from unilateral perspectives of ageing towards dynamic conceptualisations of the ageing process (Dikkers et al., 2017; de Lange et al., 2021). Such theories acknowledge that human development is affected by biological, sociological, and cultural differences and changes that occur in physical, cognitive, and psychosocial functioning at any point during the life cycle (Baltes, 2005; de Lange et al., 2006; Baltes, Rudolph, & Bal, 2012; Akkermans et al., 2016).

To measure lifespan age means to investigate the work and personal life of employees, including family life, economic constraints, behavioural changes, and the associated motivational changes that may ensue (Schalk et al., 2010). Operationalising this concept is therefore problematic because it is grounded in the intraindividual changes that emerge into adulthood and beyond. Lifespan perspectives are suitably aligned with current and forecasted age-related trends within the workforce and have been studied from perspectives such as

role theory (Biddle, 1986; 2013), which could be represented by an individual's behaviour to a promotion, and social identity theory, which may refer to an individual's detachment from work and a breach of the psychological contract (Tajfel, 1979; Robinson & Rousseau, 1994). Role theory is particularly applicable to the age-performance relationship as it accounts for the characterisation of older workers job roles in synchrony with normative expectations, social positions, their changing needs, and workplace outcomes (Biddle, 2013; Matta, Koopman, & Conlon, 2015).

The theory of aged heterogeneity (Nelson & Dannefer, 1992) theorises that interindividual variability increases over time such that the needs and motives of similarly aged adults become more variable in later life (Staudinger & Bowen, 2011; Jonsson, Hasselgren, Dellve, Seldén, Larsson, & Stattin, 2021; Nagy, Fasbender, & North, 2019). This may be because older employees are likely to experience changes to circumstances and needs that dictate their perceptions toward work characteristics but are difficult for organisations to detect (de Lange et al., 2021; den Boer, 2021). For instance, increasing age is usually associated with an increased need for leisure time and emotional interactions, but the circumstances underlying these needs may be grounded in caring responsibilities and are therefore determined also by non-work relationships (Van Dam et al., 2009; De Wind et al., 2014; Syse et al., 2014). Understanding how changes at different life stages determine individual motives can facilitate person-job fit and help to promote the idea that work is sustainable (Eurofound, 2017). On the contrary, a higher level of psychological effort is required when needs and abilities are misaligned with work designs,

so employees experiencing these situations are more likely to experience emotional exhaustion, stress, and negative affect (Kooij et al., 2008; Truxillo et al., 2012).

For workers approaching traditional retirement age, the difference between motivation to work, motivation at work, and motivation to retire is a tightrope to which organisations must persistently tend (Kanfer et al., 2013). Transitioning from working life to retirement is associated concomitant transitions; for example, a reduction of working hours to attain an improved work-life balance or to maintain performance levels for rigorously physical jobs (Sterns & Doverspike, 1989; Sterns & Miklos, 1995; de Lange et al., 2006; DeWind et al., 2014).

The latter is hypothesised within the Selection, Optimisation, and Compensation (SOC; Baltes, 1997) theory of lifespan development, which describes a process whereby individuals offset age-related losses by creating self-regulatory compensation strategies such that the gain-loss ratio is balanced. This theory holds similar assumptions to other resource-based theories of ageing which describe the resources deployed to offset age-related losses and maximise gains (e.g., resource approach, Neugarten, 1972; conservation of resources theory, Hobfall & Lilly, 1993). Where losses outweigh gains, older individuals are more likely to redirect resources from growth-related goals and toward goals that help to maintain performance and preserve a sense of competence (Baltes, 1997; Kanfer & Ackerman, 2004; Zacher et al., 2018). The identification and facilitation of SOC strategies is

mutually beneficial to employer and employee. A meta-analysis by Moghimi, Zacher, Scheibe, and Van Yperen (2017) found that successfully implemented SOC strategies were positively related to chronological age, supervisor-rated, self-rated, and objective ratings of performance, satisfaction, autonomy, and engagement, though not significantly related to job tenure or job strain.

A perspective of lifespan ageing that can help to recognise beneficial SOC strategies is Career Development Theory (CDT; Super, 1980; 1984), which argues that individuals progress through stages of their career at different ages, beginning with a matching of individual and organisational interests, capabilities, image, and role adaptability, thus defining person-job fit and cultural integration (Zacher et al., 2018). The individual then progresses to the establishment stage, which emphasises growth, role advancement, and security (or stability). The third stage – which may be applicable to workers approaching retirement age – is maintenance, which is underpinned by the preservation of current work performance. The last career stage is decline, which proposes that older workers will revise their social identity to be independent of career goals and accomplishments (Super, 1984).

CDT does not immediately recognise the role of personal changes that can occur across the lifespan but can be used to complement other theories of lifespan development. For instance, several studies have shown work to be less central to part-time female workers and those aged 25-44 (Doyal & Payne, 2006; Warr, 2008). The reasons underpinning this can vary widely; work prioritisation in the career establishment stage, for example, may be similarly

thwarted by the birth of a child or social identity and inclusiveness at work (de Lange et al., 2006; Kanfer et al., 2013). Another issue is that ages previously attached to the aforementioned career stages would also rise. For instance, researchers in the 1980's established that 40 years old marked the end of the career establishment stage and the start of the career maintenance stage, where deceleration and retirement was typical for those around the age of 65 (Super, 1980; 1984). Conversely, these stages are now considered a phase of career development rather than the end of work (Wang & Shultz, 2010; de Lange et al., 2021).

The last step of CDT is often associated with the concept of disengagement, which refers refers to the physical, cognitive, and emotional withdrawal from the work context and responsibilities (Kahn, 1990; Hewitt, 2009; Zacher & Frese, 2009). The literature on preretirement disengagement has yet to support the underlying concept of disengagement, with some research providing evidence for (e.g., Damman et al., 2013) and against (e.g., De Wind et al., 2017). Nevertheless, the disengagement process may still occur if an individual is unable to regulate the loss of physical or cognitive ability that occurs with age (Carstensen et al., 1999). This is why an increasing number of lifespan theories have focused strategies that older people employ to age successfully at work (e.g. motivational theory of lifespan development, Heckhausen, Schulz, & Wrosch, 2010) and the ways in which organisations support the effective implementation of such strategies using a combination of motivational theories that address their needs.

Employing a collaborative approach to work and job design is imperative to sustainable working. Research has indicated a significant positive relationship between career stage and characteristics such as engagement, job satisfaction, and organisational commitment (Kooij et al., 2008; Truxillo et al., 2012). However, as the working age continues to rise, it is unclear how phases such as growth and development – which historically have been said to decrease with age – can be stimulated in situations where older workers are encouraged to find new jobs or come out of retirement (Kooij et al., 2013). Furthermore, organisations regularly fail to recognise individual differences across the lifespan and are generally less willing to support access to training opportunities and resources for older workers (Shore, Cleveland, & Goldberg, 2003; Steiner, Bertolino, Fraccaroli, and Truxillo, 2007). This contributes towards negative relationships between chronological age and workplace training, resulting in assumptions being made about older workers motives towards training (Cadiz, Pytlovany, & Truxillo, 2017).

Holistically and collaboratively, lifespan perspectives of ageing can contribute to successful ageing and career sustainability and thus provide viable solutions to challenges associated with the ageing workforce. These theories suggest that increasing age is more likely to be associated with functional losses and possible ageist connotations which can impact performance and the desire to continue working (Guilbert et al., 2008; de Lange et al., 2021). Socio-emotional selectivity theory (SST; Carstensen, 1991) posits that individuals foresee, plan, and construct goals based on their perception of their career stage and predominant goal motives. SST introduces the concept of future time

perspective (FTP), which suggests that increasing age is associated with a more restrictive time perspective, leading older people to invest greater resources into positive social and emotional experiences rather than materialistic and instrumental goals (Zacher et al., 2017; Henning et al., 2023).

A more recent framework that was aforementioned – the sustainable career paradigm (SCP) – provides a bridge from other perspectives of ageing to the work context systemically by recognising that dynamic interrelations between employees and the work context continually changes over time, manifesting as antecedents to workplace behaviours and providing the foundations of career sustainability (De Vos & van der Heijden, 2015; De Vos, van der Heijden, & Akkermans, 2020; de Lange et al., 2021). Using these perspectives as a lens into the ageing workforce allows a reciprocal relationship to be built between employers and employee, providing assistance and encouragement to ageing individuals to effectively self-manage, develop, and foster their skills and knowledge to sustain their existing or new careers and provide continued value to their employers while maintaining positivity to subjective views on self-reported ageing (Berntson et al., 2008; de Lange et al., 2015; Kooij, 2015; van der Heijden et al., 2020).

Age-related changes that represent physiological and cognitive decline can negatively impact reported levels of employability, satisfaction, and career sustainability (Ng & Feldman, 2009; Bal & de Lange, 2015; de Lange et al., 2015; Kooij et al., 2015; de Lange et al., 2021). It is important to understand that the ageing process is also associated with an increase in psychological

resources (Wagner et al., 2013), including technical competences (i.e., experiential knowledge, sense of mastery (e.g., Lachman, 2004; Kramer & DePryck, 2010), positive affect (e.g., Carstensen & Lang, 2002; Scheibe & Zacher, 2013), and emotional regulation (e.g., Morgan & Schiebe, 2014; Doerwald et al., 2016). These resources have been shown to protect from work stressors and facilitate individuals in goal-directed behaviours across uncertain circumstances, including during the changes that occur across the life course (Porath & Bateman, 2006).

This has become increasingly vital given the current gradual increase in the workforce age, sustained pathways into employment, and legislative changes that have supported the extension of working life (Phillipson, 2013; EWCS, 2016). Organisations have attempted to stimulate a broader range of motives in line with the ageing population, with an increased emphasis on work-life balance, personal development, and integrating employee needs with organisational values (Mullins & McClean, 2020). Employees with a positive FTP may explore new knowledge and skill domains, while those with a shorter FTP may look to exploit existing skills and competences to maintain performance levels (Kooij et al., 2018; Grote & Pfrombeck, 2020).

Dweck (2017) postulates that in their development, individuals strive for optimal rather than complete predictability because we are innately motivated to experience new and challenging situations. However, empirical evidence indicates that goal orientations shift from maximising gains to preserving resources so to minimise future losses and maintain performance levels (Ng &

Feldman, 2010). Researchers such as Ebner et al. (2006) and Ng and Feldman (2010) found that younger individuals are more likely to strive for personal gains within their goal orientations (e.g., improving analytical proficiency), whereas older individuals will be more concerned with maintaining their attributes and prevent performance deterioration.

This is also reflected in preferences shifting away from task variety (i.e. job expansion) and towards job complexity and task significance as it allows them to use their accumulated knowledge and skills to perform challenging work, but not to take on additional or markedly different tasks (Zacher & Frese, 2011; Zaniboni, Truxillo, & Fraccaroli, 2013; de Boer, 2021). Similarly, older workers report lower motive strength for job characteristics related to learning new skills and advancement, but higher motive strength for job characteristics related to accomplishment, job satisfaction, and utilising existing skills (Kooij et al., 2011).

To influence the perceptions and behaviours of employees, organisations and their management must first adapt workplaces and job roles to suit those needs (Matta et al., 2015). Serving these broader motives both individually and culturally ought to increase the commitment of employees and reduce employee turnover, and motivate employees to perform more effectively (Kets de Vries, 2001; Harter et al., 2012). Older workers are more likely to appreciate and reciprocate accommodations made for them in the work environment, reporting higher levels of job satisfaction and exhibiting higher levels of organisational citizenship behaviour (OCB), which reflects helpful and

supportive behaviours that promote the organisations reputation internally or externally (Rotundo & Sackett, 2002; Zacher & Frese, 2011; Sen & Elmas, 2015).

Kooij et al., (2013) found that the relationship between chronological age and work-related growth, esteem, and security motivations were mediated by an open-ended future time perspective and good mental and physical health, whereas the association between age and generativity motivations was not mediated by this perspective. This is reflected in research showing that younger employees emphasise motives such as self-assertion, whereas older employees are more likely to value attachment and affiliation within the work group (Kets De Vries, 2001; Blanchard, 2011). Moreover, as employees age, they appear to value autonomy and control over scheduling of their work to better allow them to adapt to workplace changes (den Boer, 2021). This extends to third-age learning in that older workers learn best when able to work at their own pace, with shorter training sessions and support from similarly aged peers and colleagues (Sharit & Czaja, 1994; Chan et al., 2000; Yeats et al., 2000).

This also is emphasised in 25–44-year-olds (particularly female and part-time workers), where work appears to be less central compared to older workers (Warr, 2008). Lifespan age can also relate to the implications of family life; for example, employees with children may find it much more important to combine work and family life flexibly to improve employability. This suggests that those acknowledging future work opportunities, such is the case for an increasing

number of employees planning to retire, are more likely to pursue workplace behaviour to satisfy motives relating to job security, self-development, salary, and flexible work schedules (Virtanen et al., 2022).

Lifespan perspectives of ageing can serve as a lens into understanding a breadth of factors that occur throughout the lifespan. In practice, this deeper understanding can help to design suitable workplaces that dynamically recognise intraindividual changes associated with ageing and, as a result, more effectively tap into the needs and goal orientations of workers at different life stages (Kanfer & Ackerman, 2004; Roberts, Walton, & Viechtbauer, 2006; Kanfer et al., 2013).

2.2.2 Chronological Age

Chronological age is one of the most commonly used measures in ageing research and refers to one's calendar age, or the number of lived years (Kooij et al. 2010). Chronological age can serve as a useful demographic variable that allows for the identification of attitudes, preferences, and behavioural trends towards and within a specific workplace climate. Moreover, the construct is universally understood and provides functional parameters between individuals and the social systems in which they are situated, creating shared norms and beliefs about positional and behavioural expectations (Lawrence, 1984).

Historically, chronological age could be used implicitly to guide career timelines: a young employee joins an organisation, works up through the hierarchy over time, resulting in the association between older employees and

hierarchal positions, professional memberships, and culture within an organisation (Lawrence, 1988; Truxillo et al., 2012). Career timelines formed by chronological age alone is subjected to differences between industries, organisations, cultures, and work groups. For instance, 51–64-year-olds make up 31% of the education and transport industries, but only make up 17% of hospitality and 20% of finance (Eurofound, 2017).

Nevertheless, age groups are regularly used as a guide into understanding needs and capabilities. For instance, those aged 35 and under may be most concerned with job security and growing social networks as they are more likely to hold nonstandard employment contracts, while those aged 35-44 may value work-life balance because this group reports long work hours and child responsibilities (Eurofound, 2021). The way in which employees experience and attach meaning to their work environment will also differ throughout the ageing process in areas such as work centrality, altruistic values, and social values attributed to implicit timelines and hierarchal positions, such as being ‘young for a manager’ or ‘doing well for their age’ (Twenge et al., 2010; Truxillo et al., 2012). Although the literature on generational differences has yielded mixed conclusions for work outcomes, it has been well established that older workers place increased value on generativity motives and less on growth-related motives due to their shorter FTP (Kanfer & Ackerman, 2004). In cases such as this, chronological age is useful for predicting citizenship behaviours where there exist opportunities to satisfy generativity motives (Kooij et al., 2011; Zacher & Frese, 2011; Bertolino, Truxillo, & Fraccaroli, 2013).

Calendar age remains a useful way to identify potential issues associated with work and developmental outcomes that can then be subsequently investigated (Schalk et al., 2010). For example, older workers are more likely to report a variety of psychological and physical work-related ill-health conditions, such as burnout, back pain, and anxiety (e.g., Rogers & Wiatrowksi 2005; Bohle et al. 2010; Jones et al. 2013), even though those aged 45-54 appear to cope better than younger colleagues in terms of quantitative demands (Eurofound, 2021). An in-depth study of UK workers published by the Health and Safety Executive (2011; 2021) discovered that over 1.1 million workers had an illness that they believed was caused or made worse by the workplace, and over 20% of those were aged over 55. This number may rise further given that workers aged over 50 are often underrepresented in their samples (McDaniel, Pesta, & Banks, 2012).

Traditionally, chronological age was used as a means of explaining a multitude of physical and cognitive changes associated with employee performance at work, often reflecting the unfavourable decline in performance-related behaviours (Cleveland, Huebner, Anderson, & Agbeke, 2019). For example, older employees are considered to be more resistant to change, less willing to participate in training, less competent, and uninterested in adapting to dynamic or volatile work environments (Isaksson & Johansson, 2000; Riolli-Saltzman & Luthans, 2001; Dixon, 2003; Kite et al., 2005; Posthuma & Campion, 2009). On the contrary, research has found that participation rates in areas such as job-related training do not decline significantly and older workers are no less willing than younger employees (Dixon, 2003; Posthuma & Campion, 2009),

though they do receive less on-the-job training and are concerned about skill obsolescence and future career prospects (Eurofound, 2021; CIPD, 2022). Studies have also evidenced mismatches in perceived and actual performance of older workers for physical capability (Fung, Lai, & Ng, 2001), psychological aptitude (Avolio & Waldman, 1994), productivity (Waldman & Avolio, 1986; van Woerkom, 2020), creativity and adaptivity (Posthuma & Campion, 2009), amongst others.

There is now a growing body of research arguing that chronological age serves as a proxy for age-related processes that can impact work outcomes more directly (e.g., Kanfer & Ackerman, 2004; Ng & Feldman, 2008; de Lange et al., 2021). Such research aligns with the lifespan theory of development suggesting that the ageing process encompasses gains, losses, prioritisation, and exchanges that occur in biological, psychological, and social functioning over time. For instance, younger employees have stronger preferences for task variety and feedback to support development (Zacher et al., 2017) whilst older workers prefer job complexity and significance so that they can call upon experiential knowledge but not take on additional tasks (Zacher & Frese, 2011; Zaniboni, Truxillo, & Fraccaroli, 2013; de Boer, 2021). This goes further than implicit career timelines and may present as individual memberships; for example, in specific social categories (e.g., cohorts, integrating work and social life) or psychological development and maturation (e.g. variations in intrinsic motives, such as praise or autonomy) (Settersten & Mayer, 1997).

Chronological age in itself does not automatically advance individuals through hierarchical positioning or developmental ability (Heckhausen, Wrosch, & Schulz, 2010). Therefore, chronological age as a sole operationalisation of age is inadequate in assessing individual needs and motives (Avolio, Barrett, & Sterns, 1984; Settersten & Mayer, 1997; Griffiths, 1987; Kooij et al., 2008). This remains an issue in research and practice, which tend to place primary focus on calendar age while other age-related changes are neglected, often resulting in the use of calendar age as a proxy for work outcomes (Kooij, 2015; Cleveland & Hanscom, 2017; Zacher et al., 2018).

2.2.3 Physiological Age and Cognition

Physiological age – otherwise known as functional age – is grounded in biological and lifespan theories of ageing, and refers to changes occurring in physical and cognitive functions during the normal ageing process (Hedge, Borman, & Lammlein, 2006; Baltes, Rudolph, & Bal, 2012; Kooij, 2013). It states that individuals age at different rates with respect to certain developmental dimensions, such as physical ability and cognitive function (Karasik, Demissie, Cupples, & Kiel, 2005; Kooij et al., 2008).

Physiological age uses chronological age implicitly – similar to career timelines – in that an increase in chronological age is associated with a change in developmental physiological dimensions (Karasik et al., 2005). More specifically, physiological age comprises several mechanisms that are affected by the ageing process, resulting in a vast pool of biomarkers reflecting physical, cognitive, and endocrine functions, just to name a few (Eurofound, 2021). These functions are reliant on objective measurements on distinct

attributes, which differ significantly in relevance to certain industries, contexts, and job roles (Schwall, 2012). Research has often aggregated these biomarkers, though this has often disguised the contribution of specific attributes (Cleveland et al., 2019).

Cognitive ability refers to individual differences in one's learning ability and information processing capacity (Kanfer & Ackerman, 1989). Increasing age is associated with a decline in cognitive functions such as short-term memory, abstract reasoning, verbal comprehension, and reaction speed (Greller & Simpson, 1999; Warr, 2001; Kanfer & Ackerman, 2004; Ilmarinen, 2006). Research has shown that cognitive impairment is negatively related to adaptive performance capabilities (Le Pine et al., 2000; Pulakos et al., 2002). For instance, short-term memory and fluid intelligence can affect one's ability to respond rapidly to environmental changes or to maintain performance levels if unable to call upon previous experience and wisdom (Hayes et al., 2015).

Other studies have indicated a negative relationship between calendar age and physical functioning. For example, musculoskeletal disorders increase with age and are more prevalent in females than males, and issues with upper limbs (e.g. shoulder, neck) are likely to manifest in those aged 35-49 years, whilst lower limb issues (e.g. backache) are more likely to emerge for those older than 50 years, and long-term illness is most common in those aged 65 years or above (Eurofound, 2021; CIPD, 2022). The normal ageing process is also associated with a decline in visual and auditory senses (Griffiths, 1997). These declines can compromise safety, particularly in non-sedentary job roles,

and increase the risk of occupational injuries (Moyers & Coleman, 2004; Zuhosky et al., 2007). As such, physiological age has a strong positive association with employability (Van Vuuren & Marcelissen, 2017). Although steps are usually taken by employee or employer to prevent this from impairing performance (e.g., retirement, early exit, mandatory sick leave), around one in four workers report that their health limits the type and amount of work they can do (CIPD, 2022).

In laborious jobs, the effort required to offset less favourable performance or maintain similar performance levels has been questioned, particularly for those entering the latter stages of career timelines where personal life is often prioritised over work commitments (Kanfer & Ackerman, 2004; de Lange et al., 2021). As a result, any resentment and anger present towards older workers is especially prevalent in physically demanding roles, and among those with fewer personal and social resources (Van Solinge & Henkens, 2017). At the same time, being exposed to significant quantitative and physical demands is associated with a poorer work-life balance, and workers experiencing these conditions are likely to report adverse health outcomes and be unable to extend working lives beyond the age of 60 (Eurofound, 2021).

Nevertheless, individual abilities and functioning varies significantly at all ages in that one individual may score highly in one area, but be somewhat dysfunctional in others (Cleveland, Huebner, Anderson, & Agbeke, 2019). Studies have shown that poor health causes individuals to feel older than their calendar age (e.g., Barrett, 2003; Baum & Boxley, 1983; Uotinen, Suutama, &

Ruoppiala, 2003; Hubley, 2014) such that it accounts for a substantial proportion of variance in subjective age, whereas other potential predictors, including sociodemographic factors such as gender and education, play only a minor role (e.g., Barak & Stern, 1986; Barrett, 2003; Rubin & Berntsen, 2006; Hubley & Russell, 2009; Infurna, Gerstorf, Robertson, Berg, & Zarit, 2010).

This is pertinent because research suggests that age-related changes in physiological functioning generally do not result in impairment and therefore have only a small effect on performance in work settings, but can be worsened by ageist assumptions (HSE, 2011). Feinsed and Davenport (2006) found that communication and decision-making skills can offset declines in manual dexterity, which has been evidenced to deteriorate as early as 30 years old (Mulders & Henkens, 2019). Parkhouse and Gall (2004) discovered that older employees working on electrical powerlines could perform their role duties just as effectively by minimising climbing time and using their experiential knowledge to help younger colleagues. A recent review by Proper and van Hoostrom (2018) found that workplace interventions and facilitative practices had favourable effects on physical outcomes such as musculoskeletal disorders.

There is also evidence to support the positive effects of work on physiological functioning and wellbeing not only of healthy people, but also for those who suffer from health impairments or classify as disabled (Waddell & Burton, 2006). This research is in keeping with the concept of presenteeism, which refers to being present at work whilst sick and is considered to be dysfunctional

if negatively affecting performance (Cooper, 1996; Karanika-Murray & Biron, 2020). However, when working conditions are supportive and conducive to optimal performance, and when jobs are designed such that they do not excessively deplete cognitive or physical resources then work can be beneficial to health and wellbeing (Urtasun and Nuñez, 2018; Karanika-Murray & Biron, 2020). For instance, a programme aimed at providing sustainable working conditions for older employees in Finland provided older workers with free access to sports facilities, personalised help with healthy living, support for job transition, person-job fit conversations, flexible working provisions, additional paid leave for over 60's, and ergonomic changes such as height-adjusted tables (Eurofound, 2021). As a result, the organisation experienced a higher average retirement age, lower sick leave, and an improved sense of belonging for older employees.

Cadar (2017) similarly found that organisations facilitating employees in maintaining a physical fitness regime – independent of past levels of exercise and illness duration – improved the memory recall and planning and organisation abilities of those employees, which helped to improve creative and adaptive behaviours (Cadar, 2017). However, employees must also be motivated to participate in these programmes as the effort required to offset decreases during the latter stages of career timelines will be significantly higher and thus motivation to work will decrease (Kooij et al., 2008; 2013). Those employees may instead decide to exit the workforce or reduce their working hours (Belbase et al., 2015).

Whilst physiological age is factually indicative of age-related biological and cognitive changes, and the consensus is that we lose cognitive processing ability in later life (Schalk et al., 2010; D'Onofrio, Greco, & Sancarlo, 2018), the ability to process information during the average working life remains relatively stable (Ilmarinen, 2006). Despite this, a higher physiological age typically indicates less favourable performance-related behaviours (Schwall, 2012; Cleveland, Huebner, Anderson, & Agbeke, 2019), though this assumption has been criticised for being unidimensional, too simplistic, and neglective of clear evidence that declines in performance are not monotonic and rarely begin until very late into the life span or post-retirement (Ludwig & Smoke, 1990; Avolio et al., 1984; Fozard, Metter, & Brant, 1990; Lachman, 2004; Baltes, Rudolph, & Bal, 2012).

Impaired cognition is indeed more strongly associated with the elderly, although a mild decline is observed from the age of 60 (D'Onofrio, Greco, & Sancarlo, 2018). Biologically, this is in some way explained by a shrinking of the cortex from age 40, which begins to affect the ability to remember or to multitask (Balota, Dolan, & Duchek, 2000). The effects of ageing on the brain decreases the efficiency of cell-to-cell communication, thus negatively impacting areas including learning, fluid intelligence (abstract problem solving), and perceptual motor skills (timed tasks) (Besdine & Wu, 2008).

A pool of research suggests that impairments in cognitive function rarely have a noticeable impact in most jobs but could become significant if employees are much older, for those returning to work from retirement, and for those in

physically or mentally demanding roles (Ng & Feldman, 2008; Baltes, Rudolph, & Bal, 2012; Davies, Matthews, Stammers, & Westerman, 2013; Akkermans et al., 2016). In a longitudinal study conducted by Muller et al., (2015), employees over 65 with increased cognitive functioning performed better in tasks, and the positive effects of cognitive functioning were stronger for highly demanding jobs with low control, and weaker when job demands are low, irrespective of job control.

Nevertheless, physiological changes may be compensated for or moderated by work characteristics such as task complexity (Riby et al., 2004), work experience (Peeters & Emmerik, 2008; Ilmarinen, 2006), environmental stability (Niessen et al., 2010), and promotion to more – or demotion to less – demanding jobs (Sturman, 2003). The extent to which older workers are trained in and comfortable using the latest equipment, and the degree to which this equipment automates otherwise complex working practices can offset declines in abstract problem-solving and memory recall (Charness, Best, & Souders, 2012; Jundt et al., 2015). For example, Charness, Best, and Souders (2012) found that technology could be used to substitute minor or severe memory problems; for example, using an event recording system to compensate for severe episodic memory issues.

Physiological changes may present more noticeably in particular job roles, but the gains made in other domains can often compensate. Decreases in fluid intelligence, short-term working memory, and cognitive speed may be compensated by deductive reasoning, wisdom, conflict-resolution,

professional expertise, and crystallised intelligence, and experiential knowledge (Masunaga & Horn, 2001; Kanfer & Ackerman, 2004; Feinsod & Davenport 2006; Hunter & Thatcher, 2007). Wilson, Li, Bienias, and Bennett (2006) found that long-term work experience can attenuate negative relationships between age and performance, while other studies have shown that this accumulation of experience and knowledge when undertaking similar tasks allows for efficiency gains in those areas (e.g., Ilmarinen, 2006; Feinsod & Davenport 2006; Peeters & Emmerik, 2008). Older workers have also demonstrated superior performance in accuracy, consistency, and decision making (Salthouse, 1984; Robertson & Tracy, 1998), exhibited more organisational citizenship behaviours and recorded fewer CWB's at work (Ng & Feldman, 2008; Mulders & Henkens, 2019).

In some cases, employees may choose to exit their role or the workforce to alleviate the stress of maintaining performance levels when physical or cognitive ability restricts them from performing effectively. Belbase et al. (2015) found that 10 percent of workers aged between 55-69 experienced steep cognitive decline over a decade, which was more likely to result in early retirement, resignation, or demotion. This may be more pervasive in specific job roles and less likely to affect core task performance in sedentary roles (Ilmarinen, 2006). For example, some evidence indicates that age-related health and performance deterioration is more pronounced in shift workers aged between 40 and 50 than in day workers, due to issues such as irregular sleeping patterns and chronic fatigue (Costa & Santori, 2007; Peeters & Emmerik, 2008; Griffiths et al., 2009). One biological explanation is that the

circadian rhythm shifts towards a diurnal type with age, hence older people may be more active, alert, and productive in the morning (Akerstedt & Torsvall, 1981). Conway et al. (2008) did not find a significant link between age, shift work, and declines in health, which could suggest that individual differences may contribute significantly to these findings. However, this did not consider the possibility that employees experiencing significant decline may have already exited their role.

On the other hand, early retirement can also contribute to declines in cognitive function. Across 13 countries, including England and the US, Rohwedder and Willis (2010) and Bonsang, Adam, and Perelman (2012) discovered that employees who retired in their early sixties later experienced diminished mental ability compared to those who continued working. Findings showed that unlike the home environment, the work environment provided stimulation to the cerebral cortex to maintain cognition. Furthermore, the introduction of health-related investments, particularly in physical labour, and the promotion of healthier lifestyles throughout the work environment (e.g., dietary advice, canteen provisions) helped to maintain employee physical and mental health (Conen et al., 2014).

2.2.4 Organisational Age

As individuals progress into later life, the experience and knowledge that they have gained, both on company working practices and in a specific job role, can buffer the potential negative effects in other domains. Job tenure can be defined as the length of time in one position, whereas organisational tenure refers to the length of time spent in one organisation (Ng & Feldman, 2013).

Both are highly related with calendar age and are influenced by career stage, skill obsolescence and age norms within the company (Ng & Feldman, 2008; Kooij et al., 2008).

Studies examining the relationship between tenure and job performance have been largely mixed. Early studies mostly found job tenure to be a positive correlate of core task performance (e.g., Schmidt et al., 1986; McDaniel, Schmidt, & Hunter, 1988), with many studies concluding organisational tenure to be a better predictor of task performance than calendar age (Ali & Davies, 2003; Sturman, 2003). Sturman's (2003) meta-analysis hypothesised that the relationships of performance with chronological age, job tenure, and organisational tenure resulted in an inverted-U shape. Sturman found that experience becomes more positively predictive of performance when job complexity is high, but the opposite is true for low complexity jobs, indicating that accumulated skills and knowledge with tenure is beneficial but only if jobs are sufficiently challenging.

Ng and Feldman (2013) examined two underpinning theoretical approaches to job tenure and its effect on job performance. On one hand, pervasive negative age stereotypes result in perceptions that older employees – and therefore longer tenured employees – are less innovative and more resistant to change. On the other hand, human capital theory contends that longer job tenure is associated with an increase in earning potential, knowledge, skill, job experience, and thus productivity (Becker, 1964). Ng & Feldman (2013) concluded that older and longer-tenured employees do not engage in less

innovation-related behaviour than their younger or shorter-tenured counterparts.

As there was no significant relationship between tenure and performance, Ng & Feldman (2013) suggested that any gains made in experiential knowledge could be counteracted by the increases in boredom and deterioration of intrinsic stimuli associated with longer-tenured employees. Indeed, research has found that employees in the 'maintenance' stage (Super, 1984) report lower intrinsic motivation and are less likely to pursue achievement-orientated goals (Stewart, 1999). Although Ng & Feldman (2013) suggested that the relationship between tenure and job performance did not strengthen or weaken at the high end of tenure distribution, Uppal (2017) found that motivational job characteristics had moderating effects on the curvilinear relationship between tenure and job performance.

Similar research has shown that shorter job tenure and higher employee turnover is negatively related to intrinsic motives, such as social relationships with colleagues and management; and extrinsic motives, such as dissatisfactory wages, working hours, and role flexibility (Hammerberg, 2002; Mosley, Winters, & Wood, 2012; Virtanen et al., 2022), all of which have been evidenced to negatively impact work-related outcomes, including performance, counterproductive work behaviours, and employee turnover (CMI, 2012; Harter et al., 2012; Cerasoli, Nicklin, & Ford, 2014). However, high-tenure workers – irrespective of calendar age – were much more likely to experience burnout than low-tenure workers when job demands are high

(Ramos et al., 2016). This issue could relate to the lack of training and development for longer-tenured workers. Career development and skill-development should not be designed only for younger employees, both in terms of calendar age and tenure, and should focus on retaining mid-tenured team members that have been integral to the organisation for a number of years to show how they can continue internal progression whilst contributing to organisational goals (Mullins & McClean, 2020; Visier, 2021).

Organisational age culture and management policies may contribute to whether the complex relationships between age and job characteristics affect motivation and subsequent job performance (Truxillo et al., 2012). Job crafting for longer-tenured employees allows for flexibility in how work is undertaken based on their skills and needs and can provide insight into whether those employees are getting sufficient support further through their tenure. If newer or younger employees are provided with crafting opportunities to promote growth and development at the expense of older employees neglection, feelings of exclusion or ostracism may arise and negatively affect workplace belonging, commitment, exit intentions, and physiological problems, even more so than workplace bullying (Riley, 2014). Although lower tenured employees generally have the highest resignation rates (Visier, 2019; 2020; 2021), the highest percentage change of resignations in 2021 was for mid-tenured (5-10 years) employees, having risen by 56.8% compared to the same period of 2020 (Visier, 2021). Given that workplace belonging is associated with a 56% increase in job performance, a 50% reduction in turnover risk, and a 75% decrease in employee absence (BetterUp, 2014), the implications of

taking longer-tenured employees for granted are extensive. For example, these figures are associated with $52M of annual savings in a company employing 10,000 workers (Kellerman & Reece, 2014). A consideration for future workforces is that the benefits of organisational tenure may be thwarted by an increasingly mobile labour market in which individuals are unlikely to remain in one organisation for an entire career (Griffin, 2003; Mullins & McClean, 2020).

2.2.5 Psychosocial and Psychological Age

Unlike chronological age and tenure, psychological and psychosocial age accounts for individual differences, subjective experiences, and employee perceptions about their workplace abilities and general wellbeing (Barak, 2009). Psychosocial age – also known as subjective age – refers to the self and social perception of age-related changes relative to the workplace (Schwall, 2012). Although psychological age has previously been grounded in cognitive functioning (e.g., Lang & Carstensen, 2002; Kooij et al., 2008), this thesis conceptualises psychological age more in keeping with individual psychological wellbeing because it is grounded in subjective perceptions toward mental health (Weinberg et al., 2017). Specifically, individual wellbeing encompasses objective or subjective perceptions of psychological (e.g., happiness) and physical (e.g., mobility) wellbeing (Kooij, Guest, Clinton, & Knight, Jansen, & Dikkers, 2012). Thus, individual psychological wellbeing is not always linked to feeling older or younger than one's age or perceiving an open (or restricted) FTP (Bandura, 1997; Carstensen, 1995).

Both concepts, however, can be grounded in lifespan theories because they encompass the biological, social, and psychological functions of ageing (Baltes, Rudolph, & Bal, 2012). Definitions of psychosocial age present three common factors that reflect how we feel about our own or others age. First are the social perceptions of what age is considered to be *old;* second are the norms and attitudes held towards chronologically older workers and; third is the degree to which policies regarding recruitment, selection, and management of employees label employees as *old* (Kooij et al., 2008).

Psychosocial age, also known as subjective age, comprises two core dimensions: 'felt' age and 'physical' age; the former refers to how an individual feels, both mentally and physically, whereas the latter is how an individual sees themselves and could refer to biological ageing or self-appraisal (Kleinspehn-Ammerlahn, Gruhn, & Smith, 2008; Barak, 2009; Schwall, 2012; Kornadt et al., 2021). It is a concept that has gained popularity under the premise of aged heterogeneity (Nelson & Dannefer, 1992), which proposes that interindividual variability – and therefore experiences – of similarly aged individuals will increase with time. For instance, Nagy, Fasbender, and North (2019) discovered subpopulations in workers aged 50 – 66, where a large group felt substantially younger, a moderate group felt marginally younger, and a small group felt older than their chronological age.

Thus far, evidence is conflicting on which age cohorts are most likely to report a positive or negative subjective age. A general view is that suggests that young adults feel younger than their calendar age (Galambos, Turner, & Tilton-

Weaver, 2005), though Rubin and Berntsen (2006) found that those aged 25 or under feel slightly older, and those aged above 25 years feel younger than their calendar age. They noted that age denial becomes stronger as calendar age increases. However, research has evidenced a cumulative effect of poor working conditions that negatively impact subjective wellbeing and health issues which typically manifest between 35-49 and consequentially affect the sustainability of work over the life course (Eurofound, 2021; Anderson et al., 2021). For instance, individuals that felt older than they were reported higher levels of personal deprivation and work stressors, such as fatigue and tension and thus lower levels of psychological wellbeing (Schalk et al., 2010).

These working conditions can be grounded in the social aspects of subjective ageing, which involves assumptions and attitudes toward individuals with respect to a work group, occupation, or society, and can be subject to generalised ageist stereotypes which can influence and be influenced by age-diverse HR policies and practices (Barak, 2009; Kooij et al., 2008; Schalk et al., 2010). This social component is theoretically analogous to the concept of age norms in that judgements are made regarding what a person of a certain age should do within a particular work role or industry (Schwall, 2012).

As a result, many studies have sought to understand whether one's 'felt' age is related to work outcomes (Barnes-Farrell et al., 1992; 2002; Cleveland et al., 2019). Constructive self-perceptions of ageing have been evidenced to indicate productive ageing and self-regulation processes (Baltes & Smith, 2003; Sneed & Whitbourne, 2005) and positive relationships with personal and

work outcomes, such as social and occupational engagement, job satisfaction, wellbeing, physiological functioning, and intentions to remain (e.g., Boehmer 2007; Kleinspehn-Ammerlahn, Gruhn, & Smith, 2008; Muller et al., 2013; Huang, McDowell, & Vargas, 2015). These positive psychological states, which give rise to higher job satisfaction and wellbeing, lead to younger-feeling workers exhibiting higher levels of OCB (Kuehn & Al-Busaidi, 2002; Nagy, Fasbender, & North, 2019).

Promoting good psychological wellbeing at work is imperative because poor working environments can negatively impact emotional and cognitive weariness, which often presents in outcomes of job dissatisfaction, anxiety, depression, burnout, and engagement (Van Horn et al., 2004; Warr, 2007; Kooij et al., 2012). Prior literature has supported negative relationships between aspects of wellbeing (e.g., burnout) and age (e.g., Schaufeli & Enzmann, 1998; Schaufeli & Bakker, 2003), although tenure, which is a correlate of increasing age, buffers the relationship (Schaufeli & Bakker, 2003). The relationship between individual characteristics on wellbeing and chronological age has been found to be curvilinear in that wellbeing presents highest in youngest (18-20) and oldest (65+) participants (Warr, 1992; 1997; 2007; Cunningham, Rosa, & Jex, 2008). This indicates that firstly, psychosocial and psychological age may have a reciprocal relationship in that positive psychological states can promote feelings of youth and, second, different psychological needs emerge at different life stages and can be facilitated to some extent by the work environment to improve, for instance,

positive affective states (Kanfer & Ackerman, 2004; Nagy, Fasbender, & North, 2019).

This may also benefit chronologically older workers who are more likely to experience and maintain positive affective states to maintain emotional wellbeing and job satisfaction into older ages (Carstensen & Lang, 2002; Scheibe & Zacher, 2013; Doerwald et al., 2016). In line with SST, Doerwald et al. (2016) found that older employees maintained a moderate advantage over younger counterparts in perceiving, understanding, and regulating emotions. This may be because they tend to focus more on past accomplishments, meaningful social connections with colleagues, and citizenship behaviours underpinned by generativity motives, such as helping train younger colleagues (Kanfer & Ackerman, 2004; Truxillo et al., 2015). As a result, older workers generally have an improved ability to regulate emotions more effectively and mood changes are less impacting (Morgan & Schiebe, 2014).

Nagy, Johnston, and Hirschi (2019) found that subjective age was a stronger predictor of job crafting than calendar age, perceived health, and role autonomy, indicating that feeling younger can help to facilitate optimal compensation strategies through crafting jobs which enable gains to be maximised more effectively (Muller et al., 2013; Rudolph, 2016). The reported subjective age of employees can therefore be influential in productive and counterproductive work behaviours (Kunze, Boehm, & Bruch, 2011; Goecke & Kunze, 2018). Drazic and Schermuly (2021) discovered that when subjective age was low (i.e., individuals viewed their age more positively), chronological

age was positively related to readiness for change, a form of adaptivity. However, when subjective age was high, this effect became nonsignificant.

Examining the most important facets of ageing from the perspectives of individuals themselves allows for better understanding of what they believe are mostly impacting upon their ageing process and, unlike other commonly used predictors of subjective health (e.g. sociodemographic factors), workplace characteristics can significantly influence the attitudes attributed to ourselves and others during the ageing process (Moor et al., 2006; Barak, 2009). Work and job characteristics are also associated with positive affect, which describes an individual's subjective experiences associated with positive feelings such as happiness, stimulation, and wakefulness (Miller, 2011; Parker & Griffin, 2011). and is considered an antecedent to proactive behaviours such as initiative and feedback seeking (Fritz & Sonnentag, 2009; Doerwald et al., 2016).

Although these changes significantly impact at a personal, organisational, and societal level (de Lange et al., 2006), it is recognised that individual life cycles also differ, and are therefore reflective of behavioural and functional changes which need to be considered as such (Kanfer & Ackerman, 2004; Kooij et al., 2008). Working to support changes across the lifespan can serve to support or hinder adaptivity in flexibly responding to changes in workplace processes (Westerhof & Barrett, 2005; Kwak, Kim, Chey, & Youn, 2018).

Nonetheless, some of these factors cannot easily be manipulated; these may include the industry in which one is situated, or physiological changes closely tied to a job role. For instance, physiological age may measure the speed at which a programmer writes a piece of code to ascertain the best coder, whereas psychosocial age may discover aspects that constitute higher-quality coding, such as an enhanced ability to design, operate, and maintain highly complex operating systems (Schwall, 2012). The former focuses on physiological responses, whilst the latter incorporates a wider range of factors internal and external to the individual.

These changes are not captured by chronological age alone, which becomes less important than one's subjective sense of time as they grow older. This perception of self becomes much more influential in driving workplace behaviour and goal pursuit (Carstensen, 2006). Indeed, both subjective and objective ratings of physical, mental, and cognitive health have predicted cognitive variation independently of calendar age (e.g., Wahlin, MacDonald, Frias, Nilsson, & Dixon, 2006; Moor, Zimpritt, Schmitt, & Ziegell, 2006). When these ratings are poor, individuals tend to feel older than their calendar age (Baum & Boxley, 1983; Uotinen, Suutama, & Ruoppiala, 2003; Barrett, 2003), and are more likely to value leisure time rather than work (de Lange et al., 2021).

Psychosocial age therefore aligns with FTP in that the meanings we attach to the ageing process determine the construction of goals and direction of effort. Kooij et al. (2013) discovered that an open-ended FTP and positive subjective

age (in terms of physical and mental health) mediated relationships between chronological age with growth, esteem and security motives. As such, psychosocial age may be able to provide a conceptual pathway to better encapsulate experiences of the ageing process while being sensitive to the individuals own physiological needs (Schwall, 2012), thus enabling characterisation of individual differences throughout the ageing process (Kwak et al., 2018). More specifically, it can capture insights into non-normative events (e.g. ‘mentally, I feel…’) (Mathur & Moschis, 2005), as well as a variety of other individual factors (e.g. well-being, appearance, physical function; Barak, 2009) and motives that are commonly associated with certain life stages (Eurofound, 2021).

While a promising avenue for better understanding how one feels, operationalising subjective ageing at work is methodologically problematic. Recently, Zacher and Rudolph (2019) proposed that relationships between subjective age and work outcomes are confounded by core-self evaluations, but this notion could also extend to subdomains such as physiological capability and perceived work ability. Although longitudinal studies using time lags (e.g., Kotter-Grühn et al. 2016; Barnes-Farrell & Petery, 2018) have attempted to remedy this and have contributed to the research on subjective ageing at work, the concept itself is broad in nature, measured variably (both in time and scale), and is subject to higher levels of bias across studies, all of which puts into question the operationalisation of subjective age (Zacher & Rudolph, 2019; Laguerre et al., 2022). Using subjective age in conjunction with other constructs of age, aspects of the work environment, and self-rated

performance evaluations ought to reveal more about the unique effect of feeling older or younger than one's calendar age.

2.2.6 Summary

Ageing is influenced by physiological, psychological, and psychosocial changes that need to be fully understood before making assumptions in how these changes affect work outcomes. The ageing process is accompanied by a natural decline in physiological functioning, though the losses experienced are unlikely to impact operational duties in the majority of job roles (Davies et al., 2013). An increase in physical and mental ill-health has contributed to economic inactivity (McCurdy, 2023; Francis-Devine & Powell, 2023), so understanding relationships with performance behaviours is important to labour participation. Similarly, how old one feels compared to their calendar age has yielded mixed results and requires further investigation. The experiential gains made with age and increasing tenure go some way in offsetting functional losses, and the needs that gain strength at different life stages are more likely to direct workplace behaviour than these changes alone.

In the workplace, literature on lifespan theories and ageing at work has moved from unilateral perceptions of age toward multidimensional conceptualisations of the ageing process (Akkermans et al., 2016; de Lange et al., 2021). In order to facilitate a longer working life that is of benefit to both employee and employer, research needs to map the motives of workers across the lifespan with work characteristics and understand how this impacts work outcomes. Care must be taken not to exaggerate socially and culturally prescribed norms

which are grounded in a range of deficits associated with ageing. Instead, lifespan theories of development can be used to monitor changing needs and abilities and implement workplace practices that enable older workers to satisfy those needs. The work environment can then be used more effectively as a toolkit where motives are addressed, capabilities are utilised, and individuals are matched suitably to job roles.

2.3 Work Performance

Two major determinants of individual work performance are ability and motivation (Campbell & Wiernik, 2015). The previous section provided evidence that calendar age was not an accurate measure of how these two factors change across the lifespan. The journey through life is accompanied by a range of physiological, psychological, and social changes that contribute towards the way that we experience work and meanings we attach to those experiences.

In a similar manner, the association between one's age and their ability to perform at work has been one-dimensional. Some studies indicate that performance increases with age (e.g., Hunter & Thatcher, 2007), others that it decreases (e.g. Sparrow & Davies, 1988; Dalen, Henkens, & Schippers, 2010; van Woerkom, 2020), and some that it remains stable (Clark, Oswald, & Warr, 1996). Some use productivity as a measure of performance (Clark, Oswald, and Warr, 1996), whilst others have observed negative relationships among aggregated performance measures (e.g., Bal et al., 2011), while some research has found that the relationship turns negative in uncertain and

unstable work environments (Niessen et al., 2010). Ng & Feldman (2013) found no significant differences in job performance scores attributed to older and younger workers but did question the methodological approaches used and variance accounted for in each, suggesting that a more reflective and integrative taxonomy of performance ought to be measured in synchrony with age constructs that reflect the ageing process beyond calendar age.

This approach has been adopted in recent times, and the multidimensionality of work performance has been validated with studies showing unique relationships with both constructs of age and work characteristics (Schalk et al., 2010; Kooij et al., 2008, 2011; Karanika-Murray et al., 2022). Despite this, many employers still subscribe to notion that work performance declines with age (Van Dalen, Henkens, & Schippers, 2010), and while it is agreed that maintaining performance levels becomes more challenging with age (Okunribido & Wynn, 2009), most evidence suggests that experience, expertise, practice, skills, and accumulated knowledge can offset the potential decline in at least some cognitive and physical functions (Peeters & Emmerik, 2008; Ng & Feldman, 2008).

However, research that approaches the relationship between age and performance both holistically and multidimensionally is still developing, and there is yet a sound framework from which academics and practitioners can derive confident assumptions about individual age-performance trajectories. As such, the emergence and development of work performance as a multidimensional phenomenon will be discussed, before outlining a

comprehensive framework that distinguishes proficient, adaptive, and proactive performance behaviours in the context of individual, team, and organisational responsibilities (Griffin, Neal, & Parker, 2007). Each performance behaviour will be mapped to age constructs from section 2.2 to better understand age-performance trajectories that move from the general to the specific.

2.3.1 Work Performance: Concepts and Definitions

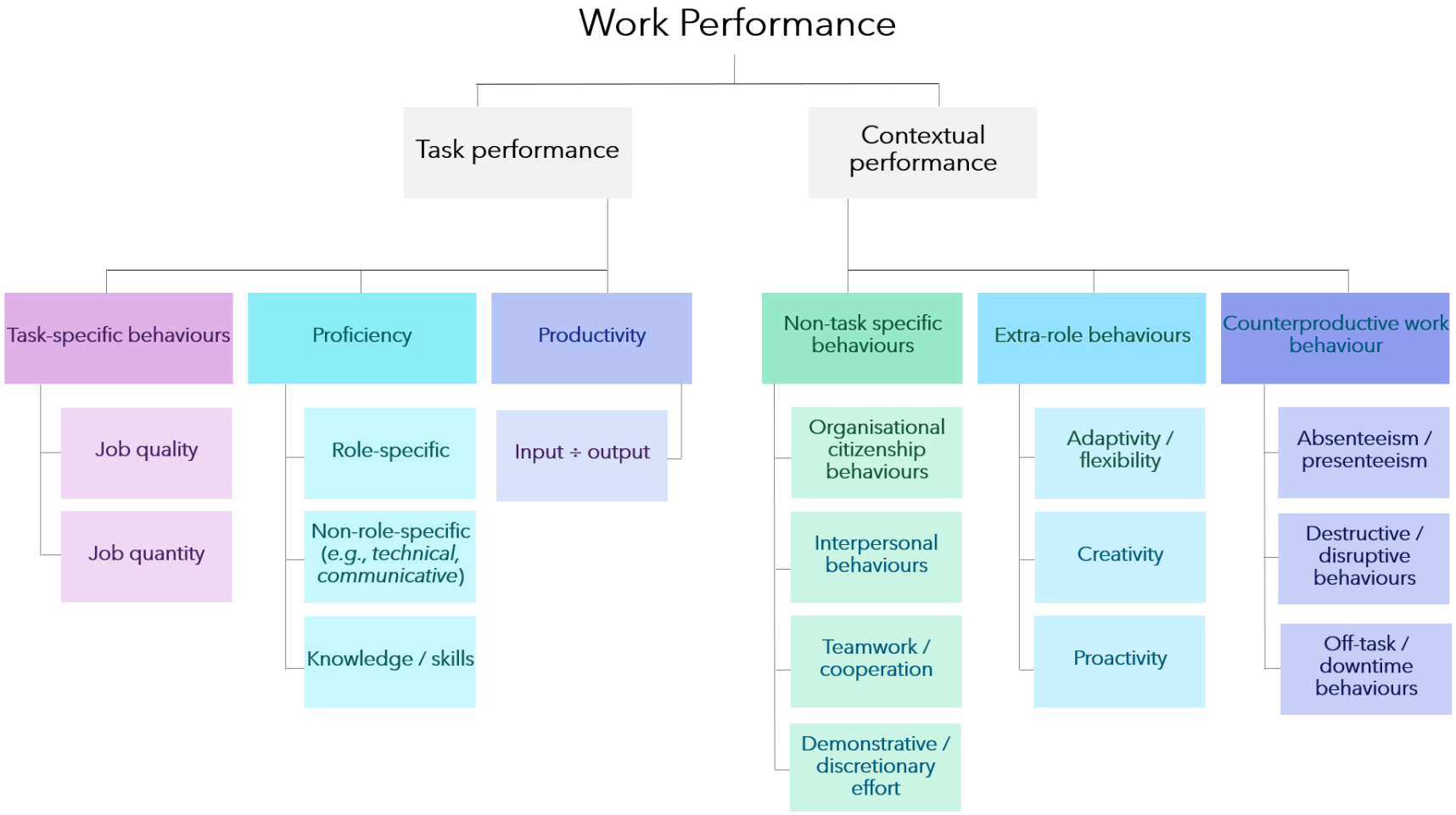
Work performance, which describes the extent to which a work task or process is accomplished effectively, is among the most researched areas in work psychology because of its collective effect on organisational performance (Kunze Boehm, & Bruch, 2013; Mullins & McClean, 2020). Job performance refers to the individual work behaviours and efforts that are relevant or contribute to the goals of the individual, work unit, or organisation (Murphy, Cleveland, & Hanscom, 2018). While job performance moves from broad to specific responsibilities, there appear to be three core mechanisms that characterise performance within the workplace (e.g., Griffin, Neal, & Parker, 2007; Lady & Conte, 2010; Motowidlo & Harrison, 2012; Koopmans, 2014; Cleveland et al., 2019):

1) *behaviour*: the actions that individuals undertake within the workplace that are related and unrelated to the task;
2) *effort*: the congregated actions and efforts that are exerted by individuals towards the fulfilment of task and work-related activities and;
3) *results*: the outputs of individual behaviour and efforts which reflect the attainment of individual and organisational goals.

These mechanisms apply to many dimensions that comprise work performance. For instance, Murphy (1989) modelled the performance domain using four behavioural dimensions reflecting the task, interpersonal communication, down-time decisions, and destructive behaviours. Campbell (1990) went into slightly more detail by decompartmentalising work performance into an eight-factor model with three primary dimensions (job-specific task proficiency, discipline, and effort) and five secondary dimensions (noncore task proficiency, leadership skills, management, communication, and teamwork). Such frameworks are in contrast to more traditional views which focus on work and production outcomes (Aguinis, 2009).

There are many frameworks that differ in the dimensions proposed to reflect work performance, though the majority are encapsulated by two broad dimensions: task and contextual performance (or 'non-task') (Campbell, 1990; Borman & Motowidlo, 1993; Rotundo & Sackett, 2002; Johnson, 2003; Ng & Feldman, 2008; Sonnentag, 2010; Borman et al., 2017). Figure 2.1 shows the dimensions of performance that are typically encapsulated within the broader constructs of task and contextual performance.

Figure 2.1 Subdimensions of task and contextual performance



This framework is representative of the changing nature of work performance, which increasingly reflects the interdependence and uncertainty of modern work environments (Griffin, Neal, & Parker, 2007). Performance constructs have been continually added in an attempt to untangle labour force challenges and to target key areas of individual performance that foster organisational success. Because of this, there remains significant empirical overlap in many ostensibly distinct constructs of job performance; that is, when behaviours ought to describe a specific construct yet are indicated in several other constructs – an issue that has rendered it difficult to distinguish and operationalise specific performance behaviour (Rotundo & Sackett, 2002; Griffin, Neal, & Parker, 2007; Garcia-Chas et al., 2015).

When purportedly different performance constructs overlap, the ability to reliably test construct and divergent validity becomes a problem both methodologically and for implications raised by the studies that use them. For example, the assessment of persistent or discretionary effort is witnessed in dimensions such as conscientiousness initiative (Johnson, 2003), demonstrating effort (Campbell, 1990), contextual performance (Organ, 1997), and OCB (Rotundo & Sackett, 2002). Similarly, the degree to which a task is completed is found in instruments measuring task performance, noncore performance, and contextual performance (e.g. Campbell, 1990; Rotundo & Sackett, 2002; Borman & Motowidlo, 1993). LePine, Erez, and Johnson (2002) discovered purportedly heterogeneous content that was observed within different scales measuring different dimensions of performance. If researchers

use analytical methods such as confirmatory factor analysis, they may struggle to validate the dimensions of their instrument.

This leads to the second issue pertaining to reliability, which is that researchers often use performance terminology interchangeably, despite constructs measuring different things. This can be increasingly confusing due to the first point and the intercorrelations observed between theoretically distinct constructs. For example, Hoffman, Blair, Meriac, and Woehr (2007) discovered that OCB shares a modest quantity of variance with attitudinal correlates beyond task performance and consistently relates more strongly to attitudes than task performance. Moreover, while results supported a distinction between a single factor model of OCB and task performance, they also found them to be highly correlated (r = .74). Bourbage, Lee, Lee, and Shin (2012) discovered a similarly strong correlation (r = .70) between OCB's directed towards individuals (OCBI) and OCB's directed towards the organisation (OCBO), which are also frequently treated as distinct constructs (e.g. Williams & Anderson, 1991, Finkelstein & Penner, 2004), despite research showing that the motive variables (e.g. leader support, job satisfaction) for undertaking these behaviours did not differ for either dimension (LePine, Erez, & Johnson, 2002; Bourbage et al., 2012).

Finally, because the performance literature has been sufficiently saturated with such constructs, the extent to which inferences can be made to the general working population is weakened (Koopmans, 2014). Furthermore, measuring performance can differ in meaning between jobs despite having the same

underlying domain outcome (Griffin et al., 2007; Koopmans, 2014). For instance, comparing the manual dexterity of older workers in medical professions with those in customer service professions is unproductive. However, comparing the proficiency between both, which may include manual dexterity (indicative of physiological age) for medical professionals and problem-solving skills (indicative of psychosocial and organisational age) for customer service professionals, is valuable in untangling which constructs of age may be most influential in how proficient one is at their job role.

2.3.2 An Integrative Taxonomy of Work Role Performance

One group of performance behaviours that recognise the uncertainty associated with modern work environments and changes that occur across the lifespan is Griffin, Neal, and Parker's (2007) integrative taxonomy of work-role performance; 'work-role' referring to the performance responsibilities that an individual has in the workplace (Murphy & Jackson, 1999). This framework builds upon existing frameworks that distinguish between task and contextual performance by classifying three behaviours (proficiency, adaptivity, and proactivity) which can contribute to effectiveness at three levels (individual, team, and organisation). More specifically, it recognises that core and noncore task performance can be carried out with varying degrees of proficiency, adaptivity, and proactivity (Neal et al., 2012).

Whilst attitudinal performance dimensions (e.g. job satisfaction, organisational commitment) remain important predictors in job performance, these behavioural performance dimensions (e.g. proactivity) allow for deeper investigation into the role of workplace dynamics such as autonomous

decision-making in performance behaviours (Peterson & Seligman, 2004; Harter et al., 2012; Sonnentag, 2010), and can be more productively analysed in relation to the heuristic changes that occur across the lifespan.

Griffin, Neal, and Parker (2007) define proficiency, adaptivity, and proactivity as three performance behaviours which are required in order to perform effectively in tasks and work systems. Proficiency refers to the fulfilment of required and expected responsibilities within a job role. Adaptivity is the degree to which individuals adjust and respond to changes in the organisation. Proactivity reflects self-initiated change behaviours, and comprises the process of anticipating, planning, and responding to future requirements. Griffin, Neal, and Parker (2007) suggest that work responsibilities and task requirements can be easily specified when uncertainty is low, and where proficiency is more readily measurable. Adaptivity and proactivity are important when uncertainty is high as it becomes more difficult to anticipate necessary behaviours and contingencies (Griffin, Neal, & Parker, 2007).

In organisations, uncertainty occurs when the inputs, processes, or outputs of work systems lack predictability, thus determining if roles can be formalised and consequently whether employees can maintain effectiveness and be adaptive or initiating of change (Wall, Cordery, & Clegg, 2001; Griffin, Neal, & Parker, 2007). Whilst most organisational theories underline the importance of adapting in times of uncertainty (e.g. Burns & Stalker, 1967; Katz & Kahn, 1978), performance frameworks often do not account for this. This framework, however, recognises the role of uncertainty which is critical at a time when

global events (e.g. Covid-19, Ukraine-Russia conflict) have given rise to challenges associated with remote working, supply chain issues, redundancies, reduced social contact, and changes to working responsibilities.

While recognising that individual performance behaviours may be differentially predicted by age and work characteristics, this review will also use role theory as a lens to recognise the increasing interdependence of modern work environments in helping to maintain and construct a social context (Borman & Motowidlo, 1993; Griffin, Neal, & Parker, 2007). Indeed, interdependence is present to some degree in all modern work environments in that individuals within a work group must cooperate to achieve shared goals, and so recognising the dynamicity of modern work environments and differences that are prioritised in different job roles allows for more accurate systematic examinations into the intraindividual changes occurring across the lifespan.

2.3.3 Individual-Task Proficiency

Individual task proficiency is grounded in traditional views of work performance in that it is evaluated through the contribution of employee behaviours and actions towards the completion of role-specific tasks (Borman & Motowidlo, 1993; Griffin, Neal, & Parker, 2007). Individual task proficiency therefore directly corresponds to the concept of task performance, which encompasses one's knowledge and skill and refers to the quality and quantity of work undertaken (Johnson, 2003; Ng & Feldman, 2008). More specifically, it refers to the proficiency – or competency – with which one executes task-specific behaviours within their job role (Campbell, 1990; Johnson, 2003; Koopmans et al., 2011).

Task proficiency therefore forms the basis for many approaches to performance management as it aims to maximise productivity through enabling employees to perform to their potential within their role (Mueller-Hanson & Pulakos, 2015). However, the term productivity differs from task proficiency in that the former can be defined as input divided by output (Viswesvaran, 2002; Koopmans, 2014), which does not account for the behavioural and ability-related characteristics encompassed within proficiency. For example, productivity indicators such as sales figures or quantitative measures of product quality are usually considered unidimensional (Campbell, 1990; Chen & Pang, 2016). These approaches no longer account for the complexity and interdependence of workplace relationships, nor do they recognise the uncertainty and dynamicity associated with rapid technological changes and increased competition (Rotundo & Sackett, 2002; Griffin, Neal, & Parker, 2007).

Because of this, proficiency has been featured in other conceptualisations of job performance which consider individual behaviours targeted towards their job roles or broader work systems. These terms include job-specific and non-job-specific task proficiency (e.g., Campbell, 1990; Rotundo & Sackett, 2002), technical proficiency (e.g., Sparrow & Davies, 1988), and communication proficiency (e.g. Campbell, 1990; Borman & Motowidlo, 1993). As a result, individual-task proficiency has been the traditional focus of performance research and remains the primary component of measuring job performance

(Borman & Motowidlo, 1993; Johnson, 2003; Neal et al., 2012; Koopmans et al., 2014).

Although the majority of studies have found no significant relationships between calendar age and task performance (e.g., Ng & Feldman, 2008; Karanika-Murray et al., 2022; Gemmano, Manuti, & Giancaspro, 2022), there have been some exceptions for other dimensions of age. Subjective age has been linked to work outcomes such as work motivation (e.g., Nagy, Johnston, & Hirschi, 2019) and performance (e.g., Kunze, Raes, & Bruch, 2015). Kunze, Raes, and Bruch (2015) observed a strong negative relationship between subjective age and task performance, measured as goal accomplishment, while Nagy, Johnston, and Hirschi (2019) found that subjective age – beyond chronological age and autonomy – was more likely to predict the job crafting tendencies of older employees to achieve better person-job fit.

Physiological age has also been linked to difficulties in maintaining performance levels in more unstable environments where the deterioration of episodic memory is severe enough to impact one's ability to respond to environmental changes (Hayes et al., 2015). However, the extent to which task performance is affected is unclear as those experiencing significant quantitative or physical demands may decide to change to a less demanding job (Sturman, 2003) and are less likely to extend working lives beyond 60 (Eurofound, 2021). However, Davies et al., (2013) determined that age-related performance differences are exaggerated when tasks are more demanding but are relatively unnoticeable during simple tasks.

As shown in section 2.2.4, tenure has been considered a positive correlate of core task performance (e.g. Schmidt et al., 1986; McDaniel, Schmidt, & Hunter, 1988). Sturman's (2003) found that job tenure strongly predicted job performance in highly complex jobs by enabling individuals to offset physiological and cognitive decline with gains in experiential knowledge. Feinsod and Davenport (2006) concluded that there was no significant relationship between age and proficiency, and that this was possibly contributed to by the crystallised knowledge and experience gained during one's tenure that can compensate – at least partially – for age-related declines in cognitive function in most industries.

Curvilinear relationships have been observed between various constructs of age and performance; for instance, between tenure and productivity (e.g., Ali & Davies, 2003), calendar age and task performance (e.g., Ng & Feldman, 2008), age and proactivity (e.g., Karanika-Murray et al., 2022), amongst others. More pertinently, work characteristics such as job complexity and job design were found to have a moderating role in such relationships (e.g., Sturman, 2003; Chung & Butler, 2011; Karanika-Murray et al., 2022). For instance, Sturman (2003) presented a moderating role of job complexity in the relationship between age and job performance. In low-complexity jobs, an inverted-U shaped relationship existed between age (calendar age, tenure), but in high-complexity jobs, the relationship remained curvilinear but was no longer U-shaped. This suggested that, over time, tenure and experience become more predictive of performance in jobs with higher levels of

complexity. Hedge and Borman (2019) also observed negative relationships between age and performance in less complex job roles.

Although Sturman (2003) and Ng & Feldman (2008) observed curvilinear patterns between age (calendar age and tenure) and task performance, a more recent study by Karanika-Murray et al. (2022) discovered that there was no relationship or interaction effect between age, proficiency, and job complexity. However, an S-shaped relationship was observed between age and proactivity that was more intense for jobs of low complexity such that it showed stronger declines in proactivity.

There are several reasons as to why the relationship between age and task proficiency has been difficult to untangle. Firstly, although measuring the same construct, task proficiency is more important in stable and predictable environments (Griffin, Neal, & Parker, 2007; Griffin et al., 2010). As such, age-related changes are much less likely to impact task proficiency in these situations as they mostly require average cognitive function, such as short-term memory and sustained attention (Ilmarinen, 2006; Davies, Matthews, Stammers, & Westerman, 2013).

Having a stable working environment can mean that adjustments are made more easily in order for older workers to maintain performance. For example, research has shown that sedentary jobs that involve being seated for much of the time can benefit significantly from ergonomics training, particularly for older workers to better understand how to reduce discomfort and work optimally

(Mahan & Chikamoto, 2006; Eurofound, 2021). Similarly, older workers with computer-based roles may benefit from frequent breaks and age-related visual accommodations for computer displays and setups (Harris & Higgins, 2006; Mahan & Chikamoto, 2006).

However, differences may be observed in unstable environments or highly demanding jobs such that the relationship may turn negative (Niessen et al., 2010). Many of these environments are fast-moving and require continuous training to keep up with economic and market developments, use the latest technology or software, and require physiological characteristics that naturally decline across the life course (Chan et al., 2000; McMullin & Dryburgh, 2011). For instance, declines in task performance are more pronounced in shift workers aged between 40 and 50 due to issues such as irregular sleeping patterns and chronic fatigue (Costa & Santori, 2007; Peeters & Emmerik, 2008; Griffiths et al., 2009). An early study investigating air traffic controllers found that highly cognitively demanding roles influenced the relationship between age and task performance such that proficiency in aptitude test scores and objective ratings in air traffic performance declined with age (Cobb, Nelson, & Matthews, 1973).

Secondly, chapter 2.2 showed that the motives and goal orientations of workers change with age. For instance, as workers age, they are more likely to experience a shift in goal orientations from maximising gains to preserving resources in order to minimise future losses and maintain performance levels (Ng & Feldman, 2010; Marvell & Cox, 2017). At the same time, older workers,

albeit to a lesser extent, still experience the need for growth, although this is often superseded by generativity motives (Bertolino, Truxillo, & Fraccaroli, 2013). Indeed, the ageing process is associated with a strengthening of generativity motives and the weakening of personal growth motives (e.g., McAdams, de St. Aubin, & Logan, 1993; Zacher & Frese, 2011). This differs from younger employees whose goal orientations are underpinned by stretching their competence (i.e. growth), older employees self-interests decline and are drawn more towards goals that avoid them being perceived as incompetent (de Lange et al., 2010; Kooij et al., 2011; Zhang & Farndale, 2022).

As a result, resources will be optimised to maintain core performance (i.e., task proficiency), while excess resources will be redirected to satisfy generativity motives (Ebner et al., 2006; Ng & Feldman, 2010). Older workers may therefore experience slight declines in task-oriented skills but increases in extra role behaviours, such as citizenship behaviour (Ng & Feldman, 2008).

This leads to the third point: the relationship between age and task proficiency is subjected to contextual characteristics (Sturman, 2003; Ng & Feldman, 2008; Truxillo et al., 2012), and so it is difficult to understand whether changes in task proficiency are due to age-related changes or characteristics of the work environment. Chapter 2.2 showed that some functions (e.g., manual dexterity; Feinsed & Davenport, 2006) decline with age, but evidence also highlighted the increase in technical, social, personal, and methodological competences that occur with age (Kramer & DePryck, 2010). Moreover, an

examination of physiological age revealed that changes could be compensated for or moderated by a broad range of contextual work factors such as the type of task (Riby et al., 2004), work experience (Peeters & Emmerik, 2008; Ilmarinen, 2006), instability of the work environment (Niessen et al., 2010), or promotion to more demanding jobs (Sturman, 2003).

In the average working life, age-related changes in physiological functioning generally do not result in impairment and therefore have only a small effect on performance (HSE, 2011). As such, several studies (e.g., Clark, Oswald, & Warr, 1996; Ng & Feldman, 2008) have placed increase importance on examining a broader range of work characteristics when attempting to understand the relationship between age and performance.

Indeed, identifying and understanding task performance is complicated and comprises physical and cognitive changes that occur across the lifespan, sociological and demographic factors such as education and work experience, and work-related factors such as age-friendly HR policies, all of which will determine the strength and direction of these behaviours (Frerichs et al., 2012). Work performance now comprises more than just one's ability to perform a task, and so approaching this relationship unidimensionally only causes further ambiguity as it neglects a whole range of behaviours and contextual factors that provide insight and clarity. Rather, research now supports the notion that task performance manifests as an outcome in response to the development of non-core factors, and therefore should be

defined by motives, behaviours, and actions, rather than results (Aguinis, 2009; Koopman et al., 2011).

2.3.4 Individual-Task Adaptivity

Effective performance is determined by one's ability to adapt to a range of individual and organisational changes (Griffin, Neal, & Parker, 2007). Being adaptive therefore involves "coping with, responding to, and supporting changes unfolding in the organizational environment, such as changes in strategy, technology, or job design" (Madrid et al., 2018, p. 462). Specifically, individual task adaptivity reflects one's initiative and responsiveness to changes in workplace equipment, processes, and procedures associated with individual core tasks with minimal input from management (Crant, 2000; Griffin, Neal, & Parker, 2007; Strauss et al., 2013). While both adaptive and proactive behaviours reflect the demands of uncertain work contexts, adaptivity is underpinned by one's ability to cope with pressure and respond to uncertain situations (Johnson, 2003; Mueller & Pulakos, 2015), and so is concerned with reactive, rather than active, behaviours (Sturman, 2003; Griffin, Neal, & Parker, 2007).

Existing research on age and coping with uncertainty or work stress has employed the theory of lifespan development with respect to the primary and secondary control strategies that can facilitate future-oriented behaviours (i.e., adaptivity and proactivity; Zacher & Kooij, 2017). Primary control strategies refer to the manipulation of ones work environment in order to meet ones needs and motives, while secondary control strategies are more reactive in that individuals attempt to adaptively fit to environmental demands

(Heckhausen, Schulz, & Wrosch, 2010). Older employees are more likely to use secondary strategies to align with possible losses in ability so that they are able to maintain functioning, including restructuring and reprioritisation of goals (Heckhausen, Schulz, & Wrosch, 2010).

Strauss et al. (2015) suggest that adaptive behaviours begin with an organisation's response to uncertainty, wherein three categories of resources are created that enable employees to engage in future proactive behaviour. Organisations firstly acquire new information and gather knowledge that assist employees in adjusting and responding to change, thus facilitating adaptive behaviour and increasing change-related self-efficacy (Strauss et al., 2015). This also suggests that those expressing higher levels of adaptivity will also have the capability to be proactive. Being adaptive can therefore refer to a wide range of anticipatory or reactive behaviours that help to maintain performance levels and minimise disruption during times of change (Jundt, Shoss, & Huang, 2015), such as solving problems creatively, dealing with unpredictable work situations, or learning new tasks (Pulakos et al., 2000; Koopmans, 2014; Jundt, Shoss, & Huang, 2015).

Because adaptivity comprises both cognitive and interpersonal components across a range of unpredictable situations (Cleveland et al., 2019), it's relationship with age is not immediately clear. Studies examining calendar age and adaptability have mostly presented no significant linear relationships (e.g., O'Connell et al., 2008; Ng & Feldman, 2008; Kunze et al., 2013; Gemmano et al., 2022), though there has been some evidence of negative linear

relationships (e.g., Gostautaite & Buciuniene, 2015). There does, however, exist a profound belief that older employees are less adaptable in that they are more resistant to change, less willing to participate in training, and less receptive to new ideas or dynamic work situations (e.g., Horner, 1980; Isaksson & Johansson, 2000; Riolli-Saltzman & Luthans, 2001; Dixon, 2003; Kite et al., 2005; Posthuma & Campion, 2009). This is also supported by research presenting lower ratings for workers aged 50 and over on their motivation to learn new skills, flexibility in adjusting to new situations, and technological adeptness (Van Dalen et al., 2011; 2017; Turek & Perek-Bialas, 2013).

This may indirectly link to the depreciation model (Yeatts et al., 2000), which assumes that employee value depreciates with age and work opportunities will decline accordingly. This assumption can hinder skill maintenance, development, equality, and self-efficacy, all of which can negatively impact adaptive behaviours (Kooij et al., 2010; Finkelstein & Truxillo, 2013). For instance, Harlos and Pinder (2000) discovered that unequally treated employees reported non-adaptive behaviours and feelings such as regression, suppressed effort, irritability. Research has shown that organisations providing support in areas where adaptivity is important (e.g., innovation, creativity) are able to mitigate negative work outcomes such as burnout and emotional exhaustion (Apenteng, Boakye, & Opoku, 2022). However, this buffering effect was only present for those with high perceived adaptivity, so operating under ageist assumptions about adaptive performance may hinder an organisations ability to minimise work stressors.

Observable negative relationships appear to support the underlying assumptions of the SOC model outlined in chapter 2.2, which suggests that older employee focus more on maintaining and preventing losses rather than learning new skills (de Lange et al., 2010; Kooij et al., 2011). These losses often refer to the physical and cognitive changes that occur across the life course, which have been shown to predict both adaptive and proactive performance (e.g., Le Pine et al., 2000; Pulakos et al., 2002). For instance, the negative effects of ageing on cognitive ability, such as memory-recall, multitasking, fluid intelligence, and perceptual motor skills (e.g., Besdine & Wu, 2008), are associated with one's ability to adapt to new situations or tasks (e.g., Le Pine et al., 2000; Pulakos et al., 2002) and contribute to an increased strain on older workers operating in more unpredictable environments (Frey, Mata, & Hertwig, 2015; Rydzewska et al., 2018). This is because those with a higher general cognitive ability are able to represent more information and process it quickly, thus resulting in faster learning experiences and a better understanding of changes occurring in the work environment that require adaptive behaviours (Le Pine et al., 2000).

Still, adaptivity is predicted more strongly by cognitive ability and is more predictive of abstract problem-solving than task performance or citizenship behaviour (Le Pine et al., 2000; Pulakos et al., 2002), and so these findings may be more applicable to stable environments. Here, individuals are able to simplify more complex decision-making processes within the work environment by limiting both the quantity and complexity of information to

which they attend (Pachur, Mata, & Schooler, 2009; Rydzewska et al., 2018). This makes it increasingly important to provide an environment where older workers have autonomy and flexibility to call upon experiential knowledge and crystallised intelligence to mitigate the potential negative effects of cognitive decline on adaptive behaviour (Kanfer & Ackerman, 2004; Feinsod & Davenport 2006; Hunter & Thatcher, 2007). For instance, Chen et al. (2005) found that adaptivity was higher when employees experienced a choice episode, rather than a goal-striving episode, in that older employees valued autonomy and flexibility in resource allocation above allocating resources to the pursuit of goal accomplishment.

The knowledge and experiences accumulated within one's tenure can offset some of the declines in cognitive ability by using past experiences to respond more efficiently to uncertainty or unpredictability (Park & Park, 2019). Job tenure or experience within one's role has been shown to positively predict adaptive performance, usually explained by increases in experiential knowledge and skills pertaining to work situations and tasks (e.g., Pulakos et al., 2002; Chen et al., 2005; Sahin & Gurbiz, 2014). In some cases, experience can add more incremental validity beyond cognitive ability and personality traits (Pulakos et al., 2002).

Even in stable environments, employees may experience losses in one area when implementing compensation strategies, but more so in roles with higher quantitative demands. Those operating in roles that require higher levels of creativity and innovation, for example, may be more profoundly affected by

their ability to adapt and therefore be impaired at a younger chronological age. For instance, early studies showed that the task performance of technological engineers peaked in the mid-thirties and declined thereafter (Price, Thompson, & Dalton, 1975). However, evidence suggests that older workers will perform more effectively when provided with task significance and complexity such that they are able to utilise accumulated knowledge and skills to perform challenging work, but not to take on additional or markedly different tasks (Zacher & Frese, 2011; Zaniboni, Truxillo, & Fraccaroli, 2013; de Boer, 2021). For instance, Karanika-Murray et al. (2022) found that employees were most adaptive in early and later life stages, and least adaptive at the midlife stage; however, this decline in adaptivity at the midlife stage could be improved markedly by increasing job complexity.

This finding can also be explained by changes in circumstances that impact the resources expendable to support adaptive performance. For instance, middle-aged employees are more likely to balance work and caring responsibilities (Baslevent & Kirmanoglu, 2012), and therefore place more value on work-life balance and role flexibility. Huffman et al. (2013) discovered an inverted-U shaped relationship between age and work-life balance, such that psychological resources begin to be directed towards personal responsibilities, such as parenting, care, or settling into a new job role. During this time, resources which could be directed towards adaptivity are redirected elsewhere, thus creating a midlife dip in adaptive behaviours (Scheibe & Zacher, 2013; Karanika-Murray et al., 2022). Job complexity can improve

adaptivity during this dip but has little effect in later life (Karanika-Murray et al., 2022).

Still, these patterns may vary greatly in practice, and so understanding how employees feel becomes just as informative as their calendar age. Unlike calendar age, subjective age recognises that individual life cycles differ significantly, and employees of the same calendar age will not necessarily require the same support or have the same motives (de Lange et al., 2006; Kooij et al., 2011). As such, subjective age is associated with group differences in social roles and adaptability or life experience in significant events (e.g. widowhood; Westerhof & Barrett, 2005) at work or at home.

When employees feel younger (i.e. lower subjective age) they are more likely to exhibit a readiness for change (Drazic & Schermuly, 2021). They are also more likely to seek out opportunities for optimal person-job fit such that they are better able to cope with and respond to uncertain or unpredictable situations (Nagy, Johnston, & Hirschi, 2019). Kunze et al. (2015) suggest that a lower collective age identity is especially relevant in dynamic environments because they require higher levels of flexibility and adaptivity in all life stages in order to maintain performance. Armenta et al. (2018) found that a lower (i.e., younger) subjective age positively predicted older workers' responses and ability to cope with negative events at work which, in turn, was positively associated with work engagement. Indeed, the attitudes towards the ageing process can serve to support or hinder adaptivity in flexibly responding to

changes in workplace policies, processes, and group dynamics (Westerhof & Barrett, 2005; Kwak et al., 2018).

2.3.5 Individual-Task Proactivity

Whereas adaptivity concerns the ability to react, proactivity concerns self-initiated change behaviours, and comprises the entire process of anticipating, planning, and responding to future requirements (Grant & Ashford, 2008; Hauschildt & Konradt, 2012). More specifically, individual task proactivity refers to an employee's ability to actively identify and pursue opportunities to offer improvements in fulfilling core tasks (Griffin, Neal, & Parker, 2007). Proactivity therefore represents the initiative and anticipation exhibited by employees to identify and implement solutions in response to change and uncertainty (e.g., Frese & Fay, 2001; Parker, Ellis, Nguyen, Arora, 2006; Strauss et al., 2013). These characteristics overlap with adaptivity, supporting the notion that adaptivity can positively predict future proactive behaviours (Griffin, Neal, & Parker, 2007; Griffin, Parker, & Mason, 2010; Parker, Bindl, & Strauss, 2010). This is partially because losses can result in adaptive capacity which leads to the use of proactive strategies (Zacher & Kooij, 2017).

Although Griffin, Neal, and Parker's (2007) framework segregates proactive behaviours aimed towards responsibilities at the individual, team, and organisation levels, there exists two predominant schools of thought underlying the broader construct of proactive performance. Individual proactivity is similar to on-the-job proactivity, which is the degree to which an employee actively engages in solving operational inefficiencies (Veldhoven & Dorenbosch, 2008). Developmental proactivity, on the other hand, holds

similarities with team and organisational proactivity because it describes the pursual, learning, and acquisition of new skills and knowledge to ensure future employability (Veldhoven & Dorenbosch, 2008).

Proactive behaviours are present in several subdimensions of work performance, such as personal initiative and creativity (Frese & Fay, 2001). Economic transformation has increased the pressure on employees to use initiative and provide better ways of working without supervisory oversight (Crant, 2000; Strauss et al., 2013), so proactivity is considered as an integral component of workplace processes, including self-leadership motives and heightened goal orientation (Hoch, Pearce, & Wenzel, 2010; Parker, Bindl, & Strauss, 2010). Being proactive is usually a dyadic process in that it requires supervisory engagement to facilitate in challenging goal-setting. The extent to which goals are accomplished depends on several workplace design factors (e.g. fostering autonomy) and an individual's attitudinal factors (e.g. perseverance) (Crant, 2000; Parker, Bindl, & Strauss, 2010).

As such, proactive behaviour is associated with intrinsic motivation and work engagement, because engaged employees are considered active in utilising resources and thriving on challenging work to stay engaged (Bakker et al., 2011; Parker & Griffin, 2011). Parker, Bindl, and Strauss (2010) suggest that three motivational paths underpin proactive work behaviours: 'can do' (i.e. feelings of control and self-efficacy), 'reason to' (i.e. intrinsically stimulating work), and 'energised to' (i.e. the persistence and vigour aspects of the the motivational process). These three paths contribute to one's positive affect,

which describes an individual's subjective experiences associated with positive feelings such as happiness and intellectual stimulation, and is considered an antecedent to proactive behaviours (Doerwald et al., 2016).

However, Garcia-Chas et al. (2014) found that intrinsic motivation did not predict proactivity of engineers at the task or team level but mediated the relationship between political skill and proactivity. They also found professional experience to predict these levels of proactivity, indicating that one's experience could facilitate proactive behaviours in their individual and team roles. This research could indicate that proactivity is determined by the extent to which challenging and intrinsically stimulating goals are set and initiative and experiential knowledge can be used to achieve them (Fritz & Sonnentag, 2009; Parker & Griffin, 2011). This indicates the presence of highly complex and interdependent relationships between work characteristics, employee motives, goal-setting, and the proactive behaviours exhibited.

Chung-Yan and Butler (2011) found significant interactions between job complexity, job design, job satisfaction and the proactivity of workers, and proposed that job complexity was more positively related to person-job fit and satisfaction for highly proactive workers. Similarly, Claes and Van Loo (2011) found a positive relationship between proactive behaviours and wellbeing, which then predicted a later expected retirement age. Such research builds upon SOC theory by understanding individuals' proactive goal-setting behaviours in accordance with developmental optimisation strategies and the

interdependencies between employee motives, work characteristics, and proactive behaviours (Dikkers et al., 2017).

Although individuals are generally motivated to experience challenging situations, older workers are more likely to do so while striving to balance their changing needs, motives, and abilities (Zacher & Kooij, 2017). FTP would posit that employees approaching latter career stages will construct goal motives based on the opportunities they perceive to be available and applicable to their circumstances (Rudolph et al., 2018). This naturally impacts the pursual of proactive behaviours, which are future-oriented and allied with uncertainty (Ng & Feldman, 2010). As older employees experience physiological and cognitive impairments (e.g., fluid intelligence) that are associated with the normal ageing process, they may remove themselves from situations where such impairments are more pronounced by exit or demotion (Belbase et al., 2015). This may also explain why older workers are less likely to focus on personal growth, which requires the proactive pursual of new skills and knowledge, and more likely to maintain skills and prevent losses (Ng & Feldman, 2010). Instead, they may pursue challenge in their role responsibilities through the use of experiential knowledge and crystallised intelligence, such as job complexity (Dweck, 2017; De Boer, 2021).

As such, literature on the relationship between age and proactivity has varied widely in identifying the motives that underpin proactive behaviours, and how those behaviours change with age (Kooij et al., 2011; Zacher & Kooij, 2017). The majority of studies do not show differences between proactive behaviours

in younger and older employees (e.g., Ng & Feldman, 2008; Bertolino, Zacher, & Kooij, 2015; Gemmano, Manuti, & Giancaspro, 2022), though there is evidence of weak positive relationships between age with personal initiative and voice (e.g., Thomas, Whitman, & Viswesvaran, 2010; Tornau & Frese, 2013) and negative relationships have been observed in contexts where ageist stereotypes are prevalent (Zacher & Bal, 2012; Truxillo et al., 2012), or where employees feel much older than they are (Zhang & Wood, 2022). Research has also shown that younger employees engage in future-oriented proactive behaviours (e.g., Warr & Fay, 2001; Strauss et al., 2011) and that older workers engage in present-oriented proactive behaviours (e.g., Van Veldhoven & Dorenbosch, 2008).

Some proactivity literature suggests that behaviours are better predicted by how positive one feels about the ageing process and whether opportunities are available that align with their motives (van Veldhoven & Dorenbosch, 2008; Zhang & Wood, 2022). The way that employees feel about their age may therefore be a useful indicator of whether employees will proactively seek ways to maintain performance levels in later life (Bindl & Parker, 2010; Nagy, Johnston, & Hirschi, 2019). For instance, Nagy, Johnston, and Hirschi (2019) found that subjective age was significantly negatively related to proactive behaviours, measured as job crafting, over and above the effect of chronological age, self-rated health, and role autonomy. Those workers exhibiting proactive behaviours in job crafting also reported higher task significance and meaningfulness above and beyond autonomy, thus signifying

a bidirectional relationship between subjective age and the self-initiated behaviours directed towards SOC strategies.

The awareness of and positive perceptions toward age-related changes can also help to accommodate assimilative strategies into later life (Zhang & Wood, 2022). This awareness has a mediating effect on the relationship between chronological age and two forms of proactivity (task and organisation), such that the relationship between age and proactivity reflects an individual's perception of gains or losses during the ageing process (Zhang & Wood, 2022). As we age, we gain more self-knowledge and become comfortable with positive and negative emotions, thoughts, and behaviours so that we can better deal with problems or challenges (i.e., emotional regulation, Baltes, 1987). As a result, the ageing process can bolster self-efficacy in strengths and weaknesses when initiating work behaviour (Bosma & Kunnen, 2001). Similar results have been observed in that a positive reflection on the ageing process can result in higher levels of self-perceived competence, which has been shown to predict proactive behaviours (Weiss, 2020). Thus, internal and external ageist assumptions held towards older workers can influence whether employees have a positive or negative experience with ageing, and subsequently promote or deter proactive performance at work.

For instance, jobs of high complexity and that are resource-intensive are more stressful for older workers because they demand higher levels of information processing, short-term memory ability, and working under time constraints (Kanfer & Ackerman, 2004; Schmitt & Unger, 2019). Proactivity in itself

includes self-initiated behaviours pertaining to work beyond core tasks, which may require employees to learn new skills, carry out unplanned work, or apply creative solutions to problems (Zacher & Kooij, 2017). As prior learning can hinder subsequent memory, older workers are more susceptible to proactive interference from long-term working memory (Rhodes, Buchsbaum, & Hasher, 2021). Such conflicts between old and new information, combined with age-related declines in fluid intelligence can result in increased level of cognitive demands which may require resources to be directed away from core task performance (Oberauer et al., 2017).

However, research has also shown that flexible workplaces can enhance positive affect which, in turn, is associated with performance (Dreisbach & Goschke, 2004; Dreisbach, 2006). Conversely, rigid workplaces that place heightened importance on maintaining core task performance also comprise supervisors that oppose and resist proactive behaviours, resulting in impaired proactivity and a lower probability of employees pursuing change-related behaviours in the future (Dreisbach & Goschke, 2004; Dreisbach, 2006; Parker & Griffin, 2011).

Curvilinear relationships support the impact of job characteristics in the relationship between age and performance. Karanika-Murray et al. (2022) discovered an S-shaped relationship between age and proactivity that was more intense for jobs of low complexity, thus showing stronger declines in proactivity, particularly from 60 onwards. Those with much more experience become specialists or experts at their job (Ericson, 2000), and so integrating

job complexity into these roles can provide much-needed challenge but not require excessive resources, which is of benefit to all ages (de Lange et al., 2006). Those extending their working lives beyond anticipatory retirement age would therefore benefit from some level of job complexity and cognitive challenge as it has been shown to improve proactive behaviours from the age of 50 (Karanika-Murray et al., 2022). Increasing job complexity even to average levels can mitigate losses of proactivity after midlife but enhancing job complexity such that it provides employees with intellectual stimulation and cognitive challenge can help proactivity to recover to levels witnessed at early life stages (Karanika-Murray et al., 2022).

Lifespan perspectives on ageing can provide insight into the proactive behaviours of employees as they transition through different life stages and balance changing needs and abilities. Older employees may experience increases in generative motives and seek out meaning in their work through, for instance, citizenship behaviours (e.g., Ng & Feldman, 2008). Proactive behaviours may therefore veer away from growth and development and be targeted towards passing on accumulated knowledge to others (e.g., McAdams et al., 1993; Zacher & Frese, 2011).

2.3.6 Team and Organisation Level Performance

The previous sections focused predominantly on individual-level performance behaviours as the foci of this thesis. However, the issues associated with the Covid-19 pandemic have meant that employees have needed to adapt to uncertain situations both in their work groups (e.g. redundancies) and in the broader organisational structure of working (e.g. remote working); with that,

comes the ability to initiate change within different work systems and with changing responsibilities. This section builds upon the previous findings on age and performance behaviours in understanding whether age is associated with behaviours at the team and organisation level.

Existing research has identified similarities between team and organisation level performance constructs which go beyond the individual task, such as extra-role behaviours, discretionary behaviours, organisational citizenship behaviours (OCB), pro-social organisational behaviours, and counterproductive behaviours (Baruch et al., 2004; Koopmans, 2014; Delgado-Rodriguez et al., 2018). For instance, components of citizenship performance – personal and organisational support – correspond to the concepts of team and organisation proficiency as they refer to one's role requirements within the team or organisation (Neal et al., 2012). As there has only been a handful of studies examining proficiency, adaptivity, and proactivity at the team and organisation levels, this section will touch upon corresponding constructs that have been more extensively researched to ascertain their associations with changes occurring across the lifespan. The most relevant frameworks that correspond to behaviours at these levels appear to be contextual performance and OCB (Griffin, Neal, & Parker, 2007; Neal et al., 2012).

Contextual performance is a branch of extra-role performance that contributes to organisational effectiveness in ways that shape the culture, norms, and context which all serve as catalysts for task processes (Borman & Motowidlo,

1993; MacKenzie et al., 1998). Similarly, OCB encompasses helpful and supportive behaviours at work that promote social cohesion, and participation in activities that promote organisations' internal and external reputation (LePine, Erez, & Johnson, 2002; Ng, Simon, & Feldman, 2016). These concepts differ from task performance in that they relate to the motives and characteristics of employees in and of being a 'good organisational citizen' (Hoffman et al., 2007), whereas task performance is more concerned with abilities and skills (Motowidlo, Borman, & Schmit, 1997).

Contextual performance and OCB often involve discretionary behaviours that are considered secondary to the original role description, such as volunteering to assist colleagues or tasks that are unrelated to their role but indirectly contribute to organisational goals (Koopmans, 2014; Delgado-Rodriguez et al., 2018). On the other hand, it can relate to adherence of regulations even if they are inconvenient or volunteering to help others even if it creates additional work (Podsakoff et al., 2000). This is reflective of Griffin, Neal, and Parker's (2007) view of team and organisation proficiency, which recognises that such behaviours are no longer considered discretionary because they are informally expected by employers. However, the common theme among these concepts is that they embody discretionary individual behaviours that go beyond formal or task requirements to support the broader work system, although are rarely recognised by the reward system (Organ, 1988; Mullins & Christy, 2016; Seong & Hong, 2018). Performing extra-role behaviours is therefore an informal – rather than formal – expectation of employees nowadays, and those

fulfilling these expectations report higher levels of social acceptance, satisfaction, and perceived support (Hutchinson, 2013).

Empirical data has yielded mixed findings concerning the relationship between calendar age and OCB, including positive relationships (e.g., Li & Wan, 2007; Ng & Feldman, 2008), negative relationships (e.g., Iun & Huang, 2007), or no significant relationships (e.g., Li, Liang, & Crant, 2010; Zhang & Farndale, 2021). Nagy, Fassbender, and North (2019) found that older individuals who felt younger showed higher levels of work engagement and OCB, which could suggest that allowing older workers to pursue generativity motives through opportunities for OCB may reciprocally improve feelings of youth, and vice versa. Furthermore, individuals that feel younger and engage in OCB are more likely to perform better in teams (Nielsen et al., 2012).

Lifespan theories of development can be applied to better understand the intricate relationship between resources, abilities, motives, goals, and performance behaviours. The lifespan theory of control proposes that older individuals are constrained by the losses encountered during the ageing process, including time, energy, and ability (Heckhausen, Schulz, & Wrosch, 2010). Performance behaviours directed towards one's role within the team and organisation creates additional demands, and so older employees may assess whether they have the resources able to fulfil formal or informal requirements, which will determine whether they pursue performance behaviours relating to the wider organisation.

2.3.6.1 Proficiency

These informal behaviours may include helping a team member or providing support which contributes towards team goals and effectiveness. Employees that are able to coordinate and integrate the actions of other team members towards a common goal through, for example, assisting with complex tasks or keeping meeting minutes within a team meeting, are considered proficient at team-level (Griffin, Neal, & Parker, 2007; Hauschildt & Konradt, 2012). This differs from team performance, which is concerned with collective team performance behaviours, rather than individual contributions to their role as a team member. Organisation member proficiency shares commonalities with individual task proficiency in that behaviours can be formalised and defined. This dimension involves the roles, expectations, and behaviours that accompany organisational membership, such as defending the reputation or participating in committees to contribute to broader parts of the organisation (Griffin, Neal, & Parker, 2007).

Both team and organisation proficiency correspond with support-oriented aspects of OCB. Team proficiency corresponds with personal support or helping behaviours within the team, although conscientious initiative also involves compliance with expectations regarding the effort exerted in one's work role (Podsakoff et al., 2000; Griffin, Neal, & Parker, 2007; Neal et al., 2012). Organisational proficiency is similar to the OCB dimensions of organisational support (e.g., Johnson, 2003) and loyalty (e.g., Podsakoff et al., 2000). Both appear to correspond with the concept of civic virtue, which is the active participation in activities regarding the wellbeing of the organisation

(Podsakoff et al., 1990). Like other components of OCB, these behaviours are considered as discretionary (Borman & Motowidlo, 1993; Koopmans et al., 2011), though have become increasingly expected from employees despite being absent from the formal requirements of the job role (Griffin, Neal, & Parker, 2007). Unsurprisingly, aspects of workplace design that tap into intrinsic motives (e.g., transformational leadership) are positively associated with proficiency behaviours at the team and organisational level (Limsili & Ogunlana, 2008).

There has been scant evidence that specifically analyses the relationship between age and support-oriented components of OCB, though parallel research indicates that older employees are expected to be more cooperative with colleagues, while younger colleagues spend less time helping colleagues in favour of personal growth and career development (Singh & Singh, 2010; Richter et al., 2015). In support of this, Huang et al. (2015) found age to be positively related to conscientious initiative, suggesting that older employees are able to adhere to informal and formal rules that promote social cohesiveness. In age-diverse environments, this can serve to benefit older employees, who are more motivated by accomplishment, enjoyment, and current skill utilisation and therefore rely more on secondary control strategies (Kooij et al., 2011). As such, they may have an increased number of opportunities to support younger employees by imparting their accumulated knowledge and wisdom.

Ng & Feldman (2008) found that job complexity moderated the relationship between age and OCB, such that the relationship weakened as complexity increased, and strengthened as it decreased. As previously mentioned, older workers aim to seek optimal working conditions. Those who are fulfilling highly complex job roles may exhibit higher levels of adaptivity and proactivity at the individual level (e.g., Karanika-Murray et al., 2022), but this may leave less resources available to perform optimally at the team or organisation level. Moreover, a restrictive FTP can be paradoxical in that those employees may display more conscientious OCB but in doing so will pursue fewer future-oriented behaviours (Ng & Feldman, 2011).

Utilising existing resources, such as experience, may help older employees to maintain support-oriented behaviours while fulfilling responsibilities in more complex tasks. Sonnentag and Volmer (2009) found that experience positively predicted individual contributions to teamwork processes and effectiveness within software design teams. They unexpectedly found a negative association between self-efficacy and problem solving, indicating that several members with higher perceived competence may experience conflict when attempting to achieve a common goal.

Support can also be a reciprocal variable in that employees who feel supported and accommodated are likely to exhibit more extra-role behaviours, despite losses in later life. This support, however, appears to be stronger for younger employees. A study by Meyers, Kooij, Kroon, Reuver, & Woerkom (2020) found that the effect of positively perceived organisational support on

contextual performance was moderated by age, and notably more so in younger employees, suggesting that the abilities and experience accumulated throughout the life course results in a lower reliance on organisational support in fulfilling responsibilities (Roberts et al., 2006; Meyers et al., 2020).

Zhang and Farndale (2021) found that age profiles were unrelated to OCB, nor did age moderate the relationship between job resources (measured as performance feedback and task variety) and OCB. This would indicate that the effects of job resources are stable across different age groups. One explanation is that the job resources being measured are more relatable to individual-task performance behaviours, whereas OCB are often considered an extra-role behaviour.

2.3.6.2 Adaptivity

Team member adaptivity questions whether individuals respond constructively to internal and external changes that affect their role within the team, and has been an integral role in performance measures that acknowledge uncertainty within the modern work environment (Pulakos et al., 2000; Griffin, Neal, & Parker, 2007). Indeed, the extent to which team members adapt their roles to external changes has shown to influence job performance (Moon, Hollenbeck, Humphrey, Ilgen, West, & Ellis, 2004). Moreover, providing an environment and the right information to empower employees has been positively linked to problem-solving during uncertainty (Cordery, Morrison, Wright, & Wall, 2010).

Similarly, organisation member adaptivity refers to a worker's ability to cope with and respond to changes that affect their organisational membership.

Whilst existing measures of adaptivity have collapsed individual, team, and organisation adaptivity (e.g. Pulakos et al., 2000), the increasing dynamicity of work environments calls for unique recognition of organisational-level changes, such as restructuring, mergers, and business process reengineering (Griffin, Neal, & Parker, 2007). The experience of successfully coping with change enables individuals to develop higher self-efficacy (Bandura, 1997), which is an important antecedent of proactivity (e.g. Parker, Williams, & Turner, 2006). As such, employees that are able to dynamically respond and cope with changes in an uncertain environment are also likely to engage in a higher level of proactivity (Strauss et al., 2013). Thus, adaptivity comprises both cognitive (e.g. learning new changes to technologies) and non-cognitive elements (e.g. demonstrating flexibility in schedule changes).

Adaptive behaviours within the team or organisational role shares similarities to the concept of adaptability, which refers to team capabilities in maintaining interdependence and their coping capacity with regards to broader organisational changes (Pulakos et al., 2000). The more specific term of 'interpersonal adaptability' (Kozlowski et al., 1999) refers to the capability of the team "to maintain coordinated interdependence" (p. 273) in response to uncertainty and the modification of work roles as and when unpredictable events arise. The ability to dynamically adapt to and align with organisational changes is positively associated with overall performance (Moon et al., 2004). The changes occurring at this level also relates to the 'sportsmanship' component of OCB (Podsakoff et al., 2000), which is the extent to which employees complain about small issues, resist work changes, and thus cause

delays to organisational functioning. Huang et al. (2015) found that age had a significant positive effect on sportsmanship, suggesting that older employees may be better equipped at coping with issues within internal structures.

The generational differences in altruistic and social values can affect how workers react to work situations (Twenge et al., 2010; Truxillo et al., 2012), indicating that older workers may be more capable in performing adaptively if their environment enables them to fulfil increasingly important motives, such as those relating to generativity. Providing older employees with opportunities to nurture, teach, and share knowledge within the work group or team can minimise isolation, increase teamwork processes, and enhance the self-efficacy of older workers (McAdams et al., 1993; Bandura, 1997; Latham & Pinder, 2005), thus enhancing perceived competence in performing adaptively or proactively. Promoting and maintaining positive relationships can significantly influence individuals decision-making process in weighing up perceived risks and benefits of pursuing future-oriented behaviours (Parker, Bindl, & Strauss, 2010; Strauss et al., 2015).

Tenure and experience can also facilitate adaptive behaviours at the team and organisation level by allowing for the use of previously learned experiences to anticipate and react more positively to future changes (Zacher & Frese, 2009; Bal et al., 2010). They may also respond more constructively to new team members as they exhibit higher levels of cooperation and place higher value on social interaction (Singh & Singh, 2010).

2.3.6.3 Proactivity

This is also applicable to team member proactivity, which refers to the development of methods that benefit the situation or work methods of the team (Griffin, Neal, & Parker, 2007). As these actions are self-directed and change-orientated, they differ from the 'helpful' behaviours (Podsakoff et al., 2000) associated with OCB's. Proactivity and adaptivity are considered integral performance dimensions in autonomous and empowered team members, who are required to make comprehensive work-related decisions and continuously reflect and adapt based on results (Hauschildt & Konradt, 2012).

Griffin, Neal, and Parker (2007) describe organisation member proactivity as the proactive behaviours which improve organisational efficiency. Whereas organisation-level proficiency is concerned with maintaining positivity about the organisation; and adaptivity reflects one's coping mechanisms to structural changes within the company, proactivity is concerned with employee behaviours that help to develop and innovate the whole organisation, rather than at functional level (Griffin, Neal, & Parker, 2007). This dimension differs considerably to concepts such as organisational loyalty as it encompasses self-initiated and future-directed behaviours (Parker, Bindl, & Strauss, 2010).

Team and organisation proactivity is more comparable to developmental proactivity than on-the-job proactivity as it is concerned with the future-oriented behaviours that may require the pursual, learning, and acquisition of new skills, rather than solving inefficiencies in everyday operational processes (Veldhoven & Dorenbosch, 2008). It is therefore also linked to conscientious

initiative and support behaviours that are underpinned by making improvements to team performance and organisational efficiency.

In some studies, research has presented a negative relationship between calendar age and developmental proactivity (e.g., Warr & Fay, 2001; Zhang & Wood, 2022). This indicates a diminished initiative towards behaviours that require resources to be allocated to growth-related outcomes and aligns with the transition towards compensation strategies and preference for current skill utilisation (Kooij et al., 2011).

Older employees are more likely to value transferring knowledge and experience to colleagues as a means of saving their expertise as professional heritage within organisations (Barak, 1995), so may be more concerned with pursuing goals relating to the work group rather than the broader organisation. A bidirectional relationship has been observed between older employees and OCBs that promote social interaction and mentoring, such that older employees will proactively seek out these behaviours and report higher levels of satisfaction if allowed to do so (Bertolino et al. 2011). Those that are issued higher levels of autonomy and empowerment in team contexts also exhibit higher levels of proactive and adaptive performance as they are required to continuously reflect on, adapt to, and make decisions about specific processes and results (Kirkman & Rosen, 1997; Griffin et al., 2007). Additionally, Ng & Feldman (2012) found that older employees were more likely to exhibit innovative behaviours (i.e., curation and dissemination of new and beneficial

ideas) if they were allowed more freedom and not subjected to micromanagement.

In contrast, some studies have found no evidence to support a relationship between calendar age and developmental proactivity (e.g., van Veldhoven & Dorenbosch, 2008; Roobol et al., 2021), and argue that it is better predicted by how positive one feels about the ageing process and whether opportunities are available that align with their motives (van Veldhoven & Dorenbosch, 2008; Zhang & Wood, 2022). Nevertheless, organisation proactivity is more concerned with future-oriented behaviours that promote change across the entire organisation and may therefore be rooted in employees with high growth drives and in individuals aiming to develop careers (Zacher & Kooij, 2017). Older employees, on the other hand, are less competitive compared to younger employees, and so proactive behaviours targeted at improving how the organisation works may be neglected, particularly if opportunities already exist which allow for the fulfilment of generative motives, such as team performance (Singh & Singh, 2010).

2.3.7 Summary

The ageing process comprises losses and gains in abilities and changes to motives which can influence the direction and strength of work behaviours across the life course. What is clear is that the relationships between constructs of age and performance are far more complex and coexist with interdependencies of modern work environments. This chapter supported the argument that calendar age does not explain variations in proficiency, but the associations between adaptive and proactive behaviour with physiological and

psychological components of ageing are less clear. For instance, older workers engage in present-oriented proactive behaviours, and younger workers engage in future-oriented proactive behaviours due to differences in growth motives. Older workers are considered to be more cooperative and therefore more effective in team-oriented roles, while younger workers are more focused on growth and development (Singh & Singh, 2010; Richter et al., 2015). In order to untangle these webs, a clear taxonomy of work role performance (Griffin, Neal, & Parker, 2007) has been presented as a base from which relationships can be mapped between age and psychological climate characteristics for motivation.

Performance in itself is rarely viewed as an easily determinable or identifiable factor and comprises physiological and psychological changes, as well as sociological and demographic factors such as experience and organisational support (van Dalen, Henkens & Schippers, 2010; Campbell & Wiernik, 2015; Karanika-Murray et al., 2022). In a similar fashion, successful ageing theories indicate that the ageing process encompasses a range of losses and gains, control and resource strategies, and social-environmental and workplace influences (Carstensen, 1991; Baltes, 1997; Heckhausen, Schulz, & Wrosch, 2010). The extent to which these strategies are optimised, in other words, whether employees are protected against age-related changes and are able to maintain performance, remains ambiguous because very little research accounts for age-related changes in needs and motives when measuring work characteristics that affect performance. To this end, research needs to incorporate a broader set of workplace characteristics that are grounded in

fundamental psychological needs that underpin motivation. In doing so, the interplay between age conceptualisations and psychological climate characteristics in predicting performance can provide a deeper understanding into how needs and motives are differentially satisfied by work characteristics across the life course (Ng & Feldman, 2008; Schalk et al., 2010).

Chapter 3: Literature Review:

Psychological Climate

The first chapter outlined several key demographic trends that will have lasting effects on the workplace. Most pertinently, individuals will be required to continue working beyond anticipatory retirement ages within an environment that is fiercely competitive and dynamic whilst managing changes that occur across the life course. Role theory was briefly established as a lens to approach the age-performance relationship whereby researchers and practitioners may observe a deeper understanding of workplace outcomes by assessing a broader set of role responsibilities, preferences, associated behaviours, and the context in which they occur.

The initial literature review on age and work performance indicated that ability and motivation interact to affect performance, such that motivation may buffer losses in ability, and ability moderates motivation in a way that influences performance (Cleveland et al., 2019). *Being* and *feeling* old are conceptually different (Schwall, 2012; Nagy Fasbender, and North, 2019), so understanding the unique effects of physical and mental health can provide an insight into ones capabilities and goal orientations beyond chronological age. Nonetheless, motives do not exist in a vacuum but in the broader work environment which can stimulate or hinder motivation. The additive model of performance aligns with this notion in that declines in ability attributed to ageing can be compensated by higher levels of motivation by, for example, proactively

seeking out job crafting opportunities to fit roles to revised ability levels (Sackett, Gruys, & Ellingson, 1998; Nagy, Johnston, & Hirschi, 2019).

The second and third chapters uncovered the multidimensionality of the relationship between age and performance, with conflicting associations emerging depending on the construct being examined. From a practical point of view, research into career sustainability has demonstrated the positive effects of extending the working lifespan on physiological health and wellbeing (Yeomans, 2011; White, Burns, & Conlon, 2018). Comparatively, taking early retirement has been associated with declines in physical and mental health due to fewer opportunities for problem solving, social interaction, and general cognitive use (Conen et al., 2014; White, Burns, & Conlon, 2018). Relationships between age conceptualisations and a contemporary taxonomy of performance were examined. Much of the evidence suggested that job behaviours cannot be separated from the context in which they are enacted and as a result can be influenced not only by their own motives but also their perceptions and experiences of their work role and environment (Biddle, 2013; Matta, Koopman, & Conlon, 2015).

Despite this, existing research on workplace ageing has tended to focus on a unidimensional relationship between age and performance; and recent studies have examined ageist climate as opposed to psychological climate (e.g., Hanraham et al., 2022). Work interventions such as flexible human resource management (HRM) can improve work outcomes for younger and older employees (Bal & de Lange, 2015), but there remains a gap in knowledge as

to what work characteristics are valued most in different age conceptualisations, and whether this differentially affects performance behaviours. If these changes are not being addressed through work characteristics, then employees are likely to become less motivated to pursue performance behaviours.

This chapter will refer to psychological climate as employee perceptions toward their experiences of work characteristics and ascertain the degree to which this influences performance behaviour. A review of motivational changes associated with the ageing process will be presented before explaining how this influences the ways in which older and younger workers perceive and value similar work characteristics differently.

3.1 Psychological Climate

Psychological climate refers to individual perceptions of the work environment and comprises the policies, practices, procedures, and support or disciplinary systems within the workplace and the meaning that employees attach to them (Parker et al., 2003; James & James, 2008; Schneider & Barbera, 2014). Although psychological climate refers to individual perceptions, the referent in which these individual perceptions are framed can differ. One's own perceptions toward experiences within an organisation refers to the measurement of psychological climate with an individual referent, while perceptions toward shared experiences of the organisational environment are framed in an organisational referent (Baltes, Zhdanova, & Parker, 2009). Nowadays work characteristics are interdependent, workspaces are shared,

and experiences are shaped mutually; job roles often encompass a range of responsibilities that are undertaken both individually and collectively (Baltes, Zhdanova, & Parker, 2009; Karanika-Murray & Michaelides, 2015). As such, this chapter views climate as individual perceptions toward the work environment (i.e., psychological climate), recognising both the role-specific (i.e., individual referent) and shared nature (i.e., organisational referent) of work.

Note that the latter referent distinction does not mean that climate should be aggregated to an organisational-level construct, because this would only be applicable to a specific organisation and its members (Baltes, Zhdanova, & Parker, 2009). In other words, aggregation of psychological climate perceptions is better defined as organisational climate, which refers to the average perceptions held by members toward their organisation (Schneider, 1990; James & James, 2008).

Though conceptually distinct, the term climate shares commonalities with culture in that they aim to understand ways in which employees view and experience their work environment (Schneider & Barbera, 2014; Ehrart et al., 2014). Schein (2010) argues that climate can be viewed as a mediator between leader actions and the development of culture, in that workplace design and resource allocation determines employee perceptions (Schein, 2010). This differs from culture, which is shaped over time through the reinforcement of shared norms, values, and belief systems that become embedded within the organisation (Tang & Chen, 2001). Psychological climate

therefore provides a lens through which employee perceptions toward the work environment can framed in terms of needs and motives (Sen & Elmas, 2015), thus allowing actionable insights to be gathered without the need for significant organisational restructuring (Gray, 2007).

Between 1960-1985, climate research was focused on structure, risks, rewards, managerial support, and conflict (e.g., Litwin & Stringer, 1968; Schneider & Bartlett, 1968) to assess employee experiences and views within the work environment. Aguirre (1968) conceptualised each of these facets into four dimensions (ecology, background environment, social system, and culture). Ecology refers to material resources, equipment, and finance; the background environment reflects employee socio-economic status, education level, and the 'development of self' concept; the social system represents the relationships, formal and informal, between organisational units, leaders, and members, including decision-making, participation, and autonomous procedures; and culture, which is now considered a distinct concept, encompasses the norms, values, and beliefs that are central to the organisation (Tang & Chen, 2001).

Rollinson (2008) refers to these categories as physical, social, and political environments, many of which can be broken down into recognisable workplace factors that have consistently been shown to predict employee attitudes, behaviours, and work outcomes. This includes climates reflective of safety (Neal et al., 2000; Clark & Robertson, 2005), creativity and innovation, sustainability and corporate social responsibility (Norton et al., 2014), social

mechanisms (Rollinson, 2008), as well as the areas of leadership, communication, role identity, and feedback/reward structures (Furnham & Goodstein 1997; Zacher & Yang, 2016; Wilckens et al., 2020).

Attitudes toward work have shifted over the last 20 years with heightened emphasis now placed on the interdependence of workplace factors in understanding that work behaviours cannot be isolated from the environments in which they are enacted (Howard, 1995; Wall, Cordery, & Clegg, 2001). This has been reflected in the many approaches to psychological climate which only recently are being integrated with lifespan development perspectives to acknowledge the changing needs and desires of employees through different life stages (Kanfer & Ackerman, 2004; Warr, 2008; Burmeister, Hirschi, & Wang, 2019; Henning et al., 2019, 2023). Indeed, climate necessitates that the quality and context of work be recognised, and this perception is shaped by a multi-generational workforce and their changing needs, demands, and experiences (Waddell & Burton, 2006; Yeomans, 2011; SHRM, 2022). Being able to meet the needs of all workers is imperative, evidenced by a recent survey of over 600 companies which discovered that social systems, clear role responsibilities, extrinsic and intrinsic rewards, feedback, and learning opportunities were important to 93% of employees with similar importance assigned across a range of age groups (Kazoo, 2022).

3.2 Motivational Psychological Climate

Schneider and Barbara (2014) aptly stated “everything that happens in organisations is due to climate and culture, and everything that happens

affects climate and culture" (p. 679). Put simply, the perceptions of climate are determined by workplace characteristics that serve to address innate needs and desires. As a result, the consensus for most psychological climate characteristics is that a more positive view is associated with higher levels of work motivation (e.g., Baltes, 2001; Baltes et al., 2009; Parker & Griffin, 2011). This positive view is a result of the stimulation of intrinsic and extrinsic motives through workplace characteristics which, in turn, promote motivational psychological climates that are positively associated with work outcomes such as performance (James et al., 2008; Baltes et al., 2009).

Extrinsic motives refer to tangible rewards that are usually determined and fulfilled by organisational policy, such as salary, working hours, and other arrangements within the contractual agreement (Mullins & McClean, 2020). Intrinsic motives refer to meaningful rewards that psychologically validate the role that one plays within the workplace (Mullins & McClean, 2020). The extent to which these motives are met will determine the initiation of workplace behaviour, and the effort, intensity, and manner of behaviour that employees direct towards their duties (Pinder, 2014). It will also influence how engaged employees are, which refers to the physical, cognitive, and emotional harnessing of oneself to operational duties and broader organisational goals (Kahn, 1990; Suhartanto & Brien, 2018). As a result, workplace motivation has been regularly associated with work outcomes including individual and organisational performance, job satisfaction, turnover, and absenteeism (CMI, 2012; Harter et al., 2012; Cerasoli, Nicklin, & Ford, 2014).

Work motivation also links to the broader concept of positive organisational psychology, which refers to the application of organisational resources in order to improve the effectiveness and quality of life for members (Donaldson & Ko, 2010). This concept has gained popularity in recent years with researchers and practitioners alike due to the increasing importance placed on meaningful work and work-life balance (Donaldson, Lee, & Donaldson, 2019). For instance, participatory decision making has increased for wellbeing practices resulting in a variety of initiatives, such as locking offices to prevent late working, providing physical and mental healthcare facilities and support, and funding social events (Weinburg, Scott, & Morrison, 2017).

Both individually and collectively, work motivation is sourced within the work environment in areas such as job design (James & James, 1989; Hackman & Oldham, 2006), training and development (Park, Hye-Seung, & Kang, 2017), and leadership (McGregor, 1974), because they contribute to the pursual of specific courses of action with a certain degree of vigour and persistence (Buchanan & Huczynski, 2019). These workplace characteristics are used to measure work climate; for instance, a climate for autonomy is measured through perceptions of ones experiences with how jobs are designed, including challenge, significance, variety, and control (James, 1989; James & James, 2008). This is in contrast to general climate models which describe, for example, safety (Neal et al., 2000) or sustainability (Norton et al., 2014).

Measures of psychological climate are therefore underpinned by individual needs which are described by content theories of motivation (e.g., Alderfer,

1972), whilst also being grounded in process theories of motivation because the extent to which these needs are satisfied depends on their experience of work characteristics. For example, affiliation climate is measured through work-group cooperation and friendliness which serve to address generativity motives (James & James, 2008).

One of the most prominent motivational theories that has been examined in the frame of psychological climate and other developmental outcomes is self-determination theory (SDT; Deci & Ryan, 1985; 2000). SDT has branched into a number of different theories in recent years (see, e.g., Deci & Ryan, 2012), but operates under the principle that the simultaneous stimulation of three basic psychological needs (autonomy, competence, and relatedness) is required in order to foster autonomous motivation, which differs to intrinsic motivation by allowing for behaviours that provide pleasure (i.e., intrinsic) and that are viewed as part of one's identity (i.e., internalised). Workers who are autonomously motivated are engaged with work or tasks both willingly and by choice (Deci et al., 2017), whereas external factors give rise to control motivation (i.e., extrinsical motivation). The three needs underpinning autonomous motivation have been positively associated with work outcomes such as job satisfaction and discretionary behaviours, and negatively related to job stressors, job insecurity, and work-life imbalance (Slemp et al., 2018; 2021).

A renowned framework of psychological climate proposed by James and James (1989; 2008) outlines four key dimensions for positive psychological

climate: supportive leadership, role stress, autonomy and job challenge, and work-group cooperation. These constructs hold similarities with basic and growth needs identified in historical theories of motivation (e.g., Maslow, 1954; McClelland, 1961; Alderfer, 1972; Blanchard, 2011). For example, emotional needs theory (Nohria, Groysberg, & Lee, 2008) proposes that individuals are intrinsically motivated only when their needs to acquire, bond, comprehend, and defend are satisfied. Like SDT, each need is essential and cannot be prioritised or compensated for. Much of the work on motivational theory has focused on needs associated with self-efficacy, positive affect, meaning or identification, emotional affiliation and attachment, and growth.

Although there are a number of workplace characteristics models which map to models of motivation, many examine experiences within one's job role as the singular source of motivation. This is in spite of the shared nature of work (i.e., organisational reference for psychological climate), and the wider responsibilities comprised in modern job roles (Griffin, Neal, & Parker, 2007). Karanika-Murray and Michaelides (2015) used SDT as a frame of reference to guide the development of the Workplace Characteristics Model (WPCM), which describes workplace characteristics that can foster motivation pertaining to the three psychological needs outlined by SDT. In doing so, the WPCM (Karanika-Murray & Michaelides, 2015) and corresponding measure – the WPDQ – describe a domain-specific rather than generic climate (Barbara & Schneider, 2014).

3.3 Motivational Psychological Climates for Successful Ageing

The relationship between the 'needs' proposed in various content theories and the relationship with quality-of-life indicators have been supported by empirical studies, providing evidence that supports a sequential fulfilment of needs (Hagerty, 1999; Baslevent & Kirmanoglu, 2012). For instance, Baslevent and Kirmanoglu (2012) used data from 20 European countries to examine whether employee preferences for job attributes were associated with their unique characteristics in ways that are line with content theories of motivation. Basic demographic data served as tools in uncovering the socio-psychological determinants of job attitudes and preferences. For instance, individuals were found to place the highest levels of importance on receiving a high income and the ability to combine work and family/caring responsibilities at age 35, resulting in fewer resources being allocated to pursuing development opportunities.

Research has indicated that ageing can impact performance through motivation, such is the negative association between increasing age and the motivation to pursue behaviours that are beneficial to employers (Rhodes, 1983; Judge & Locke, 1993; Sturman, 2003; Kooij et al., 2011). However, section 2.2.1 evidenced the intricacy of motivational changes occurring across the lifespan which can bidirectionally influence the meaning of work and work-related behaviours (Baltes, Rudolph, & Bal, 2012). This can be illustrated through the lens of the motivational theory of lifespan development (MTLD; Heckhausen, Schulz, & Wrosch, 2010), which argues that individuals attempt

to optimise primary (i.e., attempt to influence ones work environment) and secondary (i.e., attempt to adapt to ones work environment) control strategies by selecting, pursuing, engaging in, or disengaging from developmental and personal goals to reflect changes in risks and opportunities across the life course (Heckhausen, Schulz, & Wrosch, 2010).

For example, young adults tend to rely on primary control strategies (e.g., pursuance and persistence in goal achievement) that emphasise or result in extrinsic rewards (Akkermans et al., 2016). In later adulthood, individuals switch to secondary control strategies (e.g., achieving positive performance appraisals) that involve self-directed cognitive processing and learning to stimulate intrinsic outcomes (Akkermans et al., 2016). This aligns with research indicating that older individuals experience a decrease in esteem motives as they become less motivated by approval and gratification from peers (Judge & Locke, 1993; Heckhausen, Schulz, & Wrosch, 2010; Kooij et al., 2011). Instead, they are more likely to report higher generativity motives to stimulate social needs and fulfil meaningful work (Kanfer & Ackerman, 2004; Zacher et al., 2011; 2012).

At the same time, research indicates that extrinsic motives such as job security increase with age (Warr, 1997), and some intrinsic factors such as feedback decrease (Zacher et al., 2017). One explanation for this is that as employees age, they will foresee, plan, and construct goals based on their perceptions of life expectancy, healthiness, and the anticipated number of future opportunities left (Carstensen & Lang, 2002). For instance, Kooij (2013) found that those

perceiving general health to be worse would report lower growth motives and high security motives, thus returning to the motivational assumption that basic needs must be met before pursuing higher-level needs. This strengthens the importance of developing climate measures that are appropriate in measuring the dynamic needs of older workers.

A more conclusive argument is that individual needs change dynamically throughout the life course and this should be factored into the way that workplaces are designed, tasks are planned, and accommodations made (Schartz et al., 2006; Buckle et al., 2008; Kooij et al., 2010; Mulders & Henkens, 2019). As pointed out by multiple researchers (e.g., Hanscom & Cleveland, 2018), it is important to understand how information other than ones calendar age and their performance contribute toward our interpretation of the ageing workforce so that we can better understand how to maintain engagement into later life. Motivational theories of lifespan development operate under the assumption that individuals dynamically engage with personal and environmental resources to achieve an optimal balance based on their own needs (e.g., SOC, MTLD). An established problem with both theoretical and empirical work is the indistinguishability between the process and outcomes of ageing at work due to the neglection of contextual factors as possible moderators or drivers (Cheng, 2014; Zacher, 2015; Zacher & Rudolph, 2017).

All of these components contribute to the fuller picture of age-performance trajectories at work. An issue with this in the context of ageing research is that

motivational needs theories frame psychological needs as contingent on an existing need (e.g., Maslow, 1954), indistinguishably important (e.g., SDT), or innately constant (e.g., McClelland, 1961), while theories of lifespan development posit that age may be differentially related to motives across dimensions (e.g., Kooij et al., 2011).

Chapter 2 provided evidence to support the importance of job control and flexible work programmes (i.e., autonomy), opportunities to fulfil social and generativity motives (e.g., relatedness), and the extent to which workers feel supported in pursuing these goals (i.e., competence). These three needs are grounded in SDT, however, to maintain focus on work across the lifespan, the basic psychological needs outlined by SDT need to represent work characteristics that are domain-specific to these motivational needs. Thus, individual perceptions toward these experiences are grounded in needs satisfaction. The interpretation of these psychological climate characteristics must, however, be done through theories of lifespan development that recognise losses and gains during the ageing process (e.g., SOC; Baltes, 1997), rather than depreciative-only models of ageing (e.g., disengagement theory; Cumming & Henry, 1961). Doing so allows for an idiographic approach to investigating the ways in which workplace characteristics are experienced – and therefore valued – differently across the life course.

Additionally, this thesis makes a different assumption to SDT in that all three needs do not necessarily hold the same weight at different life stages. Instead, lifespan theories of development act as antecedents to the autonomous

motivational process where optimally challenging situations that are conquerable are pursued (Deci & Ryan, 1980). In other words, before conceptualising what an optimally challenging and conquerable situation is, older workers will firstly assess resources based on actual and perceived changes associated with physiological capabilities (e.g., cognitive functioning) and psychological needs (e.g., growth vs generativity orientation); this determines the strength directed toward certain motives (e.g., a decline in fluid intelligence may lead to a strengthening of autonomy needs) and subsequent strategies that are deployed in order to preserve self-concept, mitigate losses, and maximise gains (Kanfer & Ackerman, 2004; Kooij et al., 2020). This in some ways reflects the complementary path offered by SDT which recognises the role of social-contextual factors in facilitating or impeding motivation (Ryan & Deci, 2000).

The following section will therefore begin by contextualising ageing at work by explaining the implications and challenges associated with age-diverse workforces and age-inclusive practices. Next, work characteristics associated with autonomous, competence, and relatedness needs will be investigated while recognising changes occurring across the life course. Finally, macro socioeconomic factors that may influence positive psychological climates will be described.

3.3.1 Age-Inclusive Psychological climates

For the first time ever, five generations are working alongside each other. Dynamically satisfying the needs of a multigenerational workforce is accompanied by a range of challenges associated with inclusivity, diversity,

and equality (SHRM, 2022). Age diversity within organisations has been both positively (e.g., Kunze et al., 2011) and negatively (e.g., Ely, 2004) associated with performance outcomes, largely due to the role of age discrimination and stereotyping in the workplace. This form of discrimination is defined as workplace ageism, which comprises discriminatory attitudes, perceptions, and behaviours towards older workers (Butler, 1969; Rothenberg & Gardner, 2011). Section 2.1 presented a number of policies introduced to tackle workplace ageism, but the increasing number of older workers experiencing and reporting workplace ageism puts into question their effectiveness (Ng, Allore, Trentalange, Monin, & Levy, 2015; North & Fiske, 2015; SHRM, 2022).

Admittedly, stereotyping literature is predominantly focused on older employees, though there is evidence that younger employees also experience both positive and negative stereotyping (Posthuma & Campion, 2009). For instance, younger employees may receive more training than older employees because they are viewed as future investments, but as a result may be denied career advancement opportunities because they are perceived to lack skills and experience (O'Higgins, 2001). In some cases, younger employees are considered to be less trustworthy or reliable and are therefore given minor responsibilities (Loretto et al., 2000). This may be more prevalent in organisations with a higher mean age; this is because in-group bias and affinity bias has been observed in work groups with similarly aged older adults who, as a result, view individuals with a similar age much more favourably (Mullins & McClean, 2020).

Stereotyping against younger employees can be explained in some part by the concept of generational differences. This concept aligns with life course theory by positing that the meanings we attach to work (and other life activities) are influenced by significant life events and social groups in which we are embedded (Baltes, Rudolph, & Bal, 2012). Research examining generational differences have observed differences in work centrality and extrinsic, altruistic, and social values, supporting the lifespan theory of development (Twenge et al., 2010; de Lange et al., 2021). These differences in goal orientations and motives can affect how individuals perceive and react to work characteristics just as much as the physiological changes experienced as one ages (Truxillo et al., 2012). As a result of the multigenerational workforce, a broader range of beliefs, views, and norms exist in the workplace, making it difficult to solidify the meaning of work.

Nonetheless, a large body of literature indicates that generational differences do not result in markedly different work outcomes. For instance, meta-analyses by Constanza, Badger, Fraser, Severt, and Gade (2012) and Stassen, Anseel, and Levecque (2016) presented no considerable evidence for generational differences in employee commitment, satisfaction, and turnover intent. Nevertheless, much of the research investigating generational differences is atheoretical and use nonspecific secondary data that threaten empirical validity (Rudolph, Rauvola, & Zacher, 2018) and challenge inferences made about generational variation (Costanza & Finkelstein, 2017). Despite the lack of evidence supporting the existence of generational differences, some research indicates that a employing a situational leadership style that differs

for Gen Z (i.e., born from 1997) and late Millennials (i.e., born between 1981 – 1996) is beneficial for stimulating creativity and engagement (Espinoza, Ukleja, & Rusch, 2010; Graen & Schiemann, 2013). This is because Gen Z and Millenials may be more likely to reject traditional subordination and hierarchal systems due to an entitled socialisation process throughout childhood and education (Graen & Schiemann, 2013).

However, the beliefs about generational differences often underpin workplace stereotypes concerning individual-level outcomes at different life stages (Rudolph et al., 2018). Indeed, researchers argue that the association between age and performance may be guided by stereotypical beliefs rather than actual performance (Ng & Feldman, 2012; Richardson, Webb, Webber, Smith, 2012; Van Woerkom, 2020). As a result, a climate attempting to segregate and address individual generational differences may have more of a negative impact on work outcomes (Rudolph et al., 2018).

In recent years, organisations have constructed and fostered friendly and collaborative work environments as a means of engaging younger generations, but these environments are beneficial for all age groups in predicting both task performance and extra-role behaviours (Espinoza et al., 2010; Koopmans et al., 2011; Hauschildt & Konradt, 2012; Graen & Schiemann, 2013).

Organisations that isolate workers based on their age may contribute towards misconceptions about perceived and actual levels of physical capability (Fung,

Lai, & Ng, 2001), psychological aptitude (Avolio & Waldman, 1994), productivity (Waldman & Avolio, 1986; van Woerkom, 2020), creativity and adaptivity (Posthuma & Campion, 2009). The results of two meta-analyses showed that ageist stereotypes result in fewer training and promotion opportunities which, in turn, negatively impacts career development (Goldberg et al., 2004; 2007). Other research has shown that ageist stereotypes are highly influential in recruitment decisions and retention strategies concerning older workers, resulting in fewer opportunities for job selection, promotion, and development (Ilmarinen, 2006; McNair et al., 2007; Ng & Feldman, 2008). For example, Bal et al. (2011) found age to be negatively related to job role selection when considering ratings of job qualification, suitability, and hiring processes. Similarly, Gordon and Arvey's (2004) meta-analysis revealed that older workers face bias in terms of perceived job qualifications and development capacity, which consequently affected their opportunities in person-role fit and training. Based on equity theory (Adams, 1965), older employees subjected to these biases have fewer esteem and security needs satisfied, are less likely perceive work as sustainable, and will therefore pursue fewer future-oriented behaviours (Kooij et al., 2013; Rudolph et al., 2018).

Ageist beliefs are not only held by younger workers, but also older employees (Kite et al., 2005; Meisner, 2012). It is a societal and economic worry that older individuals are more likely to employ these stereotypes in the decision-making process as this has historically led to lower performance ratings (Ferris, Yates, Gilmore, & Rowland, 1985; Glover & Branine, 2001; Shore, Cleveland, & Goldberg, 2003; Kite et al., 2005). There are exceptions to this; for example,

older workers are viewed more positively in the education sector (Gordon & Arvey, 2004).

This can also apply in situations where there is a sense of shared identity among workers. A study examining the performance ratings of assemblers in a factory looking at basic task measures (e.g. quality, quantity) found some differences in rating congruence, observed more noticeably amongst older workers in that supervisor ratings were consistently higher for older workers than those younger (Shore & Bleicken, 1991). Findings showed that supervisor age was much closer to the older workers who received these ratings, indicating preferences based on shared identity and demographics.

These findings could be explained by Stereotype Embodiment Theory (SET), which proposes that significant exposure to ageist stereotypes ultimately leads to the internalisation of ageism (Ayalon & Romer, 2018). Over time, older adults implicitly internalise attitudes towards similar age groups, though the demographic composition of the work group will influence the extent to which certain employees feel similar to their work group and supervisor (Byrne, 1971). A meta-analysis undertaken by Meisner (2012) provided support for SET within the work context, showing that stereotype priming impacted health outcomes, such as memory performance and psychomotor skills, including movement and writing speed. Levy, Pilver, Chung, and Slade (2014) provided further evidence that negative age stereotyping can induce cardiovascular stress responses (e.g., elevated heart rate and blood pressure). Longitudinal studies (e.g., Wurm et al., 2017) have also affirmed the adverse influence of

negative self-perceptions of ageing among older adults on health and cognitive function, which can result in similar work health outcomes to those attributed to ageism.

An increased sense of similarity among team members is positively related to the quality of ingroup interactions (Kunze et al., 2011). While beneficial in building intergroup relationships, those members who do not perceive the same level of similarity (i.e., 'outgroup' members) are much more likely to be subjected to bias in decision making and group participation (Kunze et al., 2011). The similarity-attraction theory (Byrne, 1971) would argue that organisations with a higher mean age are more likely to receive positive perceptions because those with visible traits (e.g., age, gender) will infer similarities, such as attitudes, traits, and beliefs about each other. Conversely, older workers are more likely to be subjected to unfairness, isolation, and exclusion, if other members do not infer those similarities. Through the lens of social identity theory and self-categorisation theory, it may be proposed that fewer perceived opportunities to maintain or change social status through group membership could depreciate individual self-efficacy as well as self-value and emotional significance within the work group (Finkelstein & Farrell, 2007).

Role and social role theory suggest that opportunities for ageism are dictated by social positions and relationships and provide direction to expectations and vigour to behaviours (Eagly, Wood, & Diekman, 2000; Pinder, 2014). At work, hierarchical and social positioning are established by HR policies and

practices. Research has shown a reciprocal relationship between HR practices and ageism such that it predicts workplace interactions and decisions, including interpersonal relationships with both colleagues and management (e.g., Cortina, Magley, Williams, & Langhout, 2001; Schalk et al., 2010), role design and person-job fit (e.g., Perry, Kulik, & Bourhis, 1996; Shore et al., 2009), wellbeing (e.g. Kooij, et al., 2014), development opportunities (e.g., Maurer & Rafuse, 2001), and overall treatment at work (Lossbroek, Lancee, van der Lippe, & Schippers, 2017).

Many HR personnel policies comply with government legislation concerning age-related discrimination, diversity, and inclusion by offering sustained or alternative employment options, health insurance, and retirement options (Smits, Beeksma, Feenstra, and Junger-Van Hoorn, 2010; Wilckens et al., 2020). However, organisations going beyond these basic requirements and implementing age-inclusive policies that are pervasive from the ground up are much more likely to experience a positive age-diverse climate where employees feel reassured that the organisation is making efforts to support equality and diversity in the workplace (Kunze et al., 2011; Kunze, Boehm, & Bruch, 2013). In doing so, employees are more likely to report positive perceptions of the ageing process (Schalk et al., 2010), and experience higher levels of belonging, affective commitment, and intrinsic motivation, all of which can positively influence individual and organisational performance (Bohm et al., 2014).

Informal structures and processes that are formed – both consciously and unconsciously – in response to the ageing workforce can be just as informative and influential as written policy (Zwick, 2015; Naegele et al., 2018). Employees interact with these processes operationally and so the nurturing of such practices can help organisations to resist the potential negative effects of workforce ageing – from motivational changes to age-friendly climate conditions (Mulders & Henkens, 2019). Nonetheless, the effectiveness of age-friendly HR and government policies on developmental and work outcomes remain inconclusive (Henkens et al., 2018).

As such, basic adaptations (e.g. ergonomic adjustments) need to be considered alongside variable and complex needs to provide a suitable working environment for older workers. This may include person-job fit, management styles, and workplace redesign to support changing capabilities across the life course, for example (Waddell & Burton, 2006; Mulders & Henkens, 2019).

Finkelstein and Farrell (2007) propose three core manifestations of workplace ageism: cognitive, which reflects stereotyping; affective, which reflects prejudice; and behavioural, which reflects discrimination. Ageist stereotypes and perceptions are associated with cognitive functioning as they describe the initial interpretation and inference of incoming information, which guides the affective and behavioural components by dictating individual or group attitudes and tendencies to behave or act in a particular way (Pickens, 2005). Workplace stereotypes are habitually associated with self and social perceptions of

workplace motives, capabilities, and behaviours, all of which have been shown to change with age, including work engagement (Kahn, 1990), desires, needs (Aguinis, 2009), role transition and expectations (Kahn, 1990; Ilgen & Hollenbeck, 1999; Wang, 2007), organisational citizenship behaviours, and counterproductive work behaviours (Matta et al., 2015). These perceptions reflect the evolving and contextual stimuli formed through interactions between organisational members and processes (Rollinson, 2008).

Examining ageism at work through positive and negative dimensions of stereotype content has consistently achieved high predictive validity (Marcus, Fritzsche, Le, & Reeves, 2016). Marcus et al. (2016) and Fiske et al. (2002; 2007) propose that dimensions of competence and warmth comprise the core stereotypes for older workers, which are widely accepted dimensions of social cognition (Fiske et al., 2007). More specifically, older workers are often viewed as possessing characteristics of high warmth, but low competence, and the latter has theoretically and empirically been touted as the most significant negative stereotype attributed to older workers (Cuddy & Fiske, 2002; Krings et al., 2011).

Age prejudice refers to the assessment of an individual being ‘good’ or ‘bad’ (Kite, Stockdale, Whitley, & Johnson, 2005). This manifests emotionally, for instance, being uncomfortable with or disliking a particular colleague because of their age (Finkelstein & Farrell, 2007). Age discrimination refers to behaviours towards others due to their age and can occur in various workplace scenarios from team interactions to performance appraisals (Finkelstein &

Farrell, 2007; Truxillo et al., 2014; 2017). For example, similarly qualified older employees are more likely to receive lower performance assessments than younger employees due to ageist stereotyping (Avolio & Barrett, 1987; Finkelstein et al., 1995; Van Dalen et al., 2010; Bal et al., 2011).

Ageism can there be described as multidimensional as it is associated with a range of cognitive and physiological changes as well as the views that others hold towards these changes (Ng & Feldman, 2008). Indeed, calendar age is a universally understood human experience that provides a structural link between individuals and the social systems in which they are situated (Lawrence, 1984). In other words, humans make inferences about 'young' and 'old' and the characteristics assigned to those positions, both in the workplace and in society. A recent survey (SHRM, 2022) found that older workers were viewed as more responsible and mature, yet resistant to change and less competent with technology. On the other hand, younger workers were perceived as lazy, entitled, and disloyal to organisations, but more adaptable (SHRM, 2022). These views can be equally facilitative or disruptive to organisations when attempting to foster an inclusive workplace for the multi-generational workforce (Butler, 1969; Rothenberg & Gardner, 2011).

A recent survey of over 600 companies discovered that 21% of all employees felt they were treated unfairly in daily operations due to their age, and 29% felt unfairly treated in opportunities for job progression, with these figures rising further for senior positions (SHRM, 2022). Interestingly, those aged 18-29 reported a social and reputational impact, and individuals aged 30-39 said that

this treatment mainly impacted their finances and job satisfaction, while those aged 40 and above reported a significant impact on skill and career development opportunities (SHRM, 2022).

Research has shown that employees who feel that they are fairly treated in the workplace experience higher levels of job satisfaction, organisational commitment, and social relationships between both colleagues and supervisors (Jiang, Gollan, & Brooks, 2017; Lee & Wei, 2017; Tziner & Shloker, 2018). These employees will reciprocate the feeling of being treated fairly by expending higher efforts in the workplace (Tziner & Shloker, 2018). Conversely, employees experiencing injustice at work are more likely to report negative attitudes toward supervisors, reduced motivation, and lower levels of wellbeing (Bobocel & Hafer, 2007; Tziner & Shloker, 2018).

Practical research that investigates workplace ageism has tended to focus on ageist stereotypes as predictors of age discrimination, though associations with work outcomes are regularly offered implicitly (Ayalon & Romer, 2018). Despite evidence supporting relationships between stereotypes, perceptions, and stereotyping behaviours towards older adults (e.g., Glover & Branine, 2001; Krings et al., 2011), some research has argued that the activation of ageist stereotypes within the workplace does not routinely result in discriminatory behaviours or practices (Voss, Bodner, & Rothermund, 2018; Murphy & DeNisi, 2021). While more research is needed to understand when and how these stereotypes lead to ageist outcomes (Mulders & Henkens, 2019), research signifies the presence of an implicit bias whereby older

individuals are disadvantaged in recruitment and selection, performance appraisals, development, and interpersonal treatment (e.g., Posthuma & Campion, 2009; Erdogan et al., 2011; Truxillo et al, 2014; 2015; Petery & Grosch, 2022; Cadiz et al., 2022). The biasing factors that older workers face in development opportunities are usually unjustified; for example, rejecting older applicants because they are overqualified (Erdogan et al., 2011), or favouring others for a promotion because of perceived lower competence (Bertolino et al., 2013; Truxillo et al., 2012; 2014).

For instance, the lack of training for older workers (Canduela, Dutton, Johnson, Lindsay, McQuaid, & Raeside, 2012; SHRM, 2022) may be guided by personnel decisions formed by ageist beliefs at the organisational level that align with the aforementioned depreciation model (Yeatts et al., 2000; Petery & Grosch, 2022). 41% of executives reported using age as a factor in the recruitment process, whilst those in leadership positions were far more likely to include age in decision-making in all areas of business operations, despite only a small percentage of them understanding employment laws protecting older workers (SHRM, 2022). Behaviours, actions, and decisions made within the workplace are frequently guided by endorsed age-related stereotypes, impacting a range of organisational processes at the individual and group level (SHRM, 2022).

In a report by Visier (2021), older workers reported pay, work-life balance, and training and skill development as their three most important workplace needs, yet rated opportunities for skill development the lowest out of any age group.

The report also found that these opportunities were associated with organisational commitment, which subsequently predicted turnover rates (Visier, 2021). A combination of these factors is likely to negatively influence the occupational self-efficacy of older workers (Salthouse & Maurer, 1996; Paggi & Jopp, 2015) and contribute to contextual stimuli which promotes the view that older workers have lower competence than their younger counterparts (Cuddy & Fiske, 2002; Krings et al., 2011).

3.3.2 Autonomy

Autonomy at work refers to opportunities for choice, input, and flexibility in working practices and therefore avoids the use of extrinsic pressures to drive behaviour (Deci & Ryan, 2000; Slemp et al., 2018). Rarely are role requirements specified and enacted independently, and so autonomy refers more to the control one has over such requirements and whether they are able to fulfil them with a sense of volition (Slemp et al., 2018).

Autonomy has long been advocated as a means of stimulating intrinsic motives. Two-factor theory (Herzberg, 1959) conceptualises responsibility as a growth-related factor in the motivational process, while the job characteristics model (JCM, Hackman & Oldham, 1975) presents autonomy as a core job dimension. The job demand-control model (JDC, Karasek, 1979) describes autonomy and control as critical moderators for jobs with high demands (e.g., time pressured, role ambiguity). The WPCM (Karanika-Murray & Michaelides, 2015) conceptualises autonomy-supportive attributes as those which enable decisions to be made independently, work to be scheduled more freely, and work situations to be responded to more flexibly. As a result, much of the

research on autonomy is situated within the broad area of work and job design, which are turned to next.

3.3.2.1 Work and Job Design

Job and work design refer to the way that jobs and tasks are organised and defined through a variety of working practices, responsibilities, relationships, interactions, equipment, and goals in order to improve the attitudes, development, and performance of employees and the organisation (Parker, 2014; Fraccaroli et al., 2017). As such, it is considered to be "…one of the most powerful contextual factors determining work motivation and behaviour" (Pinder, 2014, p. 205). When organised and implemented correctly, they can improve person-job fit, facilitate goal-orientations, and stimulate intrinsic motives such that it positively influences individual and organisational performance (den Boer, van Vuuren, & de Jong, 2021).

However, matching an individual to a specific job role is a labour-intensive process that spans from recruitment to induction, and continually changes as one's needs, skills, desires, and motives change throughout their career. Furthermore, work characteristics are rarely experienced in the same way by all employees, and this notion strengthens further for age-diverse workplaces (den Boer, van Vuuren, & de Jong, 2021). Despite the difficulties, job redesign can be a useful technique for organisations to adapt to age-related changes in resources and needs, and to reassure older workers of future work opportunities (Truxillo et al., 2012; Zacher & Yang, 2016).

Despite developments in job design terminology, much of its theory is grounded in four dimensions: simplification, rotation, enlargement, and enrichment (Rollinson, 2008). Traditional theories of job design placed emphasis on simplification and rotation, which describes the process of breaking down tasks into a set of simpler sub-tasks or rotating employees between tasks to reduce costs associated with production, training, and labour, to prevent boredom and complacency, and to increase skill variety through the rotation process (Rollinson, 2008). Job rotation can also help organisations to comply with laws pertaining to health and safety. For example, Botti, Mora, and Calzavara (2017) found job rotation to be an effective risk control method in minimising the exposure of workers to the risks of repetitive movements and awkward postures. Although useful in supporting the physical health and basic safety needs of older workers, job rotation does little to intrinsically stimulate employees (Eriksson & Ortega, 2006; Mullins & McClean, 2020). This may be because these methods are often used in low-skilled job roles (e.g., supermarket worker) or those that are heavily focused on product output (e.g., assembly lines) and, as such, are often negatively associated with work outcomes such as employee satisfaction, absenteeism, and turnover (Davis, 2010).

Job enlargement is analogous with task variety in that it refers to the horizontal expansion or increased variety of tasks (Morgeson & Humphrey, 2006). Although providing employees with a wider range of responsibilities can facilitate skill development and promote self-efficacy, they do not necessarily add meaning to a job (Truxillo et al., 2012). Skill variety differs slightly to task

variety in that it refers to the expansion of opportunities to which accumulated skills can be applied (Hackman & Oldham, 1975). Research has shown that task variety is generally more beneficial to younger workers and skill variety is more beneficial to older workers (e.g., Truxillo et al., 2012; Zaniboni et al., 2013; Fraccaroli et al., 2017). Specifically, younger workers that seek growth-related goals are more likely to seek out a variety of tasks to facilitate the expansion of skills and, as a result, be more affectively and cognitively involved with the job (Carstensen et al., 1999; Zaniboni et al., 2014). On the other hand, cognitively demanding tasks require higher levels of fluid intelligence as they do not benefit to the same extent from crystallised intelligence (Kanfer & Ackerman, 2004). Thus, older workers who already have accumulated skills over their careers are unlikely to view a high level of markedly different tasks as beneficial to them, and increasing task variety for older employees has been associated with an increased sense of physical and psychological exhaustion because it does not allow them to effectively optimise resources (Zaniboni et al., 2013; Fraccaroli et al., 2017).

On the other hand, younger workers are less likely to be interested in developing a narrow set of skills because it may be damaging to future development goals (Fraccaroli et al., 2017). Older workers, however, have been shown to perform more effectively in problem-solving when they are able to apply crystallised intelligence and accumulated skills to complete tasks (Hunter & Thatcher, 2007; Zaniboni et al., 2014). Furthermore, designing tasks that allow older employees to apply experiential knowledge can help to mitigate losses in physiological functioning such that they can complete tasks

with the same efficiency as their younger counterparts (Kanfer & Ackerman, 2004; Ilmarinen, 2006; Wilson, Li, Bienias, & Bennett, 2006; Peeters & Emmerik, 2008).

Although job enrichment is associated with other motivational theories (e.g., growth factors within two-factor theory), it is most commonly associated with the job characteristics model (JCM, Hackman & Oldham, 1975). Skill variety, along with task identity, task significance, autonomy, and feedback form the five characteristics of the JCM. Task identity is the extent to which outcomes are visible when jobs are completed, while task significance refers to whether the job has a perceived meaningful impact. Autonomy is the level of discretion and independence provided in the planning and undertaking of the job, and feedback is the extent to which information about the effectiveness of work performance is communicated (Mullins & Mclean, 2020). Task identity and significance apply to all three needs in different ways, and so will not be discussed as singular concepts here. Feedback will be discussed in section 4.3.3 as part of the competence need.

3.3.2.2 Autonomy and Job Control

The JCM has formed the basis for other models of work motivation; for example, Parker, Bindl, and Strauss (2010) argued that proactive behaviours are underpinned by three motivational paths: 'can do' (i.e. feelings of control and self-efficacy), 'reason to' (i.e. intrinsically stimulating work), and 'energised to' (i.e. the persistence and vigour aspects to the motivational process). The first of these motivational paths – 'can do' – represents the need for autonomy, which allows employees to have control over their role and be flexible in their

utilisation and interaction with the work environment (Zhang & Farndale, 2021). In the context of SOC theory, this means that older employees are better able to craft their job roles to suit their needs and capitalise on strengths. Increased autonomy should therefore enable employees to respond more flexibly to unpredictable situations while also promoting task significance, engagement, and accountability, thereby encouraging them to take advantage of available opportunities (Zacher et al., 2010; Truxillo et al., 2012).

Similar to the age-differential motivation for task variety and skill variety, research has found that older workers value autonomy and job control more than younger workers because they have greater work experience, crystallised intelligence, and emotional regulation (Kanfer & Ackerman, 2004; Doerwald et al., 2016; Fraccaroli, Zaniboni, & Truxillo, 2017). A number of studies have provided evidence to suggest that autonomous work is more strongly related to work outcomes such as job satisfaction among older compared to younger workers (e.g., Humphrey et al., 2007; Bos et al., 2013), and can also lead to improved mental health (Zaniboni et al., 2017). Increased job control for older workers helps them to compensate for resource losses by allowing time and flexibility to deploy resources from other domains (Van den Berg et al., 2011; Weigl et al., 2013).

However, Ng & Feldman (2015) found that age-differential effects of autonomy on work outcomes were largely mixed. Here, autonomy was more strongly associated with job performance but more weakly associated with satisfaction and affective commitment in older workers. In the same meta-analysis, Ng &

Feldman found that the negative relationship between job autonomy and emotional exhaustion was stronger among older than younger workers, such that providing role flexibility and autonomous planning could offset exhaustion in older workers and minimise the damage done to other work outcomes. The explanation offered was that different work outcomes were measured; for instance, autonomy may be important to job attraction for younger rather than older employees, and this has been confirmed in studies since (e.g., Zacher et al., 2017). This strengthens the argument that a specific set of work characteristics for climate need to be matched to specific work outcomes to better understand workplace ageing.

Nevertheless, the ability to deploy experiential resources and regulate emotions effectively are bounded by the parameters of the job role. Jobs that require extensive resources and that are particularly complex are associated with higher levels of information processing, short-term memory ability, and working under time pressures (Kanfer & Ackerman, 2004). These jobs are perceived as more stressful for older workers (Kanfer & Ackerman, 2004; Schmitt & Unger, 2019) because they tend to find parallel processing more difficult than younger adults and therefore do not perform as effectively when undertaking complex tasks simultaneously (Verhaeghen, Steitz, Sliwinski, & Cerella, 2003; Gothe, Oberauer, & Klieg, 2007). Conversely, older workers outperform their younger counterparts when activities are routine, familiar, or representative of tasks they have previously encountered (Artistico, Cervone, & Pezzuti, 2003).

Karasek's (1989) job control-demands model (JC-D) is applicable to supporting workers into later life because it recognises that job demands need to be balanced with autonomy to effectively minimise work-related stress and maximise performance. Employees that are not provided with autonomy in work scheduling and activities are more likely to experience stress, with this risk increasing for highly complex jobs and decreasing for those with lower complexity. Truxillo et al. (2012) argues that the JD-C model could be adapted to enable older workers to execute work more autonomously by increasing scheduling freedom and autonomous work planning so that they are more dynamically able to match their resources and needs with those of the job. Doing so would be beneficial in mitigating the potential negative effects associated with physiological and cognitive changes that occur naturally across the life course (e.g., decline in fluid intelligence, Salthouse, 2010), which have shown to impair developmental outcomes such as self-efficacy (Pulakos et al., 2002; Kramer & DePryck, 2010).

In doing so, older workers are better protected from work stressors and better equipped to respond to uncertainty (Porath & Bateman, 2006). This is evidenced by research showing that providing more control over the time and pace of tasks enables older workers to perform just as effectively as younger workers (Allen, Lien, Murphy, Sanders, & McCann, 2002). Similarly, flexible workplaces fostering autonomous working practices are associated with higher levels of positive affect in older employees which, in turn, is associated with increases in performance (Dreisbach & Goschke, 2004; Dreisbach, 2006; Bal & de Lange, 2015).

Flexible working programmes have been shown to benefit older workers by allowing for effective resource selection and optimisation strategies to help sustain acceptable performance levels (Bal & de Lange, 2015). For instance, flexible HRM, which is the degree to which employees can make choices regarding the organisation and scheduling of their work responsibilities (Hill et al., 2008), has been found to improve engagement in younger workers and improve performance in older workers (Bal & de Lange, 2015). More recently, the CIPD (2022) provided flexible working as a key driver in supporting longer and more fulfilling working lives. Before the pandemic, working from home exclusively increased with age, and although this trend has shifted for all workers, older workers find working from home more important (CIPD, 2022).

What may seem trivial to those at the beginning of their career may be significant to older workers; for instance, the time taken to commute to and from a full-time job may direct resources away from fulfilling social or emotional needs (e.g., familial or caring responsibilities, Baslevent & Kirmanoglu, 2012). Younger employees experiencing work-related stress can also benefit from increased levels of decision-making and role flexibility because it improves self-efficacy and encourages participation. This differs from workplaces with low opportunities for autonomy, where younger workers are more likely to use avoidance-coping strategies to minimise work-related stress (Herter et al., 2015).

Autonomy is also valued by those during the midlife stage to help support familial responsibilities through flexible working patterns; and in later life, to support the transition from growth-related motives to generativity motives (Kanfer & Ackerman, 2004; Ramos et al., 2016; Beier et al., 2022). For example, female workers are more likely to be part-time than male workers, are more likely to be situated in less strenuous and increasingly flexible employment areas (e.g. administration, customer service), and often combine caring roles with employment (Shearn, 2005; Doyal & Payne, 2006; Kooij, 2013). Correspondingly, work is less central to individuals aged 25-44 and part-time female workers because those demographic groups find it more important to balance work and family responsibilities (de Lange et al., 2021). Employees that are provided with more control over working times from midlife are more likely to prolong working lives beyond retirement age (Virtanen et al., 2022). As such, increasing levels of autonomy and complexity (i.e., task significance) have been found to buffer the negative relationship between age and favourable perceptions of future work opportunities (Zacher et al., 2010; 2017), which can be a starting point for organisations who are less likely to invest in the training and development of older employees (Naegele et al., 2018).

Employers who worry about the physical and mental health of their employees are likely to invest in the work ability, health, and information-related HR practices that benefit older employees, but rarely do they invest in person-job fit adjustment practices (Mulders & Henkens, 2019). Research has shown that organisations with a larger proportion of older employees are much more likely

to implement adjustment measures, which will likely become mandatory as the reliance on older workers persists (Mulders & Henkens, 2019). As such, person-job fit adjustment practices may be a intrinsically motivating alternative to information-related practices, which may be more suitable for those very close to retirement.

Practices such as this are seemingly in their infancy and implemented inconsistently. For example, existing studies have found that workers normalising functional and physiological limitations as part of the ageing process were less likely to believe or ask for workplace accommodations (McMullin & Shuey, 2006; HSE, 2021). Moreover, research indicates that older workers asking for age-related work accommodations were much less likely to be accepted than those requesting disability-related accommodations (McMullin & Shuey, 2006). Employers need to work collaboratively with their members to make suitable accommodations so that valuable employees are not forced out of the workplace because of a reluctance to implement simple measures that could facilitate performance in later life (McMullin & Shuey, 2006; HSE, 2021).

3.3.3 Competence

A climate for competence is one that fulfils growth needs that foster a sense of challenge and mastery (Deci & Ryan, 2000). Because of this, self-efficacy is considered to be a primary motivational driver of the need for competence. Workplace characteristics supporting competence needs include knowledge-sharing, supportive management and leadership, feedback, appreciation, and regular communication (Ryan & Deci, 2017; Slemp et al., 2021). Thus,

competence does not refer to, for example, an appraisal process or leadership style, but to the collective contribution of such activities that support employees in fulfilling their goals by providing constructive feedback, showing appreciation, and providing them with the necessary support to do so (Karanika-Murray & Michaelides, 2015).

There are several reasons as to why research indicates that competence needs are of less importance to older workers. Firstly, older workers are more likely to have accumulated skills and experience over their career and therefore require less feedback than more inexperienced employees (Truxillo et al., 2012). Secondly, older workers – particularly in the latter stages of their career – are more likely to pursue goals that fulfil feelings of affiliation, whereas younger employees are more likely to value self-assertion motives (Kets De Vries, 2001; Blanchard, 2011). Third, older employees are more likely to reallocate resources to maintain core task performance and preserve self-concept, resulting in a disengagement from growth-related goals which are naturally allied with competence needs (Kanfer & Ackerman, 2004; Zacher et al., 2018; Henning et al., 2023). Because of these changes, older employees may reduce working hours or hand over responsibilities to younger employees rather than attempt to compensate for changes to desires and physiology (Damman et al., 2013).

From a lifespan development perspective and considering how competence needs may differ for older workers based on chapter 2, this section will firstly examine the role of management and leadership in supporting age-diverse

workforces. Second, feedback – both in delivery and topic – will be investigated to understand how employees value feedback across the life course. Finally, age-differential treatment in training and development opportunities will be assessed.

3.3.3.1 Management and Leadership

An explanation for older workers preferring autonomy at work is that cognitive demands associated with competence-related attributes are stronger than autonomous work characteristics (Slemp et al., 2018). Despite this, the need for competence and autonomy often overlap because the extent to which both are addressed is largely determined by management. This is unsurprising, given that supervisory responsibilities have expanded from transactional relationships and productivity monitoring to fitting individual needs and desires to work characteristics (Hutchinson, 2013; Weinberg, Scott, & Morrison, 2017). The extent to which employees are motivated is therefore largely seen to be driven by managerial support and leadership effectiveness (Gilbert & Kelloway, 2014).

Employees nowadays generally do not want to be led by dominance and authority (Van Vugt, 2006), and so building relationships whilst maintaining systems and processes is vital to motivating team members to a common goal (Maxwell, 2007). Managers that can effectively integrate the 'personal' with the 'policy' are more likely to benefit from a level of motivation that enhances emotional commitment, wellbeing, group dynamics, discretionary effort, and team productivity (Blanchard, 2011; Lazovic, 2012; Wilton et al., 2012). The way in which supervisors communicate with and support employees can

influence perceived job security and sense of belonging (Cabera et al., 2006; Buchanan & Huczynski, 2019). Supervisors that employ a participative and collaborative approach in problem-solving are more likely to promote wellbeing and reduce stress within their teams (Weinberg, Scott, & Morrison, 2017).

As such, emotional and social intelligence are considered to be even more important than situational considerations (Bass & Bass, 2008; Buchanan & Huczynski, 2019). Emotionally intelligent managers are better able to comprehend, integrate, and reflectively manage their own and staff feelings or actions; whilst socially intelligent managers are able to build and maintain relationships. Both are pivotal in promoting feelings of trust and in the perception that work is sustainable and enjoyable (Salovey & Mayer, 1990; Buchanan & Huczynski, 2019).

As a result, there has been an advocation in both literature and practice to switch from a means-focused to a process-focused managerial approach in order to encourage collaboration and autonomy while minimising transactional or controlling relationships (Pinder, 2014; Reeve, 2015). While this notion does not lean to the physiological and safety needs of employees, most work attributes associated with autonomy, competence, and relatedness can be directly or indirectly influenced by supervisors, who are therefore responsible – at least in part – for employee wellbeing, engagement, and performance (Schalk et al., 2010). This responsibility is arguably more poignant for older workers than younger workers because of the overlap between the need for autonomy and competence.

This is illustrated through the concept of leader autonomy support (LAS), which describes managers that acknowledge worker perspectives, offer opportunities for choice and input, and allow employees to pursue opportunities that fulfil their most important needs (Reeve, 2015; Slemp et al., 2018). Managers demonstrating LAS have been found to positively predict needs gratification for all three needs, with particularly strong associations found with autonomy, despite managerial support being considered a competence-based attribute (Van den Broeck et al., 2016; Slemp et al., 2018).

By adopting a participative approach to management, supervisors are better able to identify the needs of specific employees and to develop suitable working practices where the resources of older workers are more suitably matched with the job (Truxillo et al., 2012). For example, older employees are more likely to experience meaningful work by imparting wisdom to younger employees, rather than focusing on their own growth (Ng & Feldman, 2008; Kooij, 2013; Mulders & Henkens, 2019). Providing them with the flexibility and support to fulfil these motives can simultaneously fulfil needs associated with autonomy, competence, and relatedness. Conversely, unsupportive managers may reinforce ageist stereotypes such that older workers internalise negative assumpions, such as incompetence, low motivation for work and training, and poor performance (Fisher et al., 2017; Delgado-Rodriguez et al., 2018).

Although there are some values which do not differ across generations, such as a strong admiration for honesty (Arsenault, 2004), employees are rarely

aligned in what motivates them most strongly. For example, Generation Y (i.e., born between 1982 – 1994) employees seemingly prefer attentive supervisors that provide encouragement, mentorship, and development opportunities (Murphy, Gibson, & Greenwood, 2010; Yi et al., 2010; Kultalahti & Viitala, 2014), whereas Generation X (i.e., born between 1965 – 1980) employees respond more positively to self-scheduling, formal recognition, and shared decision-making (Wilson et al., 2008). Ignoring these differences can damage the leader-worker relationship. Younger employees who display more trust in management are more likely to demonstrate OCB than older employees who display similar levels of trust (Wagner and Rush, 2000), while older employees who are provided with autonomy will rate higher on OCBs (Zhang & Farndale, 2021).

In general, older employees value work that is meaningful, flexible, intellectually stimulating, and provides opportunities for social interaction (Marvell & Cox, 2017). As one ages, their FTP changes and preferences are redirected toward meaningful goals such as generativity (Beier et al., 2022). Employees are therefore more likely to stay in work beyond retirement if they perceive their job to be meaningful and if they feel supported in fulfilling personal and domestic needs (Marvell & Cox, 2017).

The majority of leadership models integrate components from transactional and transformational leadership, which usually align with extrinsic and intrinsic motives. Transactional leadership is underpinned by a directive exchange process that incorporates the use of explicit conditional rewards (or

punishments) based on specific goals or standards (Fischer, Malycha, & Schafmann, 2019). Transactional behaviours are often considered autocratic in that information is communicated from the top-down within the hierarchy and are unidirectional or unilateral (Tziner & Shokler, 2018). In cases where transactional leadership is used exclusively, an assumption is made that employees are not self-motivated and require rewards for compliance and punishments for noncompliance (Jung & Avolio, 1999; Bass, 2007). It is more common, however, that transactional behaviours are used to satisfy extrinsic motives and to offset counterproductive work behaviours (Komaki, 2013).

Transactional leadership canoutperform transformational behaviours in stable job roles (e.g., manufacturing) as there is more time to plan and set rewards that are accommodating of individual needs (Bass, 1985; Arnold et al., 2009; Komaki, 2013). Research has illustrated age-differential preferences in transactional leader-worker relations such that younger generations may be more focused on extrinsic rather than intrinsic rewards (Twenge et al., 2010), while older workers that report extrinsically-focused leader-worker relations also experience higher levels of injustice and lower levels of affective commitment (Tziner & Shokler, 2018).

Transactional leadership quintessentially contradicts the underlying assumption of SDT in which all three psychological needs must be met for employees to be autonomously motivated. Transformational leadership, which concerns participative and collaborative leader behaviours that actively recognise and match individual needs to work characteristics, is more

positively associated with intrinsic motivation (Bass & Bass, 2008). Employees usually perceive supervisors more positively if exhibiting transformational behaviours (Krishnan, 2005) and are more likely to score higher on work outcomes such as affective commitment, task performance, and OCB (Mester et al., 2003; Judge et al., 2006; Bass & Bass, 2008; Limsili & Ogunlana, 2008). For instance, a study by the UK department for Business Innovation and Skills indicated that employees with managers that exhibit transformational – rather than autocratic – leadership behaviours are more likely to report positive work engagement and wellbeing (Wilton, et al., 2012).

Although there is no theoretical leadership model for the ageing workforce, Hersey and Blanchard's (1969) model of situational leadership suggests that a leadership style can be adapted based on the maturity level of employees. Employees that lack knowledge or skills may require an authoritative style based on direction and close control, While workers with accumulated experience and knowledge may benefit from a laissez faire approach that promotes autonomy and progression monitoring, rather than direct intervention (Rollinson, 2008). Other approaches such as path-goal theory (House & Mitchell, 1974) and competing leadership theory (Quinn, 1984) propose similar solutions to balance employee needs with organisational objectives.

A study by Tziner and Shkoler (2018) discovered that age moderates the relationship between leadership styles and work attitudes. Younger employees responded positively in commitment and motivation to both transformational and transactional leadership when organisational justice was high. On the

other hand, transactional leadership was negatively related to organisational justice, commitment, and motivation for older workers, but transformational leadership was positively related to those work outcomes. These findings could indicate that older employees may be more inclined to remain in work beyond retirement age when leaders exhibit behaviours that tie individual needs to the broader organisational vision with consideration of person-job fit.

To understand the individual needs of employees, supervisors ought to initiate a dyadic communication process to comprehensively understand their work orientation (Goldthorpe, Lockwood, Bechhofer, & Platt, 1968) and the extent to which they value personal or social identity (Haslam, Powell, & Turner, 2000). Employees that value personal identity will likely view work as a central-life issue and seek growth and advancement, while those valuing social identity will prefer a work-life balance that promotes interpersonal relationships and recognition. These orientations may change across the life course and can therefore provide valuable information about strengths and weaknesses, person-role fit, and group dynamics (Goldthorpe et al., 1968; Mullins & Christy, 2016). For instance, female workers between the ages of 45-65 are the most likely to be combining home care responsibilities with employment (Doyal & Payne, 2006), and so suitable adjustments need to be made to provide a work environment that meets their needs. When employees perceive a lower level of supervisory and organisational support in fulfilling their needs, they are less likely to perceive an open-ended FTP (Zacher & Yang, 2016).

The concept of dyadic leadership can assist managers in deeply understanding the diverse needs of their work group but can be equally damaging if members of the work group are not included in the relationship because of the precedent that is set (Tziner & Shkoler, 2018). There has been evidence to suggest that this damage may be amplified for older workers, who experience greater stress than younger employees when perceiving low support and unfair treatment from supervisors (Yaldiz et al., 2018). Fostering an inclusive climate for employees may therefore be particularly useful for older employees who are subject to negative age stereotypes by colleagues and supervisors (Posthuma & Campion, 2009; Griffin et al., 2016). Organisations and their management must therefore be sensitive to their influence on the general negative age-discrimination climate. Those that are proactive in implementing awareness-based training show older employees that they matter to the organisation and, as a result, are able to reduce age-based conflict and discrimination (Schalk et al., 2010; Kunze, Boehm, & Bruch, 2013).

3.3.3.2 Feedback and Appreciation

Feedback reflects the amount of information received by workers on the effectiveness of their performance and usually involves goal-setting, progression monitoring, and performance evaluations such as appraisals (Morgeson & Humphrey, 2006; Mueller-Hanson & Pulakos, 2015). A core component of many feedback processes – appreciation – is the degree to which employees feel valued and receive recognition for their work efforts, and is thought to facilitate coping, adaptation, and proactivity pertaining to the goals outlined within the feedback process (Bakker et al., 2007; Naegele et al.,

2018). Thus, effective feedback should reduce uncertainty about work roles, reinforce self-efficacy, and provide informational value to facilitate goal attainment (Ashford & Cummings, 1983; Weng et al., 2015).

Feedback is most routinely manifested through the appraisal process, which is often used by supervisors to monitor and assess performance effectiveness in areas relevant to the role (Dello Russo, Miraglia, & Borgogni, 2017). Appraisals are often favoured due to efficiency gains in cost and time, despite being criticised for the excessive time spent on administrative tasks, inflexible workflow processes, and negligible improvement made to actual performance (Adler et al., 2016). Some research suggests that appraisals cling to outdated and obsolete values about an employee's performance and fail to acknowledge highly contextual factors embedded within workplace design that go beyond unilateral ratings (Rotundo & Sackett, 2002; Ng & Feldman, 2013; Dello Russo, Miraglia, & Borgogni, 2017). More than 75% of HR managers, supervisors, and employees perceive appraisal practices to be ineffective and inaccurate, and over 90% feel that performance appraisal processes fail to deliver results as intended (Corporate Leadership Council, 2012).

This may be because the majority of feedback measures simply reflect the degree to which job performance is effective. As a result, the benefits of feedback practices on work outcomes have been somewhat mixed with research demonstrating positive (Humphrey et al., 2007), negative (Mueller-Hanson & Pulakos, 2015), and mixed (Kluger & DeNisi, 1996; Gabelica et al., 2012) relationships with job satisfaction, performance, and self-efficacy.

Indicative of the unidimensionality of historical feedback practices, early work has shown older workers to score lower on both performance and promotability assessments in appraisals (Shore et al., 2003). Linderbaum and Levy (2010) challenged the unidimensionality of existing research and validated four dimensions of feedback-orientations that can be used to better understand employee motives and encourage feedback-seeking behaviour, which refers to the degree to which employees actively scan, monitor, and pursue performance-related knowledge from the organisational environment (Ashford & Cummings, 1983). Specifically, feedback orientations can be aimed at informing the quality of social relations (i.e., social awareness) and performance (i.e., utility), or reflect ones sense of obligation toward their role (i.e., accountability) and preservation of competence (i.e., self-efficacy).

By understanding feedback orientations, employers are better able to shape feedback practices toward individual differences and satisfy higher levels of prosocial motivation and positive affect (Grant & Parker, 2009; Parker & Griffin, 2011). Because of this, individuals are likely to engage in further feedback-seeking behaviours which help to shape future work characteristics that facilitate goal attainment and promote feelings of competence (Frese, Garst, and Faye, 2007; Parker & Griffin, 2011). A higher level of positive affect alone has been found to positively predict proactive behaviours, such as seeking feedback, using initiative, and setting challenging goals (Fritz & Sonnentag, 2009; Bindl & Parker, 2010; Parker & Griffin, 2011).

Lifespan theories of development can help to explain feedback orientations at different life stages. As described in section 2.2.1, SST and FTP suggest that older individuals invest greater resources into positive social and emotional experiences rather than materialistic and instrumental goals (Ng & Feldman, 2010; Zacher et al., 2017; Henning et al., 2023). Much research has validated the underlying assumptions of SST, showing that motives associated with career development declines with age (Ng & Feldman, 2012) because they have already achieved higher levels of experience and job skills (Kanfer & Ackerman, 2004) and must also consider the optimal use of their resources to prevent losses while still satisfying relatedness needs (Ebner, Freund, & Baltes, 2006). Conversely, younger adults are generally less experienced and have not had the opportunity to accumulate skills but have an open FTP and, as a result, value opportunities for learning (Kanfer & Ackerman, 2004; Wang et al., 2015), growth (Ebner, Freund, & Baltes, 2006), and opportunities for advancement (Wang & Zhan, 2012) than older employees.

Research on feedback orientations has generally supported these theoretical assumptions. For example, Wang et al. (2015) found that older workers gravitate towards feedback for social awareness but report lower orientations toward utility. Kooij et al. (2010) found that feedback practices associated with growth and development (i.e., utility) were stronger for younger employees, and those associated with maintaining performance (i.e., self-efficacy) were stronger for older employees. Subsequent studies have presented similar arguments finding that younger workers reported higher levels of job attraction and satisfaction when feedback was underpinned by growth and development,

whereas older workers place less value on this type of feedback because of their greater experience and crystallised intelligence (Wang et al., 2015; Zacher et al., 2017). Furthermore, older workers respond more strongly than younger workers when feedback delivery matches their orientation, while younger workers react more strongly to the quality of feedback provided (Wang et al., 2015). Thus, age-related differences in employee feedback orientation align with the assumptions of lifespan development theories, and these differences can help to explain reactions to feedback practices at different life stages (Wang et al., 2015).

Daneci-Patrau's (2011) reciprocal communication model provides a foundation for optimally matching feedback orientations with delivery. It argues bidirectional leader-worker communication consequentially influences the effectiveness of task assignments, feedback opportunities, and employee participation; for example, by delivering feedback face-to-face instead of in written format, supervisors are better able to encourage participative decision making to create mutually beneficial objectives that promote future-oriented behaviours toward goal attainment. Although this approach may be more time-consuming, understanding the needs and resources of employees forms a critical part of the goal-setting process by recognising the motives of that individual and creating goal-related outcomes that are valuable to them. Furthermore, collaboratively negotiated goals are significantly more effective in predicting performance and minimising boredom than non-specific goals (Locke & Latham, 1990; Gratton, 2000).

For increasingly age-diverse workforces, open communication should sit at the heart of job design models. For instance, Tims and Bakker's (2010) job control-resources model (JC-R) differs to the aforementioned JD-C (Karasek, 1989) model because it places an emphasis on individual resources rather than job control, which therefore requires a deeper understanding of the resources available from employees. At the centre of this model is job crafting, which is positioned as an important mechanism that bridges workplace characteristics to work outcomes (Tims & Bakker, 2010; Rudolph et al., 2017). As such, the JC-R model is allied more closely to competence-supportive climates because jobs are shaped to foster work motivation, rather than minimise work stressors.

Older employees who have greater experience and accumulated skills may be well positioned to craft their jobs (Rudolph et al., 2017), and research has shown that providing opportunities for older workers to craft jobs aimed at making their jobs more interesting (i.e., interests crafting) enhances work engagement and job performance (e.g., Kooij et al., 2020). Job crafting is similar to how job control is positioned to minimise work stressors in the JD-C model and has thus far shown to be much less effective in work scenarios (e.g., Lichtenthaler & Fischbach, 2019), indicating that older employers still require intellectual stimulation and challenge in order to be engaged with their work (Kooij et al., 2020).

By enabling older employees more freedom in crafting their jobs to match their resources and desires, there is a lower probability that age-related changes will be noticeable because jobs will be designed to optimise gains (e.g.,

crystallised intelligence) and mitigate losses (e.g., fluid abilities) in order to perform meaningful work, promote self-efficacy, and preserve self-concept (Kanfer & Ackerman, 2004; Salthouse, 2010; Beier et al., 2022). As a result effective job crafting leads to higher levels of feedback-seeking and proactive behaviour, making it beneficial to both employee and employer (Parker & Griffin, 2011; Kooij et al., 2020). Furthermore, job crafting moderates the inverse u-shaped relationship between calendar age and career engagement such that it reduces disengagement before workforce exit in later life (Damman et al., 2013; Katz et al., 2019).

3.3.3.3 Training and Development

A fundamental mechanism in fulfilling competence needs is the extent to which organisations provide opportunities for training and development. Workplace training is viewed as a way to develop employee competencies in a way that facilitates individual goal attainment and supports broader organisational growth (Zwick, 2011; 2015). While training and development is usually dictated by HR policies, the extent to which the employee is supported by employer and supervisor can positively influence their motivation to learn which, in turn, helps to predict training willingness, as well as their ability to utilise newly acquired skills at work (Park, Kang, & Kim, 2018). Satisfaction with training programmes has also been shown to positively predict overall job satisfaction (Schmidt, 2007).

Earlier in the chapter it was identified that older employees face discriminatory attitudes and biases in training and development, and research has generally presented a negative relationship between calendar age and training

performance (Ng & Feldman, 2008). Older workers regularly report the fewest opportunities for training and development (Canduela et al., 2012; Devins et al., 2014; CIPD, 2022) and this is contributed to in no small way by cuts to funding in supporting adult learning, particularly for employees aged over 50 (Aldridge & Tuckett, 2007; Phillipson, 2013), lower advancement prospects (Eurofound, 2021), and weaker encouragement to participate by management compared to younger workers (Humphrey et al., 2003; Villosio, 2008; Phillipson, 2013; Zwick, 2011, 2015; ILO, 2016). These ageist biases have seemingly contributed to negative internalisation whereby older workers no longer feel deserving or capable of training and development (Vickerstaff & van der Horst, 2019). While recent initiatives have attempted to remedy these situations, for example, by targeting adult upskilling, recent research in the UK shows that those aged 50 or above report the lowest levels of growth-related opportunities available at work (CIPD, 2022).

The mismatch in opportunities felt by older workers may disrupt workplace harmony and present a notable problem in achieving current and future person-job fit (Moen et al., 2017). Policy changes for older workers needs to emphasise ‘third age learning’, with equal opportunities distributed among all employees irrespective of age. HR departments may require methodological reassessment to provide suitable learning environments, techniques, and provisions for their specific team requirements (Phillipson, 2013). For example, Furunes and Mykletun (2010) found that, whereas younger employees appreciated being chosen to undertake tasks involving newer technologies or

equipment, the perceptions of ‘meaningful work’ were much reduced for older employees.

As a result, recurrences of ageist behaviour have not only shown older workers to feel less competent, but also become more incompetent over time (Schermuly, Deller, & Busch, 2014) and experience declines in productivity (Thorsen et al., 2011). Indeed, there has been evidence of a negative relationship between age discrimination and perceptions of competence (Furunes & Mykletun, 2010), and empirical studies in Europe have repeatedly shown that employees who were subjected to higher levels of ageist stereotypes also reported lower affective organisational commitment, job satisfaction, and higher intentions to retire early (Snape & Redman, 2006; Schermuly, Deller, & Busch, 2014). Furthermore, more experienced workers that are able to fulfil their job roles effectively are likely to feel more control over job prospects and remain in the labour force for longer (Mulders & Henkens, 2019).

Despite continued cuts to older adult learning and development (e.g., Aldridge & Tuckett, 2007; Phillipson, 2013), European governments have outlined the importance of training and upskilling older workers (DES, 2021). However, Cheung and Mckay (2010) illustrated that training opportunities and participation for older workers has increased significantly between 1994-2008, although older age groups still received the least training. It was also unclear as to whether the increased participation was due to external influences, such as policy changes or market competition. One argument is that most industries

are fast-moving, competition is fierce, and organisations must regularly train employees so that they possess the knowledge and skills to respond effectively (Zwick, 2015).

What is evidenced is that young adults (25-34 years) are almost twice as likely to undergo training as older adults over the age of 50 (ILO, 2002; 2016), and most research has evidenced that older workers receive or participate in less training than younger workers (e.g., Humphrey et al., 2003; Villosio, 2008; Phillipson, 2013; Zwick, 2011, 2015; ILO, 2016). Like motives that change across the life course, organisations need to consider training delivery and learning methods that engage with all age groups (Chan et al., 2000; Zwick, 2011, 2015).

During a job transition, older employees are 10% less likely to receive help to adapt compared to all other employees (Humphrey et al., 2003). Not only does this negatively affect older individuals that are currently employed, but also those who may be finding alternative employment in later life. The lack of development and learning opportunities provided by organisations can exacerbate cognitive decline, rigidity and preparedness to develop current and new skills (Schalk et al., 2010). Company sponsored training for older employees and those on NSE contracts is significantly lower than full-time employees, and the onus will increasingly fall onto those employees to pursue and acquire new knowledge and skills (Czaja & Sharit, 2009; Phillipson, 2013). Older employees may continue to suffer from a lack of development opportunities as two thirds of employees aged 50 or over were unwilling to

undertake training, compared to one third of employees aged under 50 (Feldstead, 2010; ILO, 2016). Research by Humphrey et al. (2003) also illustrated that the motivation to learn job-related skills declines further in later life (i.e., over the age of 55), possibly aligning with the increase in prosocial and decrease in growth motives occurring at this point in the life course (Truxillo et al., 2012).

This may be due to resource limitations and fear for future opportunities, but also because there is little research that examines whether generalised training techniques are consistently differentially beneficial to older workers (Czaja & Sharit, 2009), which may add further reluctance in the investment of adult learning. However, Zwick (2011, 2015) identified that variables related to training effectiveness are not age-sensitive and, as such, it can be argued that it is how training is structured and resources are allocated that explains the effectiveness of training. The labour force survey (LFS, 2008; 2009) adds further context in that individuals in professional occupations are almost three times more likely to receive training at any given point than those in routine occupations, which often use higher numbers of NSE relations. Public sector workers are almost twice as likely to receive training than those in the private sector (Schuller & Watson, 2009; LFS, 2009).

Contrary to stereotypical views, variables on training effectiveness such as duration, financing, and initiative are not sensitive to age (Zwick, 2011, 2015). However, the incorrect allocation of training contents, resources, and neglect of intraindividual differences in training preferences are considered critical

predictors of training effectiveness (Zwick, 2011, 2015). Zwick (2015) found that older employees are more effective in informal training scenarios where contents are directly relevant and can be tackled by crystallised abilities. However, studies have found a significant relationship between older workers and lower training incidence due to a lack of investment, a shorter amortisation period reflective of investment, and stronger perceptions of inflexibility underpinning older employees work ethic (Warr, 1993; Cunha et al., 2006). Researchers suggest that lower training incidence is due to shorter amortisation period of investments (Cunha et al., 2006), their lower motivation to invest in training (Warr & Fay, 2001), and a perceived lower adaptability of older employees (Warr, 1993).

The stereotype that older workers do not want to learn new skills to improve competency may therefore relate more to the fear of skill deterioration and resources losses, as research has indicated that older employees are not any less motivated than younger employees (de Lange, Taris, Jansen, Kompier, & Houtman, 2006). This challenges other assumptions indicating that job-related skills decline in later life (Humphrey et al., 2003). While the acquisition of formal qualifications tends to decline after age 25, and some stereotypes claim that older workers are less willing to learn new skills (Dixon, 2003; Kooij et al., 2011), research has found that participation rates in job-related training do not decline significantly and older workers are no less willing than younger employees (Dixon, 2003; Posthuma & Campion, 2009).

3.3.4 Relatedness

The need for relatedness reflects the innate desire for connection: to love and be loved, and to care for and be cared for (Baumeister & Leary, 1995) and, at least in social contexts, the absence of relational attachments is thought to prevent the emergence of intrinsic motivation (Deci & Ryan, 2000). At work, relatedness needs are more complicated. Relatedness is satisfied when workers view themselves as part of the team, identify with group values, sense companionship amongst colleagues, have trust in and feel trusted by co-workers, and are provided with cooperative working opportunities (Van den Broeck et al., 2016; Slemp et al., 2018). Meta-analyses have shown that autonomous motivation emerges when relatedness needs are satisfied (Van den Broeck et al., 2016; Slemp et al., 2018). In general, work climates that promote collaboration, cooperation, trust, and companionship have been shown to benefit from increased levels of employee wellbeing, engagement, and knowledge-sharing (Cabera et al., 2006; Weinburg, Scott, & Morrison, 2017). Put simply, a secure, trustworthy, and collaborative social base from which employees can operate is critical for the development of autonomous motivation (Deci & Ryan, 2000; Foss, Pederson, Fosgaard, & Stea, 2015).

According to SST, relatedness needs will become more important with age as individuals go through the process of rerouting resources from growth and development to pursuing positive social and emotional experiences due to an increasingly limited FTP (Carstensen, 1991). Older workers are therefore more focused on the present and place greater emphasis on deriving positive emotional experiences from social interactions, such as deepening

relationships, sharing knowledge, and pursuing generativity (Lang & Carstensen, 2002; Fingerman, Hay, & Birditt, 2004; Charles & Carstensen, 2010). The meaning that younger workers assign to relatedness needs differs because they place greater emphasis on deriving developmental experiences from social interactions, such as gaining knowledge and networking for advancement opportunities (Singh & Singh, 2010). The need for relatedness has shown to become increasingly important in later life as these workers focus more on past accomplishments, meaningful social connections with colleagues, and citizenship behaviours underpinned by generativity motives, such as helping train younger colleagues (Kanfer & Ackerman, 2004; Charles & Carstensen, 2010; Truxillo et al., 2015; Beier et al., 2022).

3.3.4.1 Teamwork and Cooperation

Research examining social characteristics of work have historically focused on team-oriented organisation structures (Humphrey et al., 2007; Grant & Parker, 2009), but integrating team-based working practices nowadays is one of the simplest ways of satisfying relatedness needs because of the shared and interdependent nature of modern work environments (Griffin, Neal, & Parker, 2007).

It was mentioned that the three psychological needs of autonomy, competence, and relatedness overlap and are in many ways interdependent. This argument is presented in Hackman's (2002) model of team effectiveness, which argues for the creation of an environment that brings together individuals with different strengths and enables them to work collaboratively as an autonomous unit toward a particular goal, which then also promotes individual

development. Thus, social work characteristics, such as social support, interdependence, and interactions with others have shown to support autonomous motivation beyond task characteristics alone (Morgeson & Humphrey, 2006; Humphrey et al., 2007; Truxillo et al., 2012).

As such, team-based job designs have been evidenced to minimise isolation, increase teamwork processes, and compensate for lack of growth, and have been shown to be of more benefit than individual-based designs when implemented correctly (Vaill, 1982; Latham & Pinder, 2005; Konradt et al., 2014). Those that are granted higher levels of autonomy and empowerment in team contexts often exhibit higher levels of adaptive and proactive performance behaviour as they are required to continuously reflect on, adapt to, and make decisions about specific processes and results (Griffin et al., 2007; Konradt et al., 2014).

Under the assumption of the similarity-attraction paradigm, team-based designs have the potential to bring together like-minded individuals in age-diverse organisations through collaborative working, which can improve perceptions of equality and inclusion among employees (Byrne, 1971). However, too much diversity in team member characteristics is associated with injustice and isolation, so finding a way to form a shared group identity based on age, culture, beliefs, or on the work itself is essential to creating a socially supportive working environment (Naegele et al., 2018).

The importance of promoting a supportive, accepting, and cooperative environment is increasing because the relationship between age and performance can turn negative in non-stable work environments that possess higher levels of ageist discrimination (Niessen et al., 2010). This is often experienced through the concept of stereotype threat, which describes a situation in which an employee may feel vulnerable or pressured by expectations or prejudices imposed by stereotypes (Smith, 2004), and can be mitigated or amplified through workplace interactions (Naegele et al., 2018). From a social desirability perspective, these environments could be more detrimental to older workers who have a stronger desire for social relationships (Lang & Carstensen, 2002; Charles & Carstensen, 2010). Using terror management theory (Martens, Greenberg, Schimel, & Landau, 2004) as a lens into the prevalence of ageism at work, designs that are not age-inclusive or age-supportive may increase isolation, group segregation, and enhanced feelings of weaknesses and incompetence toward older employees by others (Martens, Greenberg, Schimel, & Landau, 2004). Left unaddressed, this can worsen group harmony resulting in higher levels of work-group conflict, avoidance-coping strategies, and reduced task-interdependencies such that operational efficiency declines (Neck et al., 1999; Langred, 2007).

As such, the importance of feeling supported by colleagues and management at work is thought to increase with age (Henning et al., 2023). Social support, which describes the opportunities provided for advice and assistance from co-workers, has been positively associated with job satisfaction, but its relationship with job performance has yielded mixed results (Morgeson &

Humphrey, 2006; Humphrey et al., 2007). Recent research has shown the benefits of combining work characteristics that satisfy multiple needs. For instance, LAS combines autonomy, social support, and managerial support by encouraging self-initiating work behaviour that is autonomous, thus satisfying multiple needs concurrently (Slemp et al., 2018). However, at high baseline levels of community and belonging, there appears to be no association with age in terms of buffering workforce exit (Henning et al., 2023). Among a number of viable explanations is that older employees who do not experience positive relational interactions with colleagues may already have exited, or that the high level in and of itself is a sign of self-selection into more intrinsically meaningful jobs over the lifespan (Ng & Feldman, 2010; Henning et al., 2023).

Where a high baseline level exists, additional relatedness needs, such as generativity motives, may be satisfied by providing older workers with opportunities to give – rather than receive – social support and feedback to others (Kanfer & Ackerman, 2004; Truxillo et al., 2012). Older workers that experience more positive social interactions are also able to compensate for other age-related losses (Baltes, 1997; Carstensen et al., 1999). It can also help to guard against high demands when there are high levels of uncertainty or low levels of control (Karasek, 1989). One way of doing this is by enabling shared leadership in age-diverse teams that have a higher level of collective experience. Doing so has been shown to positively predict team performance and can simultaneously satisfy autonomy, self-efficacy, and positive social interactions (Hoch et al., 2010). Zhu, Gardner, and Chen (2018) found that a collaborative team climate could positively predict proactive behaviour in the

absence of other intrinsic motives being stimulated. Therefore, the effective coordination of team expertise, particularly in age-diverse teams, is essential for individual and collective performance (Faraj & Sproull, 2000; Lewis, 2003; Hoch et al., 2010).

3.3.4.2 Community and Belonging

Working regularly in a collaborative environment can also provide a sense of community, which is important for developing a feeling of belonging and group identity (Henning et al., 2023). The need to belong has long been established as a fundamental human need for positive and significant interpersonal relationships (Baumeister & Leary, 1995). Sense of community therefore supports relatedness needs satisfaction and is positively associated with mental health and subjective wellbeing (Stewart & Townley, 2020). From the combined perspective of SIT and SST, older workers will place a higher relative value on feeling a sense of community because of their increased need to derive positive emotional experiences from social interactions at work (Tajfel, 1979).

Experiencing a sense of belonging may be more important to older workers than the social interactions from which the feeling of belonging originated, especially for those who have established work routines and social networks which they can rely on for support (Zacher et al., 2016; Rudolph et al., 2017). Older workers that feel a sense of belonging to the group and report higher interactions with and support from colleagues ought to exhibit more contextual performance behaviours due to the satisfaction of relatedness needs (Truxillo et al., 2012). Conversely, workers are less likely to engage in prosocial and

collaborative behaviours when their sense of belonging is threatened, and in extreme cases, this can lead to aggressive and bullying behaviours at work (Twenge et al., 2007; Fracioli et al., 2018) or early exit from the job (Henning et al., 2023). Fostering a sense of community can therefore act as a protective resource from work-stressors and compensate for jobs with low levels of control (Karasek, 1989). For instance, perceiving a positive sense of community has shown to mediate the effect of poor-quality leadership on workplace bullying (Francioli et al., 2018).

Reinforcing a sense of belonging at work can promote shared group identity which can influence attitudes beyond individual experiences of work characteristics (Kozlowski & Ilgen, 2006; Naegele et al., 2018). For instance, a meta-analysis by DeChurch & Mesmer-Magus (2010) identified that the collective cognitive processes of work groups that contribute to team effectiveness (i.e. team cognition) had a strong positive relationship with the teamwork behavioural processes, motivational states, and team performance. Providing an environment that allows for meaningful workplace relationships can promote increased feelings of community among colleagues, thus acting as a resource in facilitating or mitigating physiological and psychological changes occurring with age (Boyd & Nowell, 2017).

3.3.5 Macro Influences in Psychological Climate Perceptions

The social-contextual environment can act as a facilitator or barrier to motive satisfaction (Ryan & Deci, 2000). Recent research has indicated a gradual increase in job insecurity among older employees due to technological advancements, increases in nonstandard contracts (e.g., zero hours), atypical

work arrangements, and saturation of the job market (Weinberg, Scott, & Morrison, 2017). When basic needs such as job security and salary are not met it impairs or prevents the emergence of intrinsic or autonomous motivation (Wiley, 1997; Nohria, Groysberg, & Lee, 2008).

3.3.5.1 Industry and Employment Contract

The way that employees experience work characteristics is determined by their job role, and that role is formed by the industry in which it is situated. Some industries provide a working environment that is more conducive to the emergence of autonomous motivation, while others are constrained by an emphasis on output or lack of resources available to support individual needs. The retail sector, for instance, has been commonly associated with routine job roles, high numbers of nonstandard working contracts, inflexible working practices, and restricted opportunities for training, advancement and to exhibit change-related behaviour such as initiative (Larsson & Lundholm, 2010; Mosley, Winters, & Wood, 2012; Macpherson, 2013). Furthermore, proactive behaviours in less facilitating work environments can be psychologically risky and incur resistance from colleagues and supervisors, and the direction of motives may change depending on the levels of support that employees receive (Parker & Griffin, 2011).

Nonstandard employment contracts (NSE) have become commonplace in low-paid and low-skilled industries such as retail, manufacturing, and production (ILO, 2016). NSE comprise the largest portion of unfair employment contracts (e.g., zero-hours, on-call, casual work) and refer to employment arrangements that differ from a standard employment relationship between an employee and

employer, which is usually viewed as full-time and permanent (ILO, 2016). Zero-hour contracts, for example, emerged as a result of the diversification of part-time work into contractual work and has no guaranteed minimum hours (ILO, 2016). This trend has continued to rise in recent years (ONS, 2020). In a recent nationwide survey, CIPD (2022) found that 3.3% of all workers in the UK were on a zero-hours contract.

Although laws have been introduced to promote fair treatment of employees on NSE contracts, this group often face disadvantages with regards to job security, training, occupational safety, and workplace relationships (ONS, 2014; HSE, 2021; CIPD, 2022). Furthermore, industries reliant on NSE contracts invest less per employee for personal and career development and training (Devins et al., 2014). As a result, employees on NSE contracts are more likely to experience work-related stress and anxiety and report lower levels of job satisfaction and wellbeing (Riordan et al., 2003; ONS, 2014; CIPD, 2022).

Though NSE is mostly associated with job insecurity, it has been increasingly associated with providing flexibility for older workers by removing the traditional contractual requirements of working on specific days at certain hours (ILO, 2016; HSE, 2021). Despite this, research has demonstrated a stronger relationship between age and wellbeing among full-time workers compared to those in other work arrangements (Riordan et al., 2003; ONS, 2014), indicative of the disadvantages faced for those in NSE.

The increase in NSE poses a significant problem in age-related training programs (e.g., adult upskilling, CIPD, 2022). Studies have indicated that those aged 60 or over would prefer to transition to part-time or flexible working patterns (Christensen et al., 2009). Providing these options would better accommodate a large proportion of older workers that may desire or need to undertake other responsibilities into later life (e.g. caring, domestic, health) and enables work patterns to be adjusted to suit personal circumstances and commitments which become more important with age (Harris & Higgins, 2006; Griffiths et al., 2009; HSE, 2021). Separately, older workers and workers on NSE contracts are at an immediate disadvantage in training and development. Together, the likelihood is that investment will reduce even further and actively worsen job dissatisfaction and motivation (Devins et al., 2014).

3.3.5.2 Covid-19 Impact

The Covid-19 pandemic has disrupted workforces across the globe (WHO, 2021). Shortly after 2020, the number of employees resigning from their jobs increased to 25%, indicating that 1 in 4 had left the workplace during that period (Visier, 2021). The stress on industries such as retail and public services contributed to this figure. With resignations causing further stress on employed individuals and levels of revenue and custom returning to some level of normality in 2021, organisations were left with employment gaps (Fortmeyer, 2022). The reasons for resignations not only related to the work environment at a time of high uncertainty and stress, but also at a time when life was put into perspective for many. In response, companies implemented short-term strategies to offset pandemic burnout and constructed work

environments which balanced intrinsically and extrinsically engaging practices to help foster affective commitment and reduce burnout (Fortmeyer, 2022).

The impact of the pandemic on older workers was felt in actual and perceptual terms. Even at work, the perceptions of older colleagues tended to focus on the relationship between age and vulnerabilities to the consequences of Covid-19 (Schnell, Broussard, & Magnerelli, 2021). In these environments, ageist stereotypes can be reinforced and shared among colleagues and result in discriminatory decision making, thus giving rise to feelings of isolation and disrupting self-efficacy for those affected. For instance, 84% of companies shifted to remote working as a result of the pandemic (Fortmeyer, 2022). Because younger employees are considered more technologically adept, the transition to remote working may be considered more seamless than for older workers (SHRM, 2022). Older workers, who receive less training than their younger counterparts, may be somewhat neglected in transitioning to the many changes that the pandemic has brought.

Under the assumption of SST, the increased emphasis placed on relatedness needs and increased flexibility in work scheduling in later life have been threatened by the Covid-19 pandemic. Research by the CIPD (2020) discovered that employees experienced lower financial security, higher intention to resign, and a significant mismatch in workload (key workers reported too much, routine workers reported too little), all of contribute to an increased number of resignations. Furthermore, employees regularly cited inadequate information or anxiety for returning to work, and the ability to work

normally was impacted by changes in caring responsibilities since the pandemic began (30% of all workers), making it difficult to balance work and caring responsibilities (CIPD, 2020). After the midlife point, workers are more likely to emphasise flexibility in order to balance caring responsibilities with work (Huffman et al., 2013), so these issues are likely to have impacted older workers more strongly than younger workers.

Literature investigating the post-pandemic impact on work outcomes have observed mostly negative associations, including for performance (Saleem et al., 2021; Nagarajan et al., 2022) and for mental and physical health, such as depression, anxiety, and stress (Giorgi et al., 2020). For instance, Saleem et al. (2021) found that a higher impact of Covid-19 was negatively associated with task and contextual performance, but positively associated with adaptivity. They also observed a relationship between age with the perceived pandemic impact and with contextual performance, suggesting that older employees may be more susceptible to declines in contextual performance due to the pandemic.

3.4 Literature Summary

The literature review evidenced three key areas that underpinned the need for further empirical investigation of age and performance at work. First, economies will be increasingly reliant on the continued work of ageing employees above and beyond what was previously considered *normal* due to the changing demographic. Governments have recognised that the largest proportion of the workforce will be occupied by older individuals and have

introduced changes to state pension laws, retirement packages, community initiatives, and anti-discrimination laws to provide support in and maintenance of employment (Phillipson, 2013; DWP, 2023). This support is extended to organisations in developing HR and training strategies that capitalise on the strengths of older workers, but the effectiveness of these strategies is questionable (Eurofound, 2021). The stereotypes and assumptions held towards older workers and their performance simultaneously influences how they are treated at work and, consequentially, the encouragement – or discouragement – that they feel motivationally both intrinsically and in terms of self-efficacy. The rhetoric is continued in large bodies of the literature by assigning chronological timelines to areas such as health and functioning (Kenny et al., 2016; Amarya et al., 2018).

Secondly, there is a vast body of literature that examines the relationship between age and job performance. However, current definitions and taxonomies of performance are often conflicting which makes it difficult to untangle lower-level meaningful and specific relationships with a range of individual and workplace variables.

How we define and operationalise age must go beyond calendar age whilst being cautious to not exacerbate the ageist rhetoric. Their conceptual development and measurement can lead to a stronger understanding of the changes that occur independent of and across the lifespan, thus reducing the likelihood that calendar age is used as a proxy for independent changes. It can also help to tackle mismatches associated with perceived and actual work

outcomes (Truxillo et al., 2012). On a broader scale, expanding how we understand and measure age can help organisations to untangle needs and motives that occur chronologically compared to those that change subjectively, thus enabling the construction of age-friendly work environments (Niessen et al., 2010).

The historical assumption of linearity attached to age-performance trajectories has been challenged by emerging evidence of variability in the ageing process and unique relationships observed for other conceptualisations of age (Sturman, 2003; Ng & Feldman, 2008; Kunze et al., 2015). Indeed, interindividual variability grows with time such that the differences in motives and needs of similarly aged individuals increases into later life (Nelson & Dannefer, 1992). Despite this, the absence of contextual investigation limits the extent to which successful ageing strategies can be facilitated at work. Without them, age-performance trajectories will remain theoretical rather than practicable, because workplaces cannot be developed effectively without understanding how employee needs are satisfied and the impact this has on performance. This broadening in scope also extends to job performance, where taxonomies must account for the complexity and interdependence of contemporary work environments.

This leads to the third point: older workers are driven by the same psychological needs as younger workers, but the meaning that they attach to these needs may differ (den Boer, van Vuuren, & de Jong, 2021). For instance, the purpose of social interactions for younger workers may be to build networks

to facilitate opportunities for advancement, whereas for older workers, social interactions provide emotional affiliation and attachment. As such, work characteristics associated with fulfilling needs associated with autonomy, competence, and relatedness will be experienced differently. A psychological climate for motivation may therefore be perceived differently at different life stages, so it is important to understand the interplay between work characteristics and needs (e.g., relatedness) in differentially predicting performance behaviours. In other words, it is important to distinguish between the process and outcomes of the age-performance trajectory and contextual factors contributing toward the relationship. In doing so, age-differential needs satisfaction may be reflected in psychological climate perceptions which, in turn, may facilitate or hinder certain performance behaviours.

3.4.1 Conceptual Models and Hypothesised Paths

Based on this summary, hypotheses have been developed that represent lower-level meaningful relationships to provide a renewed examination into the moderating role of psychological climate characteristics on relationships between age and performance. This section presents hypothesised paths in a series of conceptual models. A list of hypotheses is presented shortly after in Table 3.1.

Figure 3.1. Conceptual model for individual-task performance

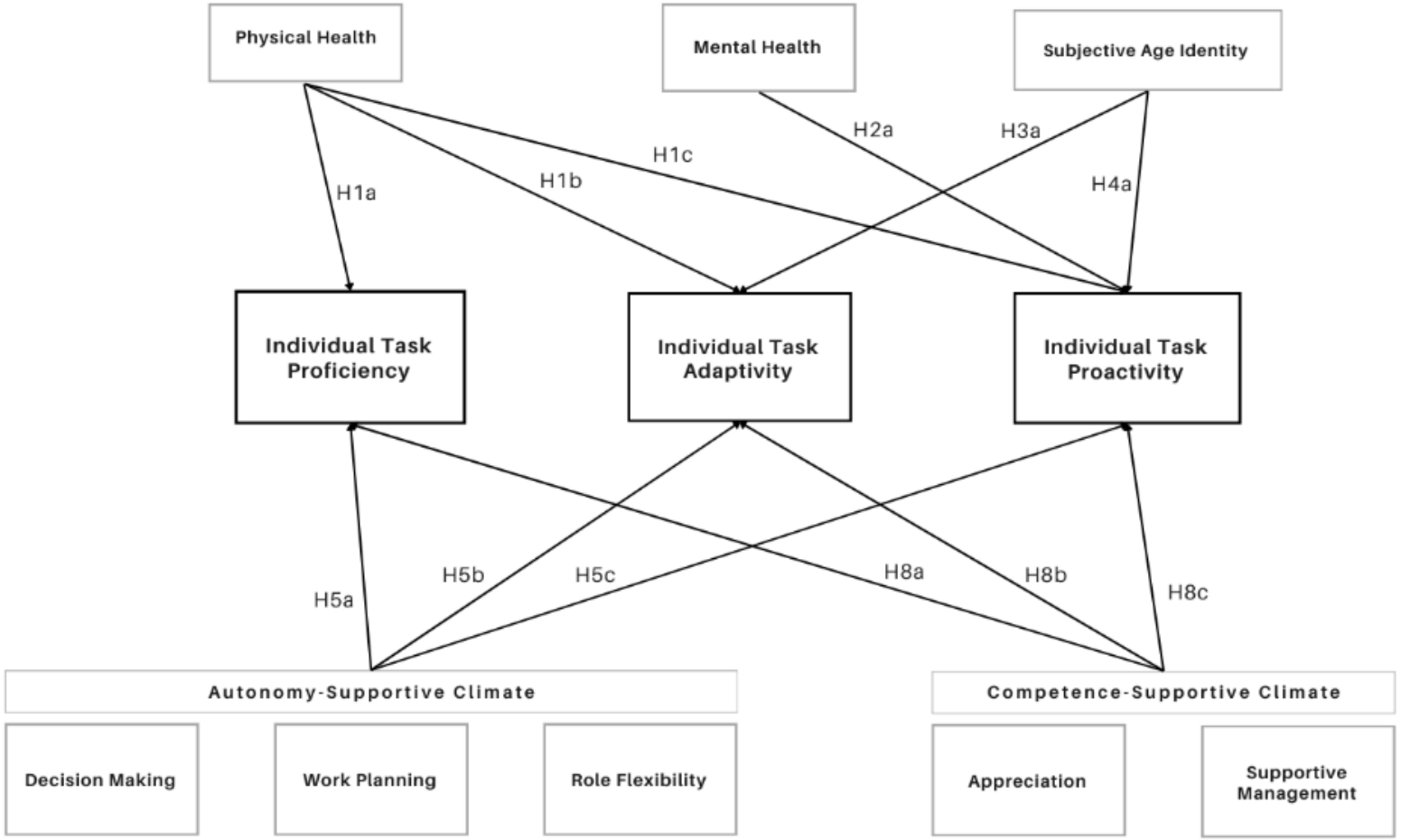


Figure 3.2. Conceptual model for the moderating role of autonomy-supportive and competence-supportive psychological climate in the relationship between age and individual-task performance

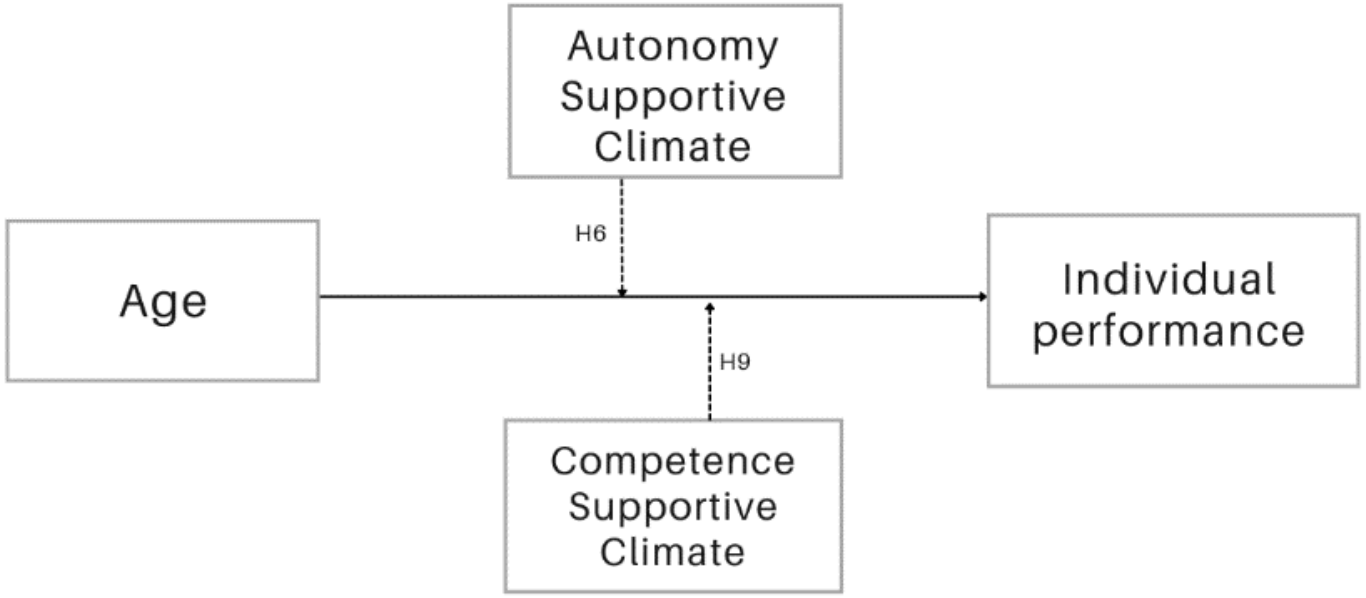


Figure 3.3. Conceptual model for team-member performance

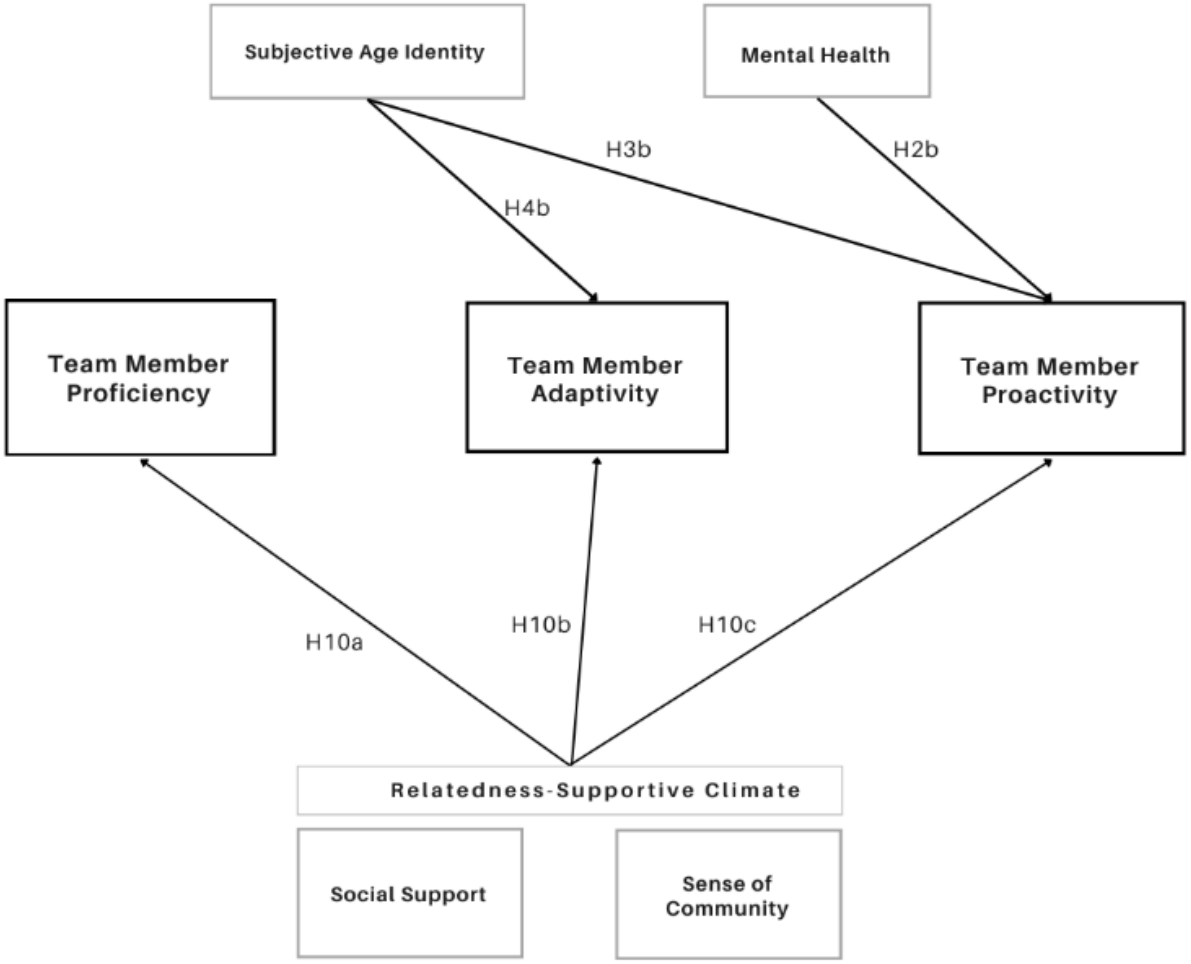


Figure 3.4. Conceptual model for the moderating role of relatedness-supportive psychological climate in the relationship between age and team-member performance

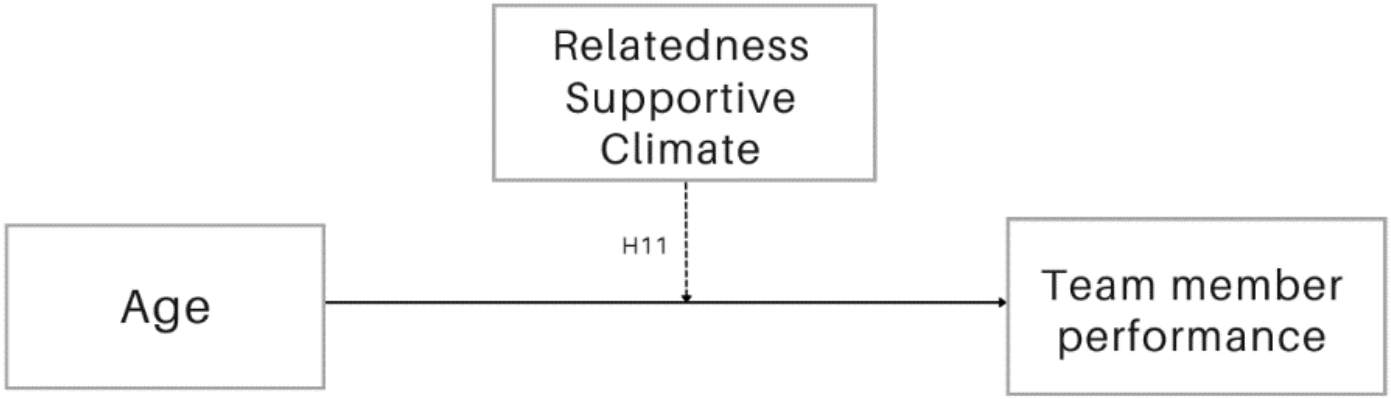


Figure 3.5. Conceptual model for organisation-member performance

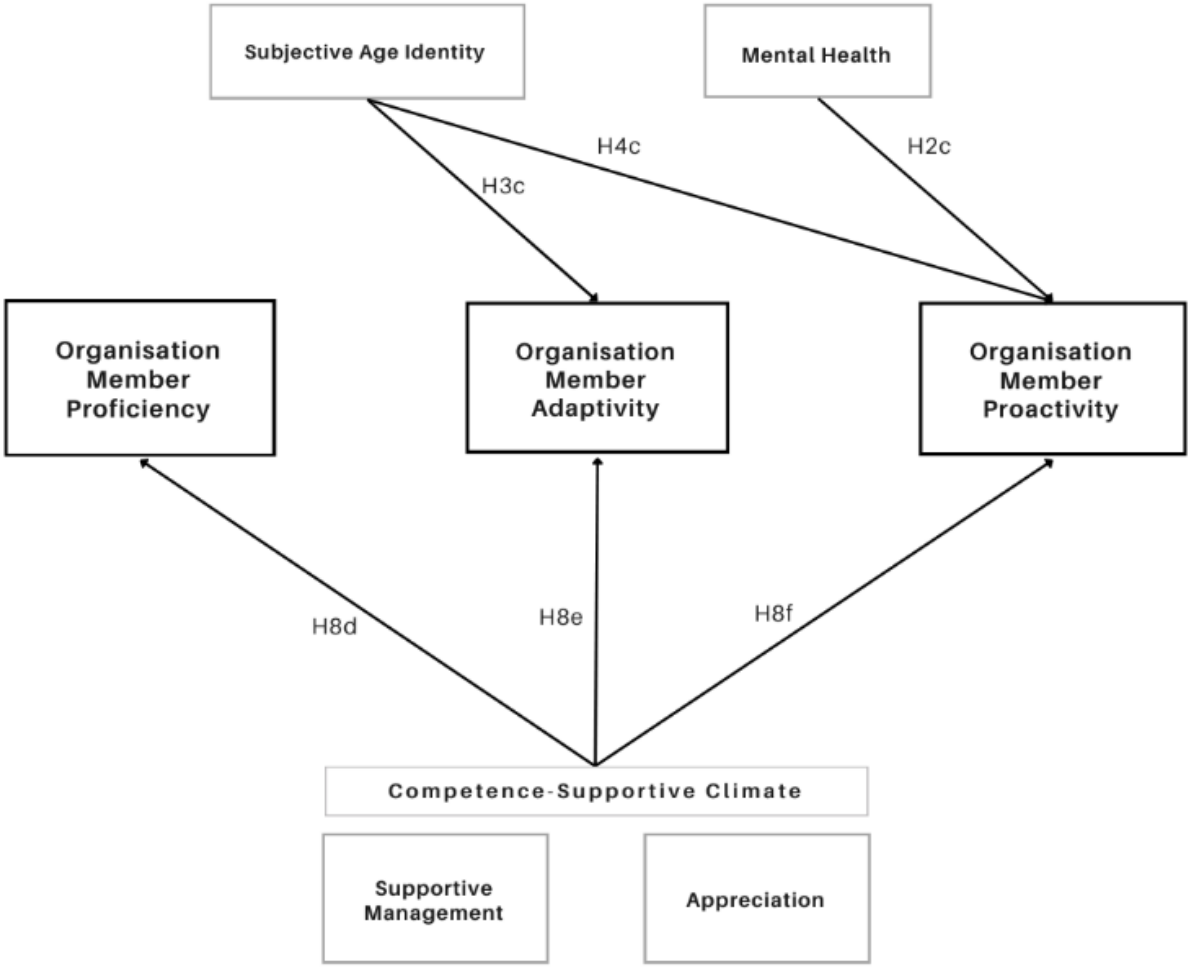


Figure 3.6. Conceptual model for the moderating role of competence-supportive psychological climate in the relationship between age and organisation-member proficiency

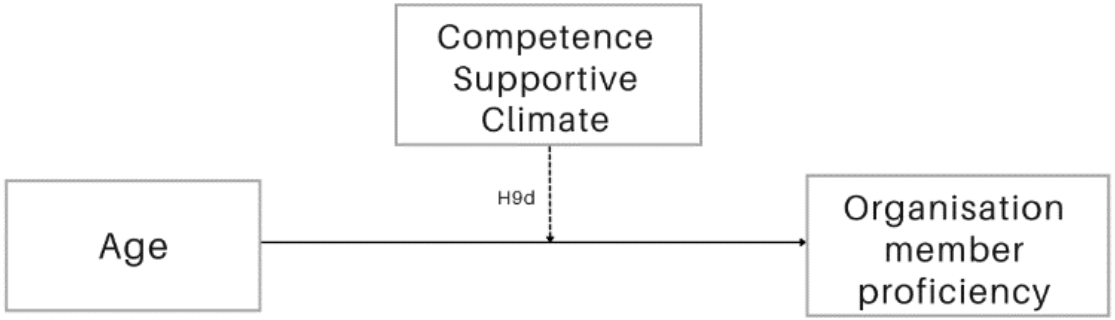


Table 3.1. Thesis Hypotheses

Hypotheses
H1: Physical health is positively associated with individual performance
H2: Mental health is positively associated with proactivity
H3: Subjective age is positively associated with adaptivity
H4: Subjective age is positively associated with proactivity
H5: Autonomy climate characteristics are positively associated with individual performance
H6: Work planning and/or role flexibility moderate the relationship between age (subjective and chronological) and individual performance
H7: Work planning and/or role flexibility moderate the relationship between subjective health (physical and mental health) and individual performance
H8: Competence climate characteristics are positively associated with individual and organisation performance
H9: Competence climate characteristics moderate the relationship between age (chronological and subjective) and individual performance, as well as organisation-member proficiency
H10: Relatedness climate characteristics are positively associated with team-member performance
H11: Relatedness climate characteristics moderate the relationship between age (chronological and subjective) and team-member performance
H12: Supervisor ratings of performance are lower than self-ratings of performance
H13: Age is more negatively related to supervisor-rated performance than self-related performance

Chapter 4: Research Design and Methods

An extensive theoretical and paradigmatic review of literature on age, performance, and psychological climate characteristics reinforced the importance of sustaining empirical investigation into ageing at work. There has been an increase in workplace ageism despite evidence to suggest a mismatch between perceived and actual work outcomes in older workers. Whilst institutional and legislative changes have been introduced to support employment in later life, the degree to which organisations foster healthy and motivational work environments will ultimately determine workers view work as meaningful and sustainable.

There has been criticism aimed at the lack of contextual investigation into the relationship between age and performance (Zacher, 2015; Zacher & Rudolph, 2017). Furthermore, the current landscape for psychological climate is ambiguous for its benefits in age-performance trajectories, particularly when lower-level relationships are neglected due to the neglect of subdomains within broader psychological climate dimensions (Baltes, Zhdanova, & Parker, 2009; Wilckens et al., 2021). As a result, the effect of being or feeling older on performance behaviours remains an area that demands empirical development, particularly in understanding the role of psychological climate perceptions that represent potentially practical solutions.

This chapter describes the research design employed to address the objectives aimed at examining the role of psychological climate in the

relationship between age and performance. The sampling and recruitment methods used to collect data are discussed, including sample selection based on the demographic characteristics needed to reliably answer the research objectives. These objectives were measured through a variety of peer-reviewed research instruments, all of which are justified for their contribution to measuring domains pertaining to age, performance, and psychological climate. Protocols for data preparation and data analysis are briefly outlined, with a more detailed justification included in chapter 5.2 and 6.2. After this, the steps taken to address issues associated with reliability and validity are explained, before stating procedural and ethical considerations with regards to data protection, use, and sharing.

4.1 Research Design

A research design provides a framework for data collection and analysis such that it addresses the research aims and objectives (Clark et al., 2021). Here, an overview of each research design for sample A and B is presented. Chapters 5 and 6 provide in-depth rationale for data analytical frameworks and procedures concerning both samples.

4.1.1 Sample A

The purpose of sample A data was to address hypotheses 1 – 11 (see section 3.4.1). These were concerned with lower-level relationships between constructs of age and performance and the extent to which psychological climate characteristics moderated these relationships. To this end, the research design for sample A was cross-sectional and quantitative, in which a convenience sample of individuals employed in the UK were asked to

complete a survey comprising 96 items relating to demographic, age, health, psychological climate perceptions (measured as experiences of work characteristics), and performance behaviours directed toward individual, team, and organisational responsibilities. The cross-sectional nature for both sample A and B supported data collection during a complex period of pandemic regulations and restrictions. The impact of the pandemic was also measured within the survey to align with a cross-sectional design, which is useful in gathering current attitudes, opinions, and beliefs about certain phenomena (Creswell, 2012).

Although some of the hypothesised relationships had not been tested in historical research (e.g., the moderating role of role flexibility in the relationship between physical health and individual adaptivity), deductive reasoning still applied. Specifically, lower-level relationships were hypothesised as a means of complementing existing frameworks (e.g., successful aging at work, Kooij et al., 2020) and to extend our understanding of the relationship between age and performance, of which the majority of research comprises unidimensional views (e.g., one performance variable such as task performance) or collapsed dimensions (e.g., examining a psychological climate for motivation, rather than examining its underlying variables, such as role flexibility).

Data preparation techniques, including coding and missing data techniques, are discussed in chapter 5.2. Pearson bivariate correlations were conducted as a preliminary exploration of relationships among all study variables and are presented in Table 5.6. Confirmatory factor analysis (CFA) was used to re-

examine the validity of the scale factor structure to ensure that the model aptly fit to the imputed datasets in readiness for specification of the structural model (Brown, 2015). After obtaining good fit for the measurement model, structural equation modelling (SEM) was conducted to test hypothesised paths between age, performance, and psychological climate variables.

The analytical procedure for conducting SEM included model specification, identification, estimation, evaluation, and modification (Hoyle, 1995; Kaplan, 2000; Kline, 2005; Schumacker & Lomax, 2004; Weston & Gore, 2006). SEM provides advantages over other multivariate methods in that it explicitly assesses measurement error (unlike procedures such as regression) and therefore accommodates estimates of variance among observed and latent dependent variables and covariances among exogenous variables (Weston & Gore, 2006). Finally, latent variable interaction modelling (i.e., moderation) was conducted to test whether climate variables the strength and/or direction of relationships between age and performance. A moderate sample size consisting of at least 375 participants is necessary for adequate model estimation (Rhemtulla & Little, 2012). Sample A therefore met the threshold needed to conduct SEM and latent interaction modelling.

4.1.2 Sample B

Sample B data was used to test hypotheses 12 and 13 (see section 3.4.1). The purpose of sample B was to test for differences between self-ratings and supervisor-ratings of performance and to measure the degree to which employee age affected these ratings. The research design for sample B differed to sample A in that the data was dyadic in nature such that ratings of

each individual employee's performance was rated by themselves and by their supervisor. The design remained quantitative and cross-sectional but the dyadic nature of the design meant that a purposive sample was required. Employees were asked to fill out an identical survey to the one used for sample A, and a survey comprising only performance items was administered to supervisors to reduce survey burden and facilitate response rates. Anonymity was preserved by creating a directory in Qualtrics where survey responses could be tracked using the embedded survey flow function. Data could be prepared upon completion to maintain confidentiality and protect anonymity.

A standard dyadic design was used such that each dyad was treated as a unique relationship. If a larger number of dyads were recorded, a one-for-many design could have been employed. Despite the smaller sample size, sample B provided a more reliable view of supervisor-employee differences in performance by accounting for the within-dyads and between-dyads variation (Kashy & Kenny, 2014).

Data preparation differed slightly in order to test for nonindependence which could be modelled into the statistical analyses. This is described in chapter 6.2. To test for the differences between supervisor ratings and self-ratings of employee performance, a series of one-way repeated measures ANOVA tests were conducted. To test for the role of age, a series of hierarchical linear regression models were developed. The procedures and results for these analyses can be found in chapter 6.

4.2 Participants and Procedure

A sample is a smaller and representative part of a larger population, such that generalisations can be inferred from samples about the population from which it was selected (Clark et al., 2021). As this research is concerned with individual performance, the first requirement was for participants to be employed in some capacity within the UK (e.g., full-time, zero-hours). This increased the number of potential participations able to participate in the research.

4.2.1 Sample A

To minimise sampling bias and to increase reach, sample A participants were targeted through social media platforms (Facebook and Twitter), several forums with the subject of retirement (e.g., mumset.com, moneysupermarket.com, citywire.com), and using word of mouth with acquaintances (e.g., former colleagues). Sample A was therefore a convenience sample: a form of non-probability sampling which is useful for increasing access to populations (Clark et al., 2021). This was substantially more important during this data collection period due to the uncertainty and restrictions emerging as a result of Covid-19 pandemic.

There were 550 recorded responses to the survey for Sample A. After removing Qualtric tests (N = 5), those who did not consent (N = 41), those who consented but answered no questions (N = 28), and those who only responded to basic demographic variables but did not report any performance or climate variables (N = 83), the final sample comprised 393 participants.

The mean age of respondents for sample A is 32.96 years and ranges from 20 years to 70 years of age. Among respondents, 52% are male and 48% are female, 41% are single, 55% are married, and 1% are divorced or widowed. Most of the sample are qualified in higher education (76%) and are employed full-time (79%). Respondent tenure within the organisation (*m* = 4.80 years) and job role (*m* = 4.75 years) are similar. Additional socio-demographic information for sample A is provided in section 5.1.

4.2.2 Sample B

Sample B consisted of 56 employees and 6 supervisors, representing 6 work groups from different organisations located in the UK. As such, purposive sampling – a form of non-probability sampling – was the most appropriate method to capture a sample representative of these requirements. Purposive sampling can give rise to selection bias, making it difficult for future studies to make inferences to the population. However, the inclusion criteria remained similar to sample A in that any organisation could participate so long as they resided in the UK. Purposive sampling was therefore the most apt method in selecting a group of participants that represented employees and supervisors within a work group.

Networks were leveraged from previous employment to gain access to organisations and work units. These organisations were approached by phone or email. Individuals expressing interest in the research were sent an overview of the research project and were contacted, with their consent, using phone or email. The research and implications were discussed with senior management

before a suitable work group was identified and lists were compiled in order to construct directories within Qualtrics to enable the matching of employee and supervisor ratings. Participants were provided with an eight-week timeframe to complete the survey. This addressed procedural bias by aligning with the time constraints of busy employees and recognised the uncertainty involved in work environments during the Covid-19 pandemic (Gray, 2014). These procedures were introduced to make employees feel safe and comfortable in answering questions honestly, which can also help to improve response rates (Quinlan, 2011; Gray, 2014).

4.3 Research Instruments

Choosing appropriate research instruments to achieve meaningful outcomes is one of the most important factors in effectively answering research objectives (Clark et al., 2021). The instruments used needed to have the capacity to generate data that allows for multidimensional and meaningful investigation. It was important that age conceptualisations ventured beyond chronological age without attaching implicit timelines to physical and mental health, and that psychological climate characteristics were underpinned by employee experiences of the work environment.

These considerations were grounded in criticisms with regards to collapsing construct dimensions and therefore failing to capture lower-level relationships between age, work characteristics, and performance behaviours, leading to spurious support of relationships without fully understanding their within-domain variation (Griffin, Parker, & Neal, 2007; Baltes Zhdanova, & Parker,

2009; Wilckens et al., 2021). As such, the scale and variable structure of psychological climate and performance questionnaires were retained so that lower-level meaningful relationships could be investigated.

A pilot study using all survey items was undertaken in January 2021 on a convenience sample comprising 20 participants to ascertain instrument bias, test usability, the time taken to complete the survey, and assess any issues that could hinder response rates. This pilot was not intended to test rigorously the reliability and validity of the scale structures as prior research had already provided evidence to support their satisfactory psychometric properties. The only changes that were made focused on feedback regarding wording, accessibility, and length (e.g., moving demographic items to the beginning of the survey to encourage response rates).

The final survey distributed to employees (sample A and sample B) contained 96 items comprising a range of questions: multiple choice, multiple answer; rater-scale, open-ended. This included sociodemographic (4 items), occupational (9 items), and pandemic-related questions (7 items), in addition to subjective age and health (20 items), nine dimensions of individual performance (27 items), and nine dimensions of psychological climate (29 items). Ensuring that the questionnaire design was identical for both sample A and B helped to reduce design bias and facilitate data analysis at a later stage (Saunders, Lewis, & Thornhill, 2012).

Verbs were conjugated in the survey distributed to supervisors in sample B to reflect supervisor ratings, rather than self-ratings, but otherwise remained the same (i.e. 27 performance items). The consent form and information sheet were integrated directly into surveys on Qualtrics. Participants were required to read and consent in order to participate in the survey. The information sheet described the research aims, participant privacy and rights, incentives, instructions, and researcher contact details. All research instruments are included in Appendix 1 and 2.

4.3.1 Age

Objective measurements of calendar age, job tenure, and organisation tenure were captured in years and months through open-ended questions. These responses were then coded into continuous data by rounding up or down. Calendar age was measured simply as ‘what is your age’. Job tenure reflected the length of time one had occupied a specific role, whereas organisation tenure referred to the length of time employed by a company.

Preliminary examinations suggested that tenure was mostly unrelated to performance and climate, but given that life stages, needs, and motives can differ depending on tenure (e.g., Sturman, 2003), both organisation and job tenure were included as control variables, rather than independent variables. To assess physiological and psychological aspects of ageing, the Short-Form Health Survey (SF-12) and Subjective Age Identity Scale (SAIS) were used respectively.

4.3.1.1 Subjective Age Identity Scale

Subjective age was measured using the Subjective Age Identity Scale (SAIS; Hubley, 1998; 2004; 2007), which is a six-item self-report measure of subjective age identity measured on a six-point rating scale. Participants were asked, compared to their calendar age, whether they felt: much younger (1), somewhat younger (2), about the same (3), somewhat older (4), much older (5), or if they did not understand the question (6). This questionnaire captured how old participants felt physically, mentally, socially, including look-age and desired-age (Hubley, 1997; 2004; 2007), thus factoring in relativity to their calendar age (e.g., *Mentally, I feel... somewhat younger than my age*). Those responding with (6) were considered as missing data.

The SAIS was transformed into a composite score as per the original authors instructions (see Hubley, 1998) by using the rowMeans function in R (RStudio Team, 2020). To align with the other constructs of age, this scale was reverse coded so that a higher score equalled a younger – and therefore more positive – perception of ageing.

This scale was chosen because of the inconsistency in operationalising subjective age in existing research (Zacher & Rudolph, 2019; Laguerre et al., 2022). For instance, single-item measures that ask how respondents feel are inconsistent because it varies from day-to-day (Kotter-Grühn et al., 2015; Laguerre et al., 2022). This measure captures how participants feel physiologically, psychologically, and socially compared to their calendar age.

The Cronbach's alpha reliability estimate for this scale was acceptable (α = 0.72) and similar to what has been observed in existing studies (e.g., Hubley & Russell, 2009; Hubley, 2014). The correlation coefficient between SAIS and calendar age was small-moderate (r = 0.30), suggesting that older employees felt younger and vice versa, which corresponds with previous research where coefficients between 0.26 – 0.42 were reported (e.g., Kastenbaum et al., 1972; Hubley, 2014).

4.3.1.2 Short-Form Health Survey

The Short-Form Health Survey (SF-12; Ware, Kosinski, & Keller, 1996) is an abbreviated version of the SF-36 (Ware & Sherbourne, 1992). The SF-12 contains 12 items and has been evidenced to reproduce at least 90% of the variance in both physical health and mental health, as defined by the SF-36 scales (Ware, Kosinski, & Keller, 1996). The SF-12 is used to measure self-ratings of physical health (six items) and mental health (six items) adapted to the domain referent of work. The physical health subscales are comprised of physical functioning (two items), role-physical (two items), bodily pain, and general health. The mental health subscales include vitality, social functioning, role-emotional (two items), and mental health (two items). As an example, the question for general health asks: *In general, would you say your health is…* to which participants can respond on a five-point scale from poor to excellent. The SF-12 is therefore a succinct, yet reliable measure to capture participant perceptions toward their physical and mental health.

The scores were computed and normalised within SPSS using the authors instructions and procedure (see Ware, Kosinski, & Keller, 1996), including

cleaning, reverse coding, variable weighting and norm-based standardisation of aggregated scores. This yielded a final statistic for physical and mental health. Participants scoring under 50 are considered to have some level of physical health detriment, while a score under 40 indicates a potential mental health issue (Ware, Kosinski, & Keller, 1996).

In this thesis, physical health and mental health are conceptualised as subjective age variables. Studies have shown that poor health causes individuals to feel older than their calendar age (Barrett, 2003; Baum & Boxley, 1983; Uotinen, Suutama, & Ruoppiala, 2003). Moreover, self-rated health has consistently been found to account for a substantial proportion of variance in subjective age, whereas other potential predictors, including sociodemographic factors such as gender and education, play only a minor role (Barak & Stern, 1986; Barrett, 2003; Rubin & Berntsen, 2006; Hubley & Russell, 2009; Infurna, Gerstorf, Robertson, Berg, & Zarit, 2010). As such, self-ratings of health can provide a better reflection of physiological changes than social perceptions from colleagues or managers because ratings by the former are susceptible to leniency bias and ratings by the latter are susceptible to recency bias (Schwall, 2012). In summary, the individuals who are most in touch with the implications and impact of physiological changes are those that are affected by them. To this end, physical and mental health refer to how old someone feels in relation to their health, not their calendar age.

4.3.2 Individual Performance

The Work Role Performance Scale (WRPS; Griffin, Neal, & Parker, 2007) was used to measure individual performance. The WRPS is based on three

performance behaviours: proficiency, adaptivity, and proactivity, and the extent to which these behaviours contribute towards individual, team, and organisational effectiveness. This results in three types of each specific performance behaviour (e.g., individual-task proficiency, team-member proficiency, organisation-member proficiency) and nine total performance behaviours.

Proficiency is concerned with the fulfilment of allocated or expected requirements of the job role. Adaptivity reflects how individuals cope with, respond to, and support change. Proactivity is the extent to which individuals engage in change-related behaviours that is self-motivated and future-directed. Each subscale is measured by three items, resulting in a total of 27 items on a five-point Likert scale. For employees, the wording remained identical in sample A and sample B. For supervisors, the wording was changed slightly to reflect ratings by other people (e.g., *ensured that their tasks were completed properly*) rather than by oneself (e.g., *ensured that your tasks were completed properly*).

The WRPS and subscales have excellent psychometric properties (Griffin, Neal, & Parker, 2007). The internal consistency estimates for all subscales were satisfactory, ranging from 0.68 to 0.82. The factor loadings and fit indices for the CFA of performance can be found in chapter 5.2.4. Studies have shown that each dimension is distinct and relate to different antecedents, thus helping to address external and construct validity issues associated with other performance frameworks, such as industry-specific measures that may be

unsuitable for use in many organisations (Johnson, 2003; Griffin, Neal & Parker, 2007; Ryan & Pulakos, 2007; Blickle et al., 2008).

The WRPS was used to address the second research objective, which aimed to adopt a performance framework that acknowledges performance behaviours that are responsive to the uncertainty and interdependence of modern work environments. There is a multitude of instruments that exist to measure work performance or one of its subconstructs. However, the conceptual parameters of performance often overlap and are terms are therefore used interchangeably, making it difficult to differentiate constructs and compare effects (Koopmans, 2014). In order to understand and measure work performance rigorously, it must first be suitably operationalised. The WRPS is able to recognise that the most salient work roles are likely to be those at the individual and team level (Riketta & Van Dick, 2005), and this appears to increase more with age. The extent to which older employees direct performance behaviours towards the organisation level seemingly becomes less important than maintaining performance levels or fulfilling generative motives in team-based activities.

By including subjective perceptions of both employee and supervisor ratings in sample B, the biases associated with using only one form of subjective measurement instrument (e.g., recency bias, halo effect) are minimised (Murphy, 2005; Koopmans, 2014). Several studies have shown self-ratings of performance to be both valid and reliable measures of job performance (Bal & de Lange, 2015; Taneya & Arnold, 2019). Finally, objective performance

measures (e.g., sales statistics) were not appropriate for this thesis because contemporary predictors of noncore job performance are rarely quantifiable (e.g. employee engagement), and those that are often require longitudinal investigation of specific job roles to make valid inferences (Murphy, 2005).

4.3.3 Psychological Climate

The Workplace Design Questionnaire (WPDQ; Karanika-Murray & Michaelides, 2015) was used to examine employee perceptions of workplace characteristics which are grounded within the domain of motivation. The WPDQ is grounded within the Workplace Characteristics Model (WPCM; Karanika-Murray & Michaelides, 2015), which suggests that the experiences an employee has within their job role and the work environment and the extent to which those perceptions are shared amongst the work group will contribute towards ones perception of the work environment. These characteristics are grounded in the three psychological needs proposed by SDT: autonomy, competence, and relatedness (Ryan & Deci, 2000). As such, psychological climate comprises perceptions toward work characteristics that map directly to fundamental psychological needs and can therefore provide a deeper understanding of their role in relationships between age and performance.

These nine characteristics are situated within categories based on these three psychological needs (autonomy-supportive, competence-supportive, relatedness-supportive), and each contain three subscales (e.g., autonomy-supportive: decision making, work planning, role flexibility), resulting in a total of 29 items situated on a seven-point Likert scale. Participants were asked: *Considering the working conditions in your workplace in the last three months,*

indicate how true the following statements are for you by selecting the relevant statement, to which they responded on a seven-point rating scale between strongly disagree and strongly agree.

The WPDQ has shown good psychometric properties in construct validity and predictive validity, internality reliability, and stability over time (Karanika-Murray & Michaelides, 2015). The Cronbach's alpha estimates for the nine subscales ranged between 0.79 and 0.90. The factor loadings and fit indices for the confirmatory factor analysis of climate can be found in chapter 5.2.4.

4.3.4 Demographic and Socioeconomic items

Sex, civil status, and education level were included as three demographic items which are commonly employed in work psychology. In recognising that factors such as nonstandard contract employment can influence attitudes towards the work environment, seven occupational items were formed using the ISCO-08: occupation, managerial level, number of employees managed, shift-working, and contract type. Finally, the literature review outlined the implications of the Covid-19 pandemic for organisations in, for example, work planning and job design (CIPD, 2020). As such, eight items were formed to assess whether employees had experienced changes to work patterns, role responsibilities, employment support, and social interactions.

Preliminary examinations revealed weak and non-significant relationships among demographic items and independent and dependent variables; such variables were not included as control variables. Management level and contract status both held significant and variably sized relationships with

independent and dependent variables, so were included as control variables. A significant negative relationship was observed between Covid-19 impact and mental health. However, once other variables were introduced into the model, this effect disappeared. As such, Covid-19 impact was not included in SEM analysis.

4.4 Research Rigour

The most prominent criteria for evaluating research are reliability, validity, relatability, and replication (Clark et al., 2021). Research rigour, which refers to the conviction and strength assigned to findings and implications of a study, is determined by the extent to which these criteria are considered throughout the research process (Long & Johnson, 2000). Measurement validity was discussed earlier within each respective research instrument and so will not be discussed again here. Internal and external validity are discussed, followed by reliability.

4.4.1 Internal Validity

Internal validity is the degree of confidence that the causal relationships presented are trustworthy and are not due to other variables missing due to ineffective an research design (Lobiondo-Wood & Haber, 2017). Internal validity is therefore determined by the appropriateness of the research strategy, data collection techniques, and the data analysis framework. In other words, the research instruments must measure the variable they claim to measure so that the aims and objectives of the research can be reliably addressed (McLeod, 2007; Lobiondo-Wood & Haber, 2017). The survey aimed

to tackle unidimensionality in existing research by encompassing a breadth and depth of variables for age, performance, and psychological climate.

The questionnaire was arguably the biggest threat to face and construct validity because responses relied on the cognitive, affective and behavioural paradigms relating to work (i.e. attitudes, perceptions, recall). Self-reports are beneficial because performance behaviours are highly variable (Griffin, Parker, & Neal, 2007), and it is likely that supervisors base performance ratings on only a fraction of information regarding these behaviours (under-sampling bias; van der Heijden & Nijhof, 2004). Furthermore, supervisor ratings of older employees can be subject to the halo effect, where negative assumptions about the capabilities of older workers influence subjective ratings of performance. In light of this and of the stereotypes held toward older employees, this thesis measured self-ratings of performance in both samples.

Nevertheless, using self-ratings can introduce similar levels of leniency effects and social desirability bias as supervisor ratings, as employees may wish to present themselves favourably, whereas supervisors may be stricter in their ratings (van der Heijden & Nijhof, 2004; Koopmans, 2014). This also applies to psychological climate, where ratings of a work environment is subjected to a range of factors and can be indirectly influenced by, for example, workplace discrimination. These biases were addressed by reassuring participants that they were able to participate anonymously in sample A, and confidentiality was addressed in sample B by removing any identifiable characteristics after responses had been recorded. Questions describing an individual's conscious

understanding of their psychological state (e.g., how engaged are you) were avoided because of the higher risk of introducing social desirability bias into responses. Instead, questions focused on experiences of age, health, psychological climate, and performance at work. Several steps were taken to reduce acquiescence bias, which describes the tendency to respond positively irrespective of content and is an issue commonly associated with rater scales (Friborg, Martinussen, & Rosenvinge, 2006). This included reverse coding measurement scales, providing neutral wording, excluding truisms, and incorporating a broad range of questions.

4.4.2 External Validity

In this thesis, external validity refers to whether the causal relationships presented can be generalised to different employees, work groups, and organisations at various times (Lobiondo-Wood & Haber, 2017). The multi-sample approach that provides evidence about variables from individual employees (i.e. sample A) and those that are nested within work groups (i.e. sample B) helped to increase the concurrent validity, or generalisation and relatability of results (Bassey, 1999; Yin, 2013). More specifically, the nested nature (employees within work groups) of sample B introduced contextualisation to the initial results from sample A, where the role of age could be tested in the effects of age on performance both for employees and their supervisors.

Further, the breadth and depth of measurement variables reflected that job behaviours cannot be separated from the context in which they are enacted and, as a result, can be influenced by motives, perceptions, and experiences

of the job role and broader work environment (Biddle, 2013; Matta, Koopman, & Conlon, 2015). Yet, processes, policies, and established norms and behaviours will differ between work environments and organisations, so caution must always be applied to generalising causality due to the emergence of such relationships in work contexts.

This sentiment also applies to the highly unstable and atypical circumstances (e.g., Covid-19 pandemic, Ukraine-Russia conflict) in which the data was collected. As the data was cross-sectional and provided a snapshot into these circumstances, the ability to generalise these specific findings may be restricted. On the other hand, the data gathered was one of the first to understand how such circumstances could affect changes in work-related variables that had not been observed prior, such as remote working and the impact of Covid-19 on work attitudes. This helped to increase the breadth and depth of the inquiry (Gray, 2014).

4.4.3 Reliability

Reliability refers to the consistency or constancy of the measuring instruments used (Lobiondo-Wood & Haber, 2017). Items pertaining to psychological climate and work-role performance were converted into latent factors as per author instructions, which could be considered a form of researcher interpretation which affects the dependability of the findings (Hammersley, 1992). However, these scales had previously been tested, peer-reviewed, and yielded excellent psychometric properties (Ware, Kosinski, & Keller, 1996; Griffin, Neal, & Parker, 2007; Hubley, 2014; Karanika-Murray & Michaelides, 2015).

In further examination of internal consistency, Cronbach's alpha was calculated for each latent factor because the survey encompassed multiple constructs within different domains. This yielded good results (see section 5.2.4; Pallant, 2001). There is some disagreement whether interrater or intrarater reliability is more appropriate to correct for imperfect measurement when performance is rated by others (e.g., Judge et al., 2001; Ng & Feldman, 2008). To address this, Cronbach's alpha was also recorded for sample B. Sample A surveys were distributed through social media channels and forums, whereas sample B participants received an email containing a survey link generated by a directory within Qualtrics. Participation requirements were transparent and accessibility was maintained by allowing participants to respond within an 8-week timeframe online. Qualtrics also enabled participants to pick up where they left off if failing to complete the survey in one sitting. This addressed issues associated with consistency by reducing survey burden and pressure which can distort responses.

CFA was conducted to test the construct validity of measurement variables to ascertain if and to what extent latent constructs were measured by their corresponding observable indicators (Kline, 2016). This allowed for validation of the factor structure and to estimate the reliability of measurement scales. Additionally, conducting CFA and SEM on the multiply imputed data yields increased power and accuracy (Plumpton et al., 2016).

4.5 Ethical Considerations

Participating in workplace research may give rise to a range of concerns, including job security, personal perceptions from peers and supervisors, and reflection about an individual's job role or career. All of these concerns could lead to exaggerated responses of performance behaviour or work characteristics. This project was therefore subject to and in compliance with Nottingham Trent University's College Research Ethics Committee requirements and regulations for primary data concerning human participants. Final ethics approval was granted in November 2020.

As well as the steps taken to protect the identities of participants, further measures were taken in accordance with Covid-19 pandemic restrictions. Initial briefings with supervisors and employees were scheduled remotely (Skype) to avoid contact and in compliance with government regulations. Additional items were included in the survey relating the impact of Covid-19 in the context of work.

4.5.1 Anonymity

Steps were taken to protect the anonymity of participants by minimising any individualised personal data. Pilot surveys were used to ascertain the objectiveness of items and scales, and to understand the best distribution methods that could minimise acquiescence bias (Friborg, Martinussen, & Rosenvinge, 2006). The research instruments were designed such that identifiable characteristics were kept to a minimum (Saunders, Lewis, & Thornhill, 2012).

Participants were briefed of the studies in different ways. Participants were provided with information sheets and informed consent was obtained at the beginning of the survey. Information sheets described how data would be used, managed, and shared, and advised participants on how their identities would be protected. Contact details for the research team were provided to participants on the information sheet for any queries or issues relating to or emerging from the research. An open and transparent approach was taken with all study participants to maintain research integrity and to minimise potential risks associated with psychological, career, or social harm from colleagues or peers. These steps helped to minimise subjective perception bias, which is a common issue in supervisor ratings of workplace behaviour (Bohlinger & Van Loo, 2010).

For sample A, anonymity was more straightforward in that no personal details were recorded that could link to any individual. An anonymous link was generated using the Qualtrics survey platform for widespread, anonymous use. For sample B, anonymity was of more importance in that responses were recorded for employees and their supervisors. The initial meeting between with organisational management was used to address concerns associated with security, confidentiality, and anonymity, and safeguards. A collaborative approach was employed with the supervisors partaking in the research so that directories of respondents could be created within Qualtrics and the embedded survey flow function used to facilitate the distribution and identification process. These details were only available to the researcher and the directory was to

be destroyed upon collection of the data as the personal information was only required for the purposes of identifying employee-supervisor dyads. There was an option to complete a paper survey by post for individuals that did not have computer access, but this was not required. In addition to preparing the data (see sections 5.2.1 and 6.2.1) in a way that maintained confidentiality (for instance, recoding open responses), coding was also used to facilitate data analysis at a later stage.

4.5.2 Confidentiality

For both samples, a consent form was provided alongside the information sheet. Informed consent was obtained directly within the survey where participants simply needed to review, acknowledge, and confirm that they had read the information sheet and consent form. This prevented the need to collect any personal data for consent purposes. Any identifiable characteristics in the raw data were removed or recoded as described in chapters 5.2.1 and 6.2.1 so that no individuals could be identified. Unique identifiers were used for sample B to identify employee-supervisor dyads whilst maintaining confidentiality. The data is securely stored on an NTU password protected computer and can only accessed by the immediate research team. In line with the European Code of Conduct for Research Integrity, the anonymised data will be stored separately and retained securely for 6 years, after which it will be destroyed.

For sample B, the directory was set up in a dyadic format such that responses would automatically be recognised. Neither supervisors nor employees were able to access this information and would be able to recognise responses once

the data were cleaned and prepared, after which any potentially sensitive directory information was deleted. Finally, only aggregated data is presented in results such that neither employee nor supervisor would be able to identify responses within the discussions. This was implemented to maintain ethical standards and to reduce acquiescence bias.

4.5.3 Participant Incentives

In sample A, participants were given the option to provide an email address in order to enter a prize draw worth £10 per winning participant. Email addresses were to be entered at the end of the survey and were entered into an Excel spreadsheet prior to coding. After, a random number generator (random.org, 2022) was used to generate winners. The generator was rerun in the event that the same number presented more than once. In sample B, Amazon vouchers of £10 were allocated to each work unit and drawn randomly in the same method as sample A. Email addresses were stored temporarily only for these purposes and destroyed as soon as was practicable.

It is widely accepted that response rates from organisations tend to be lower than individuals (Baruch & Haltum, 2008). Additionally, the pressing issues associated with the pandemic resulted in a hesitancy to participate given general anxieties and more specific issues such as furlough and closure. The organisations were offered, if they wished, a copy of the thesis and aggregated results when published. They were advised that these results would comply with BPS ethical guidelines, including managing data with confidentiality, maintaining professional boundaries, and enhancing the anonymity and transparency of data both prior and subsequent to data analysis. The results

and discussion would not reveal data (e.g., company name) that could link back to organisations or individuals. All incentives were therefore considered to be genuine and influential, but not coercive.

Chapter 5: Results: Sample A

This chapter will outline the framework for, and results obtained from analysing sample A data. Firstly, descriptive statistics pertaining to the sample demographic are presented. The framework for data analysis is outlined next, including details about data preparation, missing data techniques, and tests for collinearity and normality. The results of CFA are presented to support the factor structures of performance and work climate, and pooled bivariate intercorrelations are reported for all study variables. The procedure for SEM is specified before presenting results and testing hypothesised paths for age, climate, and interactions within models representing the nine performance constructs.

5.1 Descriptive Statistics

Sample A (N = 393) had a mean age of 32.96 years, ranging from 20 years to 70 years of age, and most felt similar to their calendar age (*M* of subjective age = 2.92). There was a good balance between male (51.90%) and female (47.84%) participants; and between those who were single (40.71%) and married (54.96%). In general, most of the sample had received some form of higher education (75.83%) compared to further (17.56%) or secondary (6.36%).

Organisational tenure (M = 4.80 years) and job tenure (*M* = 4.75 years) were similar, though organisational tenure had a higher range (0 – 42 years) than job tenure (0 – 32 years). Both job tenure ($r = 0.59$, $p < 0.001$) and organisation

tenure (r = 0.60, p < 0.001) were significantly and positively predicted by calendar age.

The majority of participants were employed on a full-time contract (78.88%) compared to part-time (17.81%) or zero-hour (2.54%) contracts. There was a similar number of workers in operational roles (41.22%) to managerial roles (36.39%), with fewer in support positions (21.37%). Accordingly, the mean number of employees managed was 9.56 and ranged between 0 – 500, though only a small percentage of non-managerial workers were responsible for any employees (9.92%).

Almost half of participants worked shifts (48.35%) in their job roles and over a third had transitioned from office-based work to remote working (37.15%) since the Covid-19 pandemic. The mean score for Covid-19 impact was 2.45, suggesting that, on average, participants had experienced between two and three significant changes due to the pandemic. Overall, 91.60% of participants experienced at least one change due to the pandemic.

Table 5.1. Descriptive statistics for Sample A

Descriptive Statistics of Demographic Variables for Sample A

	Descriptive Statistics			
Measures	*M*	*SD*	Range	Frequency (%)
Age				
Calendar Age	32.96	9.84	20 - 70	-
Job Tenure	4.80	5.02	0 - 32	-
Organisational Tenure	4.75	4.97	0 - 42	-
Gender				
Male	-	-	-	204 (51.90)
Female	-	-	-	188 (47.84)
Other	-	-	-	1 (0.25)
Education				
Secondary	-	-	-	25 (6.36)
Further	-	-	-	69 (17.56)
Higher	-	-	-	298 (75.83)
Civil Status				
Single	-	-	-	160 (40.71)
Married or Domestic Partnership	-	-	-	216 (54.96)
Divorced	-	-	-	17 (4.33)
Job Role				
Number of Employees Managed	9.56	36.76	0 - 500	-
Covid Impact	2.45	1.28	0 - 6	-
Shift Worker	-	-	-	190 (48.35)
Transitioned from Office to Remote Work since Co	-	-	-	146 (37.15)
Role Responsibility				
Managerial	-	-	-	143 (36.39)
Operational	-	-	-	162 (41.22)
Support	-	-	-	84 (21.37)
Contract				
FT	-	-	-	310 (78.88)
PT	-	-	-	70 (17.81)
Zero Hours	-	-	-	10 (2.54)

5.2 Framework for Data Analysis

This section precedes the results section and outlines the framework for data analysis. This section begins by describing the data preparation techniques used to export and transform data in readiness for analysis. Next, tests for collinearity and any resulting changes are reported. Third, the procedure for multiple imputation is discussed with regards to dealing with missing data and robustness in yielding unbiased estimates. The procedure and results for CFA are presented, before outlining the procedure and justification for using SEM to test hypothesised paths and interactions.

5.2.1 Data Preparation

The survey deployed to participants in both sample A and sample B included ninety-six items comprising both open and closed-ended questions. Some items needed to retain their raw observed scores (e.g., calendar age), and others would form indicators of latent constructs (e.g., performance and climate items). As such, a significant amount of data preparation was required in order to quantify and analyse the data.

There were some initial errors with exporting data from Qualtrics resulting in items being coded incorrectly. For example, four items in the SF-12 survey were coded on a 4-8 scale rather than a 1-5 scale. Because of this, each set of coded values were re-examined to verify for accuracy in Qualtrics before exporting the data as a .csv file.

Open-ended questions are more time consuming than closed-ended questions and can introduce measurement error by means of variability if coding answers in a way that compromises construct validity (Clark et al., 2021). However, introducing multiple choice options instead of open-ended questions can also neglect variability in answers and miss crucial information from the sample. For any questions that were not part of a peer-reviewed scale, content analysis was undertaken in order to identify and label connections between open-ended responses so that codes could be assigned based on themes. For instance, three items asked participants about their occupation, job role, and tasks. These items were collapsed by using the Standard Occupational Classification (2010) where job roles within respective industries could be collapsed into one overarching category.

In total, there were seven questions examining how the Covid-19 pandemic had impacted aspects of working life. Question 7 measured this by allowing participants to select up to six issues reflecting the impact of Covid-19 on working life. No other questions pertaining to Covid-19 were retained because question 7 captured the majority of variance. One area of impact would equal a one-point score, resulting in a six-point scale whereby a higher score equalled a higher impact. Nonrespondents were assumed to have experienced no impact as a result of the Covid-19 pandemic and recoded as ‘0’ to avoid inflated missingness.

Calendar age, job tenure, and organisational tenure items were presented in open-text format to increase accuracy. Responses that were given in literary

format were quantified by rounding up (or down) to the nearest year; for example, one year and two months would be coded 1 to represent one year. The contract status item was collapsed into three overarching categories of full-time, part-time, and zero-hours. Where logical, all items were recoded to reflect a 'higher-higher' assumption; for example, a higher rating on management level would equal a higher managerial position, and a higher rating on education would equal a higher educational status.

The SF-12 survey, containing twelve items equally distributed among physical health and mental health, required significant recoding to align with procedural instructions by the authors (see Ware, Kosinski, & Keller, 1996). Firstly, data was examined for out-of-range values and reverse coding was applied to four items such that a higher item value indicates better health for all SF-12 items (Ware, Kosinski, & Keller, 1996). Binary scales were recoded as 0 and 1 and indicator variables were weighted using regression coefficients from the US population and aggregated. The US instructions were used because, at the time of writing and to the best of the authors knowledge, no instructions for the UK are available. Norm-based standardisation of aggregate scores was calculated by adding a constant (regression intercept) so to have the same mean as the SF-36 version. This resulted in two final items, one for physical health and one for mental health. This analytic procedure was conducted using syntax in SPSS (2023) before exporting results as a .csv file.

The Subjective Age Identity Scale contains eight items on a six-point scale and measures how young one feels comparative to their calendar age. A score of

6 on this scale referred to ‘I do not understand the question’, and so was treated as a missing value as per the authors instructions. To align with the other constructs of age, this scale was reverse coded so that a higher score equalled a younger – and therefore more positive – perception of ageing. All eight items were examined for internal consistency before being transformed into a composite score according to the author’s instructions (see Hubley, 1998) using the rowMeans function in R (RStudio Team, 2020).

5.2.2 Collinearity

Multicollinearity occurs when sufficiently high correlations (e.g., $r > 0.85$, Kline, 2005) exist among predictor variables. The presence of multicollinearity can cause a range of issues during analysis, such as inflated standard errors (thus reducing statistical power), indeterminacy among parameter estimates, and unreliability in model fit indices (Kline, 2005; Iacobucci et al., 2016). In the analysis of sample A, constructs of psychological climate were treated as exogenous and moderating latent factors and were therefore allowed to covary. Constructs of performance were treated as endogenous latent factors and tested within separate models. To this end, the purpose of examining collinearity among performance variables was to ensure that variables were distinguishable and therefore not redundant. For psychological climate variables, however, the existence of collinearity could give rise to the aforementioned problems in parameter estimates and model fit. As such, the covariance matrices for performance and climate factors were inspected during CFA and, as an additional examination of collinearity, bivariate correlations among all variables of interest were tested.

Pooled Bivariate correlations (see Table 5.6) revealed significant positive, but not collinear, relationships among performance (r = 0.42 – 0.73) and climate (r = 0.28 – 0.73) variables. However, an inspection of covariance matrices during CFA indicated that feedback was collinear with both appreciation ($\sigma_{x,x}$ = 1.06) and supportive management ($\sigma_{x,x}$ = 0.97), and trust was collinear with sense of community ($\sigma_{x,x}$ = 0.91). Introducing two highly collinear factors into the same model simultaneously can result in coefficient suppression, indeterminant parameter estimates, or an unexpected coefficient sign (Kennedy, 2005).

Testing whether the indicators of feedback would load onto other competence-supportive climate characteristics was unsuitable because it would simply result in collinearity between appreciation and supportive management. Trust was collinear with sense of community, but not with social support. As such, there was potential for trust items to be loaded onto the latent factor for sense of community, providing that they were theoretically and empirically suitable. To test this, a simultaneous analysis approach was taken in that all items for trust and sense of community were loaded onto one factor. The lowest factor loadings comprised the three items for trust, and so sense of community was retained as the core construct. To keep the number of indicators consistent with other climate characteristics, each item was removed, one by one, to test factor loadings and fit indices. Item 1 of ‘trust’ was the worst fitting, which also made sense theoretically. Items 2 and 3 of trust were then tested; these items were theoretically suitable for sense of community. The variance of item 2 and 3 were similar, but the factor loading for item 3 was higher than item 2, and the

model fit improved when including only item 3. Thus, item 3 was added to the sense of community construct. Full results for CFA are reported in section 5.2.4.

5.2.3 Missing Data and Normality

There were 550 recorded responses to the survey for Sample A, with 393 of these responses to be included in analysis. This final figure was calculated by removing Qualtric tests (N = 5), participant responses that failed to consent (N = 41), participant responses that answered no questions (N = 28), and participant responses that provided basic demographic information but failed to answer questions regarding performance and climate (N = 83).

There are no established parameters concerning an acceptable percentage of missing data. Some researchers suggest that anything above 10% could introduce bias into the statistical analyses, whilst others suggest that under 5% is preferable (e.g., Schafer, 1999; Bennett, 2001; Tabachnick & Fidell, 2012). For all items in sample A, there were 673 missing responses out of a total of 36549, resulting in 1.8% of missing variables – a figure well below the average rate of 15-20% in psychological studies (Enders, 2008). Nonetheless, understanding the patterns observed within the missing data can help to understand which mechanisms should be used to address missingness.

Typical statistical tests examining patterns in missing data can only examine up to 50 variables (e.g., Little's MCAR test; Little & Schenker, 1995). As such, missing data patterns were examined using Dong and Peng's (2013) method. Here, the data matrix was partitioned into the observable and missing parts

before conducting bivariate correlation analyses on variables with missing data. The ‘md.pattern’ and ‘aggr_plot’ functions were used within R Studio to visually inspect any patterns of missingness. Patterns of missingness were observed for variables predicted to be missing at random (MAR), which describes patterns of missingness that depend on the observed and missing data. For example, the lowest management level was associated with missing responses in the number of employees managed.

Where there existed patterns of missingness between observed variables and missing responses to performance or psychological climate, the data was retained, and multiple imputation employed in the following phase. Although this could have been removed by means of listwise deletion, this is usually only preferable for data that is missing completely at random (MCAR), which is rare in practice (Nakai & Weiming, 2011). Moreover, it would mean deleting otherwise sound responses due to a small number of missingness and may distort relationships modelled during analysis (Nakai & Weiming, 2011).

The final data was relatively symmetrical and only three items were moderately, but expectedly, skewed (e.g. number of employees managed). Because these items were expectedly skewed and did not form part of SEM, no transformations were made for the purposes of preliminary analyses. Field’s (2013) recommendations of ten data points for each predictor in a statistical model suggested that the sample was robust enough without further transformations being necessary. Moreover, maximum likelihood estimators

were used within the multiple imputation process which also accounts for potential non-normality (Rhemtulla & Little, 2012).

5.2.3.1 Multiple Imputation by Chained Equations

Conditional multiple imputation is an iterative procedure where the conditional distribution of certain variables – given other variables within the dataset – are modelled in a way that the distribution is assumed for each variable, rather than the entire dataset. This results in multiple imputed datasets that are created independently with new standard errors using variation across datasets to account for the uncertainty created by them (Little & Rubin, 2002).

While missing data should not necessarily determine whether or not multiple imputation is used, the number of parameters emerging as a result of lower-level relationships being examined simultaneously in structural models demanded a robust analytical approach. Multiple imputation, which possesses benefits in minimising bias and maximising efficiency, was therefore employed for sample A (Madley-Dowd, Hughes, Tilling, & Heron, 2019).

The advantage that this has over other types of imputation methods (e.g. mean substitution) is that uncertainty is accounted for by generating multiple imputations and iterations until convergence has been reached, resulting in *m* data sets, each uniquely estimating missing values (Little & Rubin, 2002). Analysis of multiply imputed data yields greater statistical power and efficiency than complete case analysis (Simons et al., 2014; Plumpton et al., 2016). No one parameter estimate is used as this may introduce bias into standard errors; instead, data sets are analysed individually resulting in more unique estimates

for each parameter. These estimates are pooled using Rubin's rules (Rubin, 1987) to yield a single estimate and corresponding standard error so that the between and within imputation uncertainty are acknowledged (Dong & Peng, 2013).

Although imputation can be directly incorporated into statistical modelling and analyses using procedures such as full information maximum likelihood (FIML), this can require significant computational effort, especially if there are a large number of variables being tested in multiple models. In many cases, FIML and ML yield such similar results that the imputation technique of choice is inconsequential (Enders & Mansolf, 2018). As such, multiple imputation was undertaken prior to statistical analyses, subsequently converted into a .csv file, back into a mids object and list of imputed datasets which could then be fitted with a statistical model using semTools in R (Schoemann & Jorgensen, 2021). This was done using the multiple imputation by chain equations R package (MICE; van Buuren & Groothuis-Oudshoorn, 2011, 2022) to impute missing values.

The default imputation methods were employed for both numeric data and factor data with 1) 2 levels, 2) > 2 unordered levels, and 3) > 2 ordered levels. Mice uses predictive mean matching (pmm) for both scale data and categorical variables where there are a large number of categories with many other predictors in the dataset (van Buuren & Groothuis-Oudshoorn, 2011, 2022), which was the case for items such as occupational code, which contained around fifty levels. Research has shown that pmm can just as accurately

impute values for categorical data (van Buuren & Groothuis-Oudshoorn, 2011, 2022). Some categories had a smaller number of levels and were therefore changed to reflect that. For example, the item asking participants whether they worked shifts was changed from the pmm method to logistic regression (logreg) to reflect it as a two-levelled binary variable. During analysis, the computation process encountered convergence issues for logreg variables – similar to those that have been experienced previously with larger numbers of variables (van Buuren & Groothuis-Oudshoorn, 2011, 2022). The imputation method was therefore changed to polyreg, which also accounts for unordered categorical data. These checks were undertaken to ensure that the correct imputation methods were applied whilst considering levels of data and computational capability/efficiency.

Bodner (2008) recommends that the number of imputations should be determined by M = 100γ_{mis}, where γ_{mis} is the fraction of missing information ranging from 0 – 100%. Von Hippel's (2009) suggestion that the number of imputations should be similar to the percentage of incomplete cases yielded similar results to this method. For sample A, there was less than 5% of missing data among all items and less than 1.8% of missing data overall. In order to achieve better estimates of standard errors, avoid possible Heywood cases, and approximate fuller distribution, the number of imputations was increased to 50.

There is no best method for diagnosing convergence (Cowles & Carlin, 1996), though plots can be used to ascertain when it has likely been reached, which

is when the variance between different iterations is no larger than the variance within each individual iteration (van Buuren & Groothuis-Oudshoorn, 2011, 2022). It is usually recommended that 10 iterations be used for each imputation so that convergence can be reached from the imputations to minimise inaccuracy (Bodner, 2008). To maximise accuracy, however, imputations were set to 50 and iterations to 50. Mean and variance plots were examined to diagnose convergence, which was determined at iteration number 22.

5.2.4 Confirmatory Factor Analysis

After the data was prepared and imputation mechanisms applied, CFA was conducted to test whether latent constructs were reliably measured by observable indicators (Kline, 2016). Although these scales had previously been tested and peer-reviewed and yielded excellent psychometric properties (Griffin, Neal, & Parker, 2007; Griffin et al., 2012; Karanika-Murray & Michaelides, 2015), the validation of the scale's factor structure and estimation of reliability was re-examined to ensure that the model aptly fitted the imputed datasets in readiness for specification of the structural model (Brown, 2015). Furthermore, conducting CFA and SEM on multiply imputed data yields increased power and accuracy (Plumpton et al., 2016).

The purpose of CFA is to validate the dimensions of an instrument. The original measurement models for performance and psychological climate specified by authors were retested. For work-role performance, there existed nine latent factors and twenty-seven observed variables/indicators (Griffin, Parker, & Neal, 2007). There were nine latent factors and twenty-nine observed indicators for psychological climate (Karanika-Murray & Michaelides, 2015).

To assess the feasibility of alternative models, CFA was conducted on a series of alternative models to ascertain changes in model fit, construct validity, and whether parameters were robust enough to make inferences in the structural model.

Although there are no stringent guidelines on goodness of fit criteria, there is agreement among authors regarding fit indices which result in reasonably good fit between the target model and observed data (Hu & Bentler, 1999; Brown, 2015). Models with comparative fix index (CFI) values over 0.90, root mean square error of estimation (RMSEA) values below 0.08, and standardised root mean squared residual (SRMR) values under 0.10 are generally of acceptable fit (Bentler, 1990; Marsh, Hau & Grayson, 2005), though good fit is recognised if values are below 0.06 (Hu & Bentler, 1999). For structural models, it is considered good practice to provide the 90% CI for RMSEA, which incorporates the sampling error associated with the estimated RMSEA (Weston & Gore, 2006). These were not reported because all RMSEA values in the final models had an upper 90% CI that was below 0.06, which is deemed satisfactory (Kline, 2016).

Chi-square (χ^2) values and its associated p-value can be useful for relatively simplistic models with a small sample size. However, it's sensitivity to sample size means that it can reject perfectly acceptable models (Weston & Gore, 2006). For instance, a significant p-value may present if there are a large number of variables in the model or if sample size is large (Weston & Gore, 2006; Alavi et al., 2020). In summary, it remains disputed whether χ^2 tests are

suitable for evaluating SEM fit, especially when fitting models to multiply imputed data (Enders, 2008; Enders & Mansolf, 2018).

Furthermore, the cut-off values for fit indices must be assessed in the broader research context. This may include the type of research undertaken, type of variables, model complexity, degree of misspecification, and sample size (Hu & Bentler, 1999; Marsh et al., 2004; Weston & Gore, 2006; Brown, 2015). Simply applying cut-off criteria without acknowledgement of these criteria can result in the incorrect rejection of acceptable models (Weston & Gore, 2006).

In both models, 'std.lv' was set to 'false' to fix the first latent indicator estimate to 1. This is known as the fixed marker or fixed indicator approach (Kline, 2005; 2016), whereby the scale of measurement for the latent variable is set to that of the first indicator of each latent variable. This method was appropriate for CFA, where the objective was to determine the strength of loadings on each factor, and for SEM, where unstandardised estimates could be reliably computed. This consistency carried into the structural models, because std.lv = TRUE, also known as the fixed variance method (Kline, 2005; 2016) also sets the residual variance of latent factors to unity, therefore impacting regression coefficients and standard errors when dependent variables are represented as latent factors. Indicators were rotated to test whether fixing a higher loading would improve the fit, though ultimately no changes were made. Standardised factor loading estimates were deemed to be 'very good' (Comrey & Lee, 1992; Stevens, 1992; Hair et al., 2006) for both work-role performance (0.62 – 0.82) and psychological climate (0.66 – 0.91).

Results supported the convergent and divergent validity of the nine-factor model for work-role performance. Table 5.4 shows that the nine-factor model of performance yielded good fit (CFI = 0.93, TLI = 0.91, RMSEA = 0.06, SRMR = 0.04) without any modifications required. The model fit for the nine-factor model was improved over the alternative three-factor models. This provided support for each of the nine dimensions to be treated as individual endogenous factors.

The nine-factor model of psychological climate yielded good fit (CFI = 0.93, TLI = 0.92, RMSEA = 0.06, SRMR = 0.04) and was improved over a three-factor model using all indicators, suggesting that participants could distinguish between all nine dimensions. However, a three-factor model using item parcelling where appropriate constructs were loaded onto broader psychological climate factors (e.g. autonomy-supportive climate) achieved better fit. Despite this, the chi square (χ^2) statistic: degrees of freedom ratio was significantly higher than the nine-factor solution and thus was rejected (Kline, 2005; 2016). As mentioned, however, the nine-factor model of climate demonstrated high collinearity for feedback with supportive management and appreciation, and for trust with sense of community. Two further models were tested with improved fit over the nine-factor model. The final seven-factor measurement model – which eliminated feedback and trust as latent factors – represented the best fitting model (CFI = 0.94, TLI = 0.93, RMSEA = 0.06, SRMR = 0.04) and addressed multicollinearity issues. In the WPDQ, feedback refers not to individual task feedback but to the sharing and offering of

feedback among colleagues, which within the context of increased remote working may have reduced its unique dimensionality.

To examine whether a better fit could be achieved, the modindices() function was used to ascertain whether improvements could be made by specifying covariances. The modification index score refers to a chi-squared reduction score of what adding a covariance into the model will result in. Modifications were naturally suggested for items that may reflect either the level (i.e. individual, team, organisation) or the construct (i.e. proficiency, adaptivity, proactivity). However, the fit was adequate enough that no covariances were introduced or error terms correlated for the sole purposes of achieving better fit, especially when those items measure different factors (Hooper, 2008).

Table 5.2. Results for Confirmatory Factor Analysis of Performance Items

	Results of Confirmatory Factor Analysis of Performance Items		
Constructs	α	Estimate	Standardised
Individual Task Proficiency	0.80		
Item 1		1.00	0.80
Item 2		0.91	0.75
Item 3		0.95	0.72
Individual Task Adaptivity	0.73		
Item 1		1.00	0.77
Item 2		0.88	0.70
Item 3		0.83	0.63
Individual Task Proactivity	0.82		
Item 1		1.00	0.82
Item 2		0.92	0.74
Item 3		0.97	0.77
Team Member Proficiency	0.78		
Item 1		1.00	0.75
Item 2		1.02	0.79
Item 3		0.85	0.69
Team Member Adaptivity	0.68		
Item 1		1.00	0.62
Item 2		1.20	0.65
Item 3		1.10	0.66
Team Member Proactivity	0.77		
Item 1		1.00	0.67
Item 2		1.11	0.75
Item 3		1.17	0.78
Organisation Member Proficiency	0.75		
Item 1		1.00	0.70
Item 2		1.06	0.72
Item 3		1.06	0.71
Organisation Member Adaptivity	0.78		
Item 1		1.00	0.75
Item 2		0.98	0.74
Item 3		1.08	0.73
Organisation Member Proactivity	0.78		
Item 1		1.00	0.73
Item 2		1.05	0.73
Item 3		1.08	0.76

Note.
α = Cronbach's Alpha

Table 5.3. Results for Confirmatory Factor Analysis of Climate Items

Results of Confirmatory Factor Analysis of Climate Items

Factors and Items	α	Estimate	Standardised
Decision Making	0.79		
Item 1		1.00	0.66
Item 2		1.11	0.83
Item 3		1.03	0.78
Work Planning	0.84		
Item 1		1.00	0.78
Item 2		0.95	0.84
Item 3		0.87	0.79
Role Flexibility	0.86		
Item 1		1.00	0.85
Item 2		0.96	0.83
Item 3		0.90	0.79
Feedback	0.81		
Item 1		1.00	0.77
Item 2		1.14	0.80
Item 3		1.07	0.74
Appreciation	0.85		
Item 1		1.00	0.78
Item 2		1.05	0.86
Item 3		1.09	0.81
Supportive Management	0.90		
Item 1		1.00	0.80
Item 2		0.92	0.80
Item 3		0.97	0.83
Item 4		1.12	0.89
Social Support	0.83		
Item 1		1.00	0.76
Item 2		1.20	0.90
Item 3		1.07	0.71
Trust	0.81		
Item 1		1.00	0.77
Item 2		0.97	0.81
Item 3		0.92	0.74
Sense of Community	0.87		
Item 1		1.00	0.78
Item 2		0.95	0.81
Item 3		1.03	0.77
Item 4		0.97	0.81

Note.
α = Cronbach's Alpha

Table 5.4. Alternative Factor Structures for Work-Role Performance

	Comparison of Alternative Factor Structures for Work-Role Performance in Sample A					
Models	*df*	χ^2	CFI	TLI	RMSEA	SRMR
*Nine Factors**	288	670.84	0.93	0.91	0.06	0.04
Three Factors						
Proficiency, Adaptivity, and Proactivity	321	1234.88	0.83	0.81	0.09	0.06
Three Factors (item parceling)						
Proficiency, Adaptivity, and Proactivity	24	164.88	0.94	0.90	0.12	0.04

Table 5.5. Alternative Factor Structures for Work Climate

	Comparison of Alternative Factor Structures for Work Climate in Sample A					
Models	*df*	χ^2	CFI	TLI	RMSEA	SRMR
Nine Factors Full Model	341	826.85.72	0.93	0.92	0.06	0.04
Eight Factors Feedback dropped	271	674.61	0.93	0.92	0.06	0.04
*Seven Factors** Feedback and Trust dropped	231	536.14	0.94	0.93	0.06	0.04
Three Factors Autonomy-Supportive, Competence-Supportive, Relatedness-Supportive	374	1627.86	0.82	0.81	0.09	0.06
Three Factors (item parceling) Autonomy-Supportive, Competence-Supportive, Relatedness-Supportive	36	1949.34	0.98	0.97	0.06	0.03

5.2.5 Structural Equation Modelling

Structural equation modelling (SEM) is a multivariate technique which combines regression analysis and factor analysis for the purposes of testing hypotheses and verifying relationships among observed and latent variables (Thakkar, 2020). SEM provides advantages over other multivariate methods by explicitly assessing measurement error and thus accommodating estimates of variance among observed variables and latent variables, and covariances among exogenous variables (Weston & Gore, 2006).

There are various approaches to SEM, but most begin with a measurement model followed by a structural model (Lomax, 1982). There are five steps associated with this process: specification, identification, estimation, evaluation, and modification (Hoyle, 1995; Kaplan, 2000; Kline, 2005; Schumacker & Lomax, 2004; Weston & Gore, 2006). The structural model specifies relationships among the latent variables and, in this instance, uses structural regression to test relationships among observed and latent variables (Anderson & Gerbing, 1989). Unlike CFA, SEM examines the relationships between all variables, and when a relationship is not established, it is the same as assuming independence between them (Weston & Gore, 2006; Kang & Ahn, 2021). The model should accurately represent the data structure and relationships therein, so introducing path coefficients and covariances are an important addition to make the model more parsimonious.

Model specification refers to the relationships specified between observed variables and latent factors within the presented model, whereas model

identification is the complex process of finding the most parsimonious summary of the interrelationships that most accurately reflect the observed data (Weston & Gore, 2006; Schumacker, 2016).

A similar approach was taken in this thesis, though the structural component of each structural equation model are the foci of this section and were therefore analysed independently from the measurement model. The χ^2 statistic and *df* were also reported for each structural model to account for the measurement portion of the model (Mulaik et al., 1989; Meyers, Gamst, & Guarino, 2013; Schumacker, 2016). CFA showed that participants could distinguish between performance constructs, and so candidate structural models used individual performance constructs as the foci of each model, rather than incorporating all nine performance constructs into one model. Although an overarching model may be preferred for analytical purposes, there is no recommendation to develop a standalone model unless it is beneficial to capture all performance constructs within the same model, which was unnecessary here. Further, including all performance and psychological climate factors within the same model would have substantially increased model complexity, which can be of detriment to both model fit and accuracy of structural regression paths due to the amount of 'noise' in the model (Kline, 1998, Field, 2013). For sample A, the number of variables and moderate sample size precluded from specifying one standalone model.

To this end, models were specified such that performance factors did not overlap on level (individual, team, organisation) or construct (proficiency,

adaptivity, proactivity). This was in contrast to the initial measurement model, where the aim was to examine the construct validity and divergent validity of performance variables. Examining structural models separately from measurement models is common in research using SEM procedures (Meyers, Gamst, & Guarino, 2013), because the objective of the structural portion of the model is to examine the relationships among variables that represent the best view of the observed data while balancing this with model fit indices (Byrne, 2013).

5.3 Bivariate Correlations

Table 5.6 presents a pooled Pearson bivariate correlation matrix, which served as a preliminary exploration of interrelationships between all study variables. This was created using the 'micombine.cor' function within the 'miceadds' (Robitzsch, 2023) package, which provides statistical inference for correlations and covariances specifically for MI datasets by using Rubin's (1979) rules. This allowed for the computation of standardised coefficients with corresponding standard errors to account for the within and between imputation variance. Pooled means and SDs from MI data are presented in table 5.6. Although there are benefits and drawbacks for the 'impute, then transform' methodology (von Hippel, 2009), the transformations undertaken served only for the purpose of developing composite scores in order to conduct Pearson bivariate correlational analyses. By transforming relevant variables after imputation, the results were of more interest when comparing to unstandardised estimates in SEM.

The preliminary exploration into relationships between all study variables supported the overarching hypotheses that all constructs of climate positively predicted all nine performance dimensions. When discussing the impact of Covid-19 and transition to remote working, it was put forward that the perceived effectiveness towards individual, team, and organisation-level performance may be more closely related than would typically be observed in normal working conditions due to reduced interaction with colleagues, hybrid working practices, and the reported changes to role responsibilities (91.60%). Despite this, correlational analyses indicated that Covid-19 impact was not significantly related to any of the performance variables.

Preliminary results showed that climate was most strongly related to organisation-level performance constructs (r = 0.19 – 0.47). Individual and team proficiency were most strongly related to role flexibility (r = 0.33 – 0.37) and sense of community (r = 0.34 – 0.36), while organisation proficiency was more strongly related to work planning (r = 0.47) and supportive management (r = 0.45). Adaptivity at all three levels was most strongly related to work planning (r = 0.34 – 0.47) and role flexibility (r = 0.34 – 0.43). Similarly, proactivity at all three levels was most strongly related to dimensions of autonomy-supportive climate, which comprised decision making (r = 0.30 – 0.37), work planning (r = 0.34 – 0.47), and role flexibility (r = 0.34 – 0.43).

Some age constructs were expectedly highly correlated, most notably calendar age with organisation tenure (r = 0.60). Significant effects were observed for calendar age (r = -0.16) and job tenure (r = -0.11) with individual-task

adaptivity, but not with any other performance construct. No significant relationships were observed between organisation tenure and performance. Physical health was significantly and positively related to all performance dimensions (r = 0.12 – 0.35), and so was mental health (r = 0.11 – 0.21). There were also significant, positive relationships between subjective age identity with all nine performance dimensions (r = 0.11 – 0.23).

Management level was significantly related to organisation tenure (r = 0.10) and physical health (r = -0.18), but not to other age constructs. Management level was also significantly related to proactivity at all three levels (r = 0.17 – 0.23), and also to organisation proficiency (r = 0.15). Of the psychological climate constructs, management level was significantly related to decision making, work planning, feedback, appreciation, and supportive management (r = 0.11 – 0.19). Contract status was significantly and positively related to calendar age, job tenure, organisation tenure (r = 0.13 – 0.15) and significantly negatively related to physical health (r = -0.18), but not related to subjective age or mental health. It was also significantly related to proactivity at all three levels (r = 0.11 – 0.20), but only to work planning (r = 0.13) and appreciation (r = 0.11) of the psychological climate constructs.

In summary, the correlations indicate that all nine dimensions of performance are significantly and positively related to all constructs of psychological climate. The largest effects on performance were role flexibility and work planning, with stronger correlations observed in organisation-level performance. Performance was more sporadically related to age constructs, with individual

adaptivity the only dimension to be significantly related to calendar age, job tenure, or organisation tenure. However, subjective age, physical health, and mental health were all significantly and positively related to all nine performance dimensions.

Table 5.6. Pooled Pearson Bivariate Correlation Matrix (Sample A)

	M	*SD*	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Calendar Age	32.96	9.84													
2. Job Tenure	4.80	5.02	0.59***												
3. Organisation Tenure	4.75	4.97	0.60***	0.59***											
4. Subjective Age Identity	2.92	0.57	0.30***	0.12*	0.14**										
5. Physical Health	49.34	8.53	-0.07	-0.06	-0.04	0.24***									
6. Mental Health	40.88	8.31	0.07	-0.03	-0.03	0.21***	0.13*								
7. Management Level	2.15	0.75	0.07	0.09	0.10*	-0.03	-0.18***	-0.05							
8. Contract Status	2.76	0.48	0.15**	0.13*	0.15**	0.01	-0.18***	0.06	0.33***						
9. Covid Impact	2.45	1.28	0.05	0.13*	0.12*	-0.05	-0.08	-0.19***	0.00	0.05					
10. Individual-Task Proficiency	3.86	0.66	0.00	-0.03	0.05	0.23***	0.35***	0.21***	0.07	0.04	0.02				
11. Individual-Task Adaptivity	3.83	0.66	-0.16**	-0.11*	-0.09	0.20***	0.32***	0.19***	0.06	0.00	0.02	0.66***			
12. Individual-Task Proactivity	3.63	0.72	-0.08	-0.06	-0.03	0.20***	0.25***	0.21***	0.17***	0.11*	-0.04	0.52***	0.67***		
13. Team-Member Proficiency	3.88	0.71	0.04	0.03	0.07	0.21***	0.28***	0.11*	0.02	0.09	0.04	0.47***	0.50***	0.42***	
14. Team-Member Adaptivity	3.77	0.63	-0.08	-0.06	-0.03	0.11*	0.23***	0.15**	0.08	0.07	0.03	0.53***	0.68***	0.64***	0.63***
15 Team-Member Proactivity	3.56	0.72	-0.02	0.02	0.07	0.19***	0.17***	0.17***	0.23***	0.20***	-0.04	0.47***	0.53***	0.71***	0.47***
16. Organisation-Member Proficiency	3.69	0.73	-0.01	0.01	0.01	0.23***	0.19***	0.21***	0.15**	0.09	-0.04	0.46***	0.53***	0.56***	0.47***
17. Organisation-Member Adaptivity	3.70	0.71	0.01	-0.01	0.00	0.22***	0.20***	0.21***	0.09	0.07	-0.01	0.50***	0.60***	0.61***	0.56***
18. Organisation-Member Proactivity	3.48	0.77	0.04	-0.02	0.05	0.22***	0.12*	0.20***	0.18***	0.13**	-0.05	0.46***	0.48***	0.57***	0.42***
19. Decision Making	4.76	1.16	-0.03	0.00	-0.03	0.19***	0.08	0.04	0.15**	0.10	0.05	0.27***	0.31***	0.30***	0.28***
20. Work Planning	4.92	1.27	-0.05	-0.02	-0.10	0.15**	0.04	0.10	0.19***	0.16**	0.04	0.27***	0.35***	0.37***	0.24***
21. Role Flexibility	5.04	1.17	-0.05	0.00	-0.02	0.18***	0.09	0.13*	0.08	0.12*	0.09	0.37***	0.38***	0.35***	0.33***
22. Feedback	4.64	1.27	-0.04	0.02	-0.09	0.17***	0.00	0.16**	0.11*	0.09	0.01	0.21***	0.27***	0.22***	0.12*
23. Appreciation	4.66	1.34	-0.03	-0.03	-0.12*	0.13*	-0.04	0.17***	0.15**	0.11*	-0.10	0.20***	0.27***	0.27***	0.13*
24. Supportive Management	4.78	1.29	-0.05	-0.01	-0.07	0.16***	-0.01	0.15**	0.13**	0.10	-0.05	0.24***	0.31***	0.31***	0.14***
25. Social Support	4.84	1.26	-0.15**	-0.08	-0.11*	0.12*	-0.01	0.05	0.04	0.07	0.06	0.20***	0.19***	0.14**	0.20***
26. Trust	5.17	1.11	-0.11*	-0.08	-0.12*	0.22***	0.20***	0.12*	0.02	0.04	-0.04	0.34***	0.31***	0.27***	0.22***
27. Sense of Community	5.19	1.07	-0.04	-0.01	0.01	0.23***	0.14**	0.07	0.03	0.06	0.00	0.36***	0.31***	0.25***	0.34***

Table 5.6 (cont.). Pooled Pearson Bivariate Correlation Matrix (Sample A)

Pearsons Bivariate Correlations for Sample A (cont)

	M	*SD*	14	15	16	17	18	19	20	21	22	23	24	25	26
1. Calendar Age	32.96	9.84													
2. Job Tenure	4.80	5.02													
3. Organisation Tenure	4.75	4.97													
4. Subjective Age Identity	2.92	0.57													
5. Physical Health	49.34	8.53													
6. Mental Health	40.88	8.31													
7. Management Level	2.15	0.75													
8. Contract Status	2.76	0.48													
9. Covid Impact	2.45	1.28													
10. Individual-Task Proficiency	3.86	0.66													
11. Individual-Task Adaptivity	3.83	0.66													
12. Individual-Task Proactivity	3.63	0.72													
13. Team-Member Proficiency	3.88	0.71													
14. Team-Member Adaptivity	3.77	0.63													
15 Team-Member Proactivity	3.56	0.72	0.61***												
16. Organisation-Member Proficiency	3.69	0.73	0.56***	0.56***											
17. Organisation-Member Adaptivity	3.70	0.71	0.73***	0.64***	0.67***										
18. Organisation-Member Proactivity	3.48	0.77	0.55***	0.70***	0.50***	0.61***									
19. Decision Making	4.76	1.16	0.29***	0.37***	0.38***	0.40***	0.37***								
20. Work Planning	4.92	1.27	0.34***	0.38***	0.47***	0.47***	0.43***	0.71***							
21. Role Flexibility	5.04	1.17	0.34***	0.41***	0.43***	0.43***	0.43***	0.62***	0.67***						
22. Feedback	4.64	1.27	0.18***	0.21***	0.31***	0.33***	0.27***	0.49***	0.49***	0.47***					
23. Appreciation	4.66	1.34	0.23***	0.33***	0.41***	0.37***	0.35***	0.46***	0.50***	0.44***	0.71***				
24. Supportive Management	4.78	1.29	0.26***	0.30***	0.45***	0.44***	0.37***	0.44***	0.51***	0.40***	0.64***	0.73***			
25. Social Support	4.84	1.26	0.13**	0.16**	0.19***	0.18***	0.23***	0.25***	0.26***	0.27***	0.37***	0.34***	0.28***		
26. Trust	5.17	1.11	0.26***	0.27***	0.41***	0.34***	0.33***	0.44***	0.47***	0.52***	0.53***	0.51***	0.56***	0.40***	
27. Sense of Community	5.19	1.07	0.29***	0.29***	0.41***	0.35***	0.34***	0.45***	0.43***	0.51***	0.48***	0.51***	0.54***	0.48***	0.71***

5.4 SEM Procedure

A sequential procedure was adopted for SEM whereby predictors were entered in a logical and stepwise fashion through blocks 1 – 4 to test for individual and conditional effects while controlling for other variables of interest. Interaction effects were specified individually in block 3 and simultaneously in block 4. Based on the parsimony principle, variable selection was used in a stepwise fashion to respecify models by removing nonsignificant variables, one by one, with the final model including only significant main ($p < 0.05$) and interaction ($p < 0.10$) effects. Rubin's (1987) rules were used to estimate models and test hypotheses by pooling point and standard error estimates across imputed datasets, and by calculating the degrees of freedom for each specified parameter's *t*-test and confidence interval. Likelihood Ratio Tests were also used to test the predictive power of age variables within block 4, which controlled for all other variables of interest.

5.4.1 Step One: Sequential Entry of Predictor Variables

A sequential block-entry approach was employed in blocks 1 – 4. Specifically, predictor variables were entered consecutively to control for demographic variables (block one) whilst permitting the evaluation of the predictive power of age (block two), and psychological climate – both individually (block three) and simultaneously (block four) – for each of the nine performance constructs (Kline, 2016). Backward stepwise selection was used in block 5, not only to obtain the most parsimonious models of performance, but in recognising that using the simultaneous analysis approach (i.e., entering all age and climate predictors simultaneously in block 4) can reduce the average contribution per

predictor variable and result in non-significant *t* and F statistics, in spite of significant effects of one or more predictors (Cohen & Cohen, 1983; Chowdhury & Turin, 2020).

Measurement models and specified paths were identical for each of the nine models in blocks 1 – 4 so ensure that the model parameters for different performance constructs were comparable. In each block, the relevant variables of interest were regressed onto the performance construct to determine the value of unknown parameters while controlling for other covariates (Weston & Gore, 2006). Each candidate model was compared against the respective baseline model, which refers to a model constraining all covariances to zero and that which freely estimates the means and variances of observed endogenous variables, therefore operating under the assumption that there are no meaningful relationships among variables. This is done automatically using the lavaan package (Rosseel, 2022) and enables goodness of fit to be assessed during each phase of model estimation.

In block 1, control variables were entered and regressed onto the respective performance factor. Although control variables are not explicitly incorporated into SEM, they can be included manually if theorised to hold a relationship to independent and dependent variables (Jorgensen, 2021). In keeping with previous studies, bivariate correlational analysis suggested that contract status, management level, and tenure were related to both psychological climate and performance, and so were included as control variables. This was done by regressing the control variables onto dependent variables within the

model and by adding covariances between control variables and independent variables. Although other control variables could have been introduced, doing so could compromise model parsimony and statisticians generally warn against introducing exhaustive quantities of explanatory variables into statistical models in order to control for their effects (Achen, 2005; Kline, 2016). For instance, gender was not associated with age constructs or performance and was therefore not included as a control variable, despite it being a variable that is regularly controlled for in psychological research.

In block 2, calendar age, physical health, mental health, and subjective age were introduced as four observed exogenous variables and regressed onto the relevant performance variable, in addition to the control variables. Physical health and mental health both reflect the physiological construct of ageing but were kept separate as the initial standardised effects varied for different performance constructs. The relationships specified in blocks 1 and 2 were retained in block 3, which also introduced the seven psychological climate factors, one by one, by regressing them onto the relevant performance factor. Each psychological climate factor was tested individually for interaction effects with age variables as an exploratory exercise to facilitate model specification in blocks 4 and 5. Interaction effects that were significant in block 3 were included in block 4, which also contained all four age variables and all seven psychological climate factors and therefore represented a simultaneous entry approach. Block 5 employed backwards stepwise selection to obtain the most parsimonious models of performance and is discussed further in step four (chapter 5.4.4).

Unstandardised estimates – analogous to a *b* value in regression – were recorded in all blocks at the point of entry. The R^2 value was also reported to understand the proportion of variance accounted for in performance by each of the control and predictor variables. It is not possible to measure adjusted R^2 in lavaan, so individual changes to R^2 were not recorded. As previously mentioned, Rubin's rules were used to pool parameter estimates. Standardised coefficients – analogous to a β value in regression – were not reported as they do not effectively capture the unique distributions of the diverse range of variables included in the model (Weston & Gore, 2006) and would have to be adjusted for phenomena such as range restriction and reliability (Baguley, 2009).

It is important to note that unstandardised estimates represent the amount of change in the outcome associated with a unit change in the predictor (Field, Miles & Field, 2012), so if the minimum and maximum observed scores of one independent variable vary considerably compared to another independent variable, then the unstandardised estimates are likewise expected to differ. In this thesis, the measurement units of independent variables and moderating variables differed from each other and to the dependent variables, so a half-standardisation approach (Stavig, 1977) was taken by using the standard deviation (SD) of age to interpret the change in performance. For instance, the unstandardised estimate of the relationship between mental health and individual proactivity (0.01) is multiplied by the SD of mental health (8.31), resulting in a part-standardised coefficient b_{Sj} = 0.08. This new coefficient

implies that a one SD change in mental health produces a 0.08 change in unstandardised individual proactivity. This procedure did not apply to calendar age because increasing in SD-increments of calendar age would inaccurately assume improvement or worsening due to the ageing process.

5.4.2 Step Two: Testing the Predictive Power of Age Variables

Meng and Rubin's (1992) pooled likelihood ratio test (LRT), also known as the D_3 procedure, was used to examine hypotheses 1 – 4 pertaining to the predictive power of age variables. The Wald test (Wald, 1943) could also have been used, and is asymptotically equivalent to the LRT under a null hypothesis (Gonzalez & Griffin, 2001). However, the Wald test can change the quality of approximations in SEM because it is not invariant across different model identifications or parameterisations (Gonzalez & Griffin, 2001). LRT, on the other hand, compares the 'full model' fit (i.e., when the parameter is free) to the 'null model' fit (i.e., when the parameter is restricted to the value of the null hypothesis), thus forcing terms that are relevant to model identification to drop out of the standard error and making LRT invariant to the method of identification (Gonzelz & Griffin, 2001).

In multiple imputation, each imputed dataset was analysed separately for parameter estimates and subsequently pooled using Rubin's (1987) rules. Pooling LRT statistics is challenging as it necessitates a comparison of the log-likelihood of the imputed data under the full model with that under the null model (Grund, Ludtke & Robitzsch, 2021). Meng and Rubin's (1992) D_3 statistic is derived from the mean LRT statistic evaluated at the pooled parameter estimates for all imputed datasets (in this instance, the pooled

values that were obtained through Rubin's rules). The D_3 statistic has been recommended as a reliable method for pooling LRTs in multiple imputation and for providing adequate type I error control with comparable power to FIML (Meng & Rubin, 1992; Enders, 2010, Enders & Mansolf, 2018). It is important to note that pooling estimates can lead to different results under nonlinear transformations of the parameters (e.g., squared loadings; Enders & Mansolf, 2018), though such alternative identification strategies were not used in this thesis.

To conduct LRT within semTools, the function lavTestLRT.mi() was used. This performs a LRT on models fitted to multiple imputed datasets by pooling likelihood ratios across imputed datasets and resultantly yielding an *F*-distributed statistic and associated p-value (Meng & Rubin, 1992; Rosseel, 2022). To test the hypotheses, two nested models must be fitted to the imputed datasets: one which specifies a parameter constraint and the other which allows that parameter to be freely estimated. For consistency, each model was identical to those specified in block 4. These models were specified within the lavTestLRT.mi() function to conduct the LRT.

5.4.3 Step Three: Testing for Interaction effects between Age and Psychological Climate

To understand whether the effect of age is conditional on different levels of climate, interaction effects between age and climate were tested in blocks 3 – 5. Due to the complexity of the model, these interactions were tested individually in block 3 to facilitate detection. If interaction effects were not

significant at this stage, then they were excluded from blocks 4 and 5. Hypotheses 6, 7, 9, and 11 pertain to interaction effects.

Conceptually, the existence of a significant main effect for the predictor or moderating variable is not directly relevant to testing the moderator hypothesis (Baron & Kenny, 1986). Further, it is more difficult to detect interaction and moderator effects than to detect simple effects in field research (McClelland & Judd, 1993; Steinmetz, Davidov & Schmidt, 2011). As such, interaction effects were considered for probing based on effect size and significance at $p < .10$, irrespective of main effect significance. There was potential for a substantial number of interactions given the study variable combinations, and so this approach allowed for targeted exploration and for probing of interactions. Any interactions that did not meet these criteria would indicate that the hypothesised effect of age was not conditional on different levels of psychological climate.

Because SEM explicitly models measurement error in observed variables, it provides benefits not only to structural regressions but also in testing interactions (Weston & Gore, 2006; Schoemann & Jorgensen, 2021). In doing so, latent models provide increased power to detect interaction effects over regression models (Schoemann & Jorgensen, 2021). There are two broad approaches to estimating models with latent interactions: 1) the product indicator (PI) approach and, 2) the distribution analytic (DA) approach (Nord, Bovaird & Fritz, 2020). The former models the latent interaction term by making products of the lower-order indicators and using those products as indicators

for another latent construct representing the interaction term (Kenny & Judd, 1984; Nord, Bovaird & Fritz, 2020). The latter estimates latent interactions without product indicators and, instead, approximates a multivariate non-normal density function of the observed variables to account for the non-normality of the interaction term. There is little difference in the performance of both approaches except that there is reduced statistical power when DA approaches are used with non-normal data (Nord, Bovaird & Fritz, 2020). Nevertheless, PI approaches have demonstrated that they can account for measurement error with minimal loss of power in existing studies with missing data (Nord, Bovaird & Fritz, 2020).

There are several approaches to creating product indicators and it is beyond the scope of this thesis to discuss all in detail. Mean-centering refers to the subtraction of a variable mean from all of its observations within a dataset, such that the revised mean of the variables is equal to zero; this allows for meaningful interpretation of computed regression coefficients (Hayes, 2013; Iaobucci et al., 2016). In lavaan, the main effect indicator was centred before computing product terms (which serve as moderator terms). Iacobucci et al. (2016) notes that mean-centering does not necessarily alleviate multicollinearity in the macro context (i.e., where it intends to characterise the fit of a whole model), but it does alleviate multicollinearity in the micro context (i.e., where it intends to characterise individual regression coefficients). The latter was true in the latent interaction models estimated in this thesis. The other two product indicator approaches – residual-centering (Little, Bovaird, & Widaman, 2006) and double mean-centering (Lin et al., 2010) – were not used

because the former may introduce bias whenever indicators have nonzero skew, and the latter yields optimal coverage rates only in larger sample sizes (Nord, Bovaird & Fritz, 2020).

To compute this in lavaan and semTools, the lapply() and indProd() functions were used to make products of indicators using mean-centering, which are computed and added to the list of imputed datasets. These indicators are then loaded onto a latent factor as the interaction effect and regressed onto the dependent variable along with the independent and moderating variables. As recommended by lavaan, any observed variables were loaded as single indicators onto latent factors. In testing interaction effects, the method of mean structure identification does not affect results of the interaction because latent means are arbitrary. However, for interpretation purposes, the first indicators and variances of performance factors were fixed to zero so that their latent means could be estimated and presented when conducting simple slopes. Probe2wayMC() and Plotprobe(), which are functions of the semTools package, were used to conduct simple slopes and graphical plotting corresponding to high, average, and low levels of the relevant climate factor. Exogenous factor covariances were freely estimated for latent interaction effects so to account for unmodeled heteroskedasticity of factor scores, which is beneficial when comparing interactions across different performance models (Kolbe, Jorgensen & Molenaar, 2021; Schoemann & Jorgensen, 2021).

5.4.4 Step Four: Stepwise Variable Selection

Each step of the procedure for specifying and estimating models is comparable to stepwise selection, though variables were entered individually and in blocks

which has the advantage of being able to monitor changes in parameter estimate and significance. This process allowed block 4 to be used as a baseline model comparable against a series of candidate models as part of the backward elimination process, which is often preferred over forward selection because the effect of all candidate variables is assessed (Steyerberg, 2008). In other words, variables were eliminated and reintroduced in a stepwise fashion in order to obtain the most parsimonious models for each model of performance (Chowdhury & Turin, 2020).

This process was beneficial due to the complexity of each model. Although steps were taken to address multicollinearity, coefficient suppression and confounding effects can occur in complex models with multiple explanatory variables measuring similar constructs (Cohen & Cohen, 1983; Chowdhury & Turin, 2020), which was the case for both age and psychological climate variables. Backward elimination provided the flexibility to address this issue, whereby regression coefficients with *p* values greater than .05 were removed, one by one, in order of increasing statistical significance (i.e., higher p-value paths were eliminated first). Interaction effects were exempt to this threshold and were eliminated based on *p* values greater than .10 because they are generally harder to detect than simple effects (McClelland & Judd, 1993; Steinmetz, Davidov & Schmidt, 2011). Where interaction effects were significant but main effects were not, both paths were retained in candidate models to avoid distorting the meaning of the interaction. If the R^2 statistic declined by more than .02 (2%) after a variable was eliminated, the variable in

question was reintroduced into the model irrespective of statistical significance.

The trade-off between model fit and complexity was assessed continuously using goodness of fit indices, Akaike's information criterion (AIC; Aikake, 1974), reductions in R^2, and theoretical grounding, such that the final models represented theoretically and empirically validated paths between age, psychological climate, and performance. Compared to block 4, each model in block 5 had a slightly reduced R^2 value due to the iterative process of eliminating variables based on a combination of effect size, significance, R^2, and fit indices to obtain a parsimonious model. Table 5.8 shows that the final models in block 5 had better fit and lower AIC than the models in block 4, with only minimal reductions in R^2.

5.5 SEM Results

This section begins by reporting changes to model fit and R^2 between blocks 1, 2, 4, and 5. Fit statistics are directly reported for block 5, and fit statistics for blocks 1, 2, and 4 are presented in Table 5.8. Next, hypotheses regarding the effect of age on performance are examined, along with the changes observed after each block. Finally, hypotheses regarding the effect of climate on performance and interactions between age and climate on performance are presented, in addition to changes observed after each block. Variables involved in interaction effects retain direct paths to performance but are treated as conditional – rather than simple – effects. Only relevant parameter

estimates are reported in the following sections, however, Table 5.7 presents parameter estimates for all blocks should the reader wish to refer back.

Table 5.7. *Unstandardised coefficient estimates in blocks 1 – 5 for all performance models*

Predictor Variables —► Performance Unstandardised Coefficient Estimates (block 1 - 5)

	Individual Task			Team Member			Organisation Member		
Block 1 (Control Variables)	Proficiency	Adaptivity	Proactivity	Proficiency	Adaptivity	Proactivity	Proficiency	Adaptivity	Proactivity
Job Tenure	-0.01 [-0.03, 0.00]	-0.01 [-0.03, 0.01]	-0.01 [-0.03, 0.01]	0.00 [-0.02, 0.02]	-0.01 [-0.02, 0.00]	-0.01 [-0.03, 0.02]	0.00 [-0.02, 0.01]	0.00 [-0.01, 0.01]	-0.01 [-0.03, 0.00]
Organisation Tenure	0.02 [0.00, 0.04]	-0.01 [-0.02, 0.01]	0.00 [-0.02, 0.02]	0.01 [-0.01, 0.03]	0.00 [-0.01, 0.01]	0.00 [-0.02, 0.02]	0.00 [-0.02, 0.01]	0.00 [-0.01, 0.01]	0.01 [-0.01, 0.03]
Management Level	0.06 [-0.05, 0.16]	0.09 [-0.02, 0.19]	**0.15** [0.05, 0.25]**	0.00 [-0.11, 0.10]	0.04 [-0.04, 0.12]	**0.16*** [0.07, 0.25]**	**0.11* [0.02, 0.20]**	0.08 [-0.02, 0.18]	**0.15** [0.05, 0.24]**
Contract Status	0.01 [-0.15, 0.17]	-0.04 [-0.20, 0.12]	0.11 [-0.05, 0.26]	0.12 [-0.04, 0.28]	0.06 [-0.06, 0.18]	**0.16* [0.02, 0.29]**	0.06 [-0.07, 0.19]	0.05 [-0.11, 0.20]	0.11 [-0.04, 0.26]
R^2	0.016	0.028	0.052	0.013	0.023	0.087	0.032	0.014	0.060
Block 2 (Age Variables)									
Calendar Age	-0.01 [-0.02, 0.00]	**-0.02*** [-0.02, -0.01]**	**-0.01** [-0.02, 0.00]**	0.00 [-0.01, 0.01]	-0.01 [-0.01, 0.00]	**-0.01** [-0.02, 0.00]**	-0.01 [-0.01, 0.00]	0.00 [-0.01, 0.01]	0.00 [-0.01, 0.01]
Physical Health	**0.03*** [0.02, 0.03]**	**0.02*** [0.01, 0.03]**	**0.02*** [0.02, 0.04]**	**0.02*** [0.01, 0.03]**	**0.01*** [0.01, 0.02]**	**0.01*** [0.01, 0.02]**	**0.01** [0.00, 0.02]**	**0.02*** [0.01, 0.03]**	0.01 [-0.01, 0.01]
Mental Health	**0.01** [0.00, 0.02]**	**0.01** [0.00, 0.02]**	**0.01*** [0.01, 0.03]**	0.00 [-0.01, 0.01]	**0.01* [0.00, 0.01]**	**0.01** [0.00, 0.02]**	**0.01*** [0.01, 0.02]**	**0.01*** [0.01, 0.02]**	**0.01*** [0.01, 0.02]**
Subjective Age Identity	**0.17** [0.06, 0.28]**	**0.21*** [0.10, 0.32]**	**0.21*** [0.10, 0.33]**	**0.19** [0.07, 0.32]**	0.07 [-0.02, 0.16]	**0.19*** [0.08, 0.29]**	**0.22*** [0.11, 0.32]**	**0.19** [0.07, 0.31]**	**0.22*** [0.11, 0.34]**
R^2	0.225 (0.209)	0.242 (0.214)	0.224 (0.172)	0.129 (0.116)	0.141 (0.118)	0.216 (0.129)	0.178 (0.146)	0.147 (0.133)	0.168 (0.108)
Block 3 (Individual Entry of Climate Variables)									
Decision Making	**0.20*** [0.13, 0.28]**	**0.23*** [0.15, 0.31]**	**0.23*** [0.15, 0.31]**	**0.22*** [0.14, 0.31]**	**0.19*** [0.12, 0.26]**	**0.24*** [0.17, 0.32]**	**0.30*** [0.22, 0.38]**	**0.37*** [0.28, 0.46]**	**0.30*** [0.21, 0.39]**
Work Planning	**0.16*** [0.10, 0.21]**	**0.19*** [0.13, 0.25]**	**0.20*** [0.14, 0.27]**	**0.16*** [0.09, 0.22]**	**0.16*** [0.10, 0.21]**	**0.20*** [0.14, 0.26]**	**0.26*** [0.20, 0.32]**	**0.31*** [0.24, 0.37]**	**0.26*** [0.19, 0.32]**
Role Flexibility	**0.20*** [0.14, 0.26]**	**0.21*** [0.15, 0.27]**	**0.20*** [0.13, 0.26]**	**0.21*** [0.14, 0.28**	**0.16*** [0.11, 0.22]**	**0.21*** [0.15, 0.27]**	**0.25*** [0.19, 0.31]**	**0.28*** [0.22, 0.35]**	**0.26*** [0.19, 0.33]**
Appreciation	**0.13*** [0.07, 0.19]**	**0.15*** [0.09, 0.21]**	**0.17*** [0.10, 0.23]**	**0.10** [0.03, 0.16]**	**0.12*** [0.06, 0.17]**	**0.17*** [0.11, 0.23]**	**0.23*** [0.17, 0.29]**	**0.26*** [0.19, 0.32]**	**0.21*** [0.14, 0.27]**
Supportive Management	**0.13*** [0.07, 0.18]**	**0.15*** [0.09, 0.20]**	**0.17*** [0.11, 0.23]**	**0.08* [0.02, 0.14]**	**0.11*** [0.06, 0.16]**	**0.14*** [0.09, 0.20]**	**0.23*** [0.17, 0.29]**	**0.26*** [0.19, 0.32]**	**0.19*** [0.13, 0.26]**
Social Support	**0.12*** [0.06, 0.19]**	**0.10** [0.03, 0.17]**	**0.08* [0.01, 0.15]**	**0.15*** [0.08, 0.22]**	**0.06* [0.01, 0.12]**	**0.08* [0.02, 0.14]**	**0.12*** [0.05, 0.18]**	**0.13*** [0.06, 0.20]**	**0.16*** [0.09, 0.22]**
Sense of Community	**0.22*** [0.15, 0.29]**	**0.19*** [0.11, 0.26]**	**0.16*** [0.08, 0.23]**	**0.23*** [0.15, 0.31]**	**0.15*** [0.09, 0.21]**	**0.17*** [0.10, 0.24]**	**0.26*** [0.19, 0.34]**	**0.26*** [0.18, 0.34]**	**0.24*** [0.16, 0.31]**
Block 4 (Simultaneous Entry of Climate Variables)									
Decision Making	0.06 [-0.18, 0.31]	0.01 [-0.22, 0.24]	-0.04 [-0.29, 0.21]	0.24 [-0.08, 0.56]	0.07 [-0.17, 0.31]	0.15 [-0.13, 0.43]	-0.03 [-0.25, 0.18]	0.00 [-0.24, 0.25]	-0.05 [-0.30, 0.19]
Work Planning	-0.09 [-0.33, 0.15]	0.02 [-0.22, 0.25]	0.13 [-0.10, 0.37]	-0.06 [-0.15, 0.05]	-0.02 [-0.24, 0.20]	-0.09 [-0.35, 0.17]	0.16 [-0.03, 0.35]	0.16 [-0.05, 0.38]	0.16 [-0.06, 0.37]
Role Flexibility	**0.17* [0.04, 0.31]**	**0.14* [0.01, 0.28]**	0.11 [-0.03, 0.26]	0.13 [0.02, 0.37]	**0.14* [0.01, 0.28]**	**0.21** [0.05, 0.36]**	0.05 [-0.07, 0.17]	0.09 [-0.05, 0.22]	**0.15* [0.01, 0.29]**
Appreciation	-0.01 [-0.18, 0.16]	-0.03 [-0.22, 0.17]	0.02 [-0.13, 0.16]	0.07 [-0.09, 0.23]	0.09 [-0.03, 0.21]	**0.26** [0.07, 0.45]**	0.02 [-0.09, 0.13]	-0.01 [-0.18, 0.16]	0.00 [-0.13, 0.13]
Supportive Management	0.06 [-0.07, 0.19]	0.09 [-0.03, 0.24]	0.11 [-0.03, 0.25]	0.01 [-0.15, 0.17]	0.02 [-0.11, 0.15]	0.07 [-0.07, 0.21]	0.09 [-0.03, 0.21]	**0.19** [0.06, 0.33]**	0.07 [-0.06, 0.21]
Social Support	0.02 [-0.06, 0.11]	0.02 [-0.07, 0.10]	0.03 [-0.06, 0.12]	0.06 [-0.04, 0.16]	0.00 [-0.07, 0.08]	0.04 [-0.05, 0.13]	0.01 [-0.07, 0.08]	0.03 [-0.06, 0.11]	0.06 [-0.02, 0.14]
Sense of Community	0.10 [-0.03, 0.24]	0.01 [-0.13, 0.15]	0.05 [-0.10, 0.20]	0.13 [-0.05, 0.31]	0.05 [-0.19, 0.09]	-0.08 [-0.30, 0.15]	0.10 [-0.02, 0.22]	0.03 [-0.17, 0.25]	0.00 [-0.14, 0.14]
Calendar Age	0.00 [-0.01, 0.01]	-0.01 [-0.02, 0.00]	-0.01 [-0.02, 0.01]	0.00 [-0.01, 0.01]	-0.01 [-0.02, 0.00]	-0.01 [-0.02, 0.00]	0.00 [-0.01, 0.01]	0.00 [-0.01, 0.01]	0.00 [-0.01, 0.02]
Physical Health	**0.02*** [0.01, 0.03]**	**0.02*** [0.01, 0.03]**	**0.02*** [0.01, 0.03]**	**0.02** [0.01, 0.03]**	**0.01** [0.01, 0.02]**	**0.01** [0.01, 0.02]**	**0.01** [0.00, 0.02]**	**0.02*** [0.01, 0.03]**	0.01 [0.00, 0.02]
Mental Health	**0.01** [0.00, 0.02]**	0.01 [0.00, 0.02]	**0.01* [0.00, 0.02]**	0.01 [0.00, 0.02]	0.01 [0.00, 0.02]	0.01 [0.00, 0.02]	**0.01* [0.00, 0.01]**	**0.01* [0.00, 0.02]**	0.01 [0.00, 0.02]
Subjective Age Identity	0.03 [-0.09, 0.15]	0.07 [-0.06, 0.20]	0.11 [-0.03, 0.25]	0.04 [-0.11, 0.18]	0.08 [-0.04, 0.20]	0.10 [-0.02, 0.23]	0.08 [-0.03, 0.19]	0.04 [-0.08, 0.16]	0.09 [-0.03, 0.21]
R^2	0.407 (0.182)	0.439 (0.197)	0.370 (0.146)	0.341 (0.212)	0.323 (0.182)	0.410 (0.194)	0.504 (0.326)	0.489 (0.342)	0.410 (0.242)

Table 5.7 (cont.). *Unstandardised coefficient estimates in blocks 1 – 5 for all performance models*

Block 5 (Final Models)									
Work Planning	-	0.01 [-0.14, 0.16]	**0.15*** [0.07, 0.24]**	-	**0.12*** [0.06, 0.19]**	-	**0.18*** [0.10, 0.26]**	**0.25*** [0.16, 0.35]**	-
Role Flexibility	**0.15*** [0.06, 0.23]**	**0.15* [0.01, 0.30]**	-	**0.13** [0.04, 0.22]**	-	**0.20*** [0.12, 0.29]**	-	-	**0.25*** [0.16, 0.34]**
Appreciation	-	-	-	-	-	**0.09** [0.03, 0.16]**	-	-	-
Supportive Management	-	**0.07* [0.00, 0.14]**	**0.08* [0.00, 0.15]**	-	-	-	**0.10** [0.03, 0.17]**	**0.13*** [0.06, 0.21]**	**0.09** [0.03, 0.16]**
Sense of Community	**0.13** [0.04, 0.21]**	-	-	**0.15** [0.04, 0.25]**	**0.07* [0.00, 0.14]**	-	**0.09* [0.01, 0.18]**	-	-
Calendar Age	-	-0.01 [-0.02, 0.00]	-0.01 [-0.01, 0.00]	-	-	-0.01 [-0.02, 0.00]	-	-	-
Physical Health	**0.02*** [0.02, 0.03]**	**0.02*** [0.01, 0.03]**	**0.02*** [0.01, 0.03]**	**0.02*** [0.01, 0.03]**	**0.01*** [0.01, 0.02]**	**0.01*** [0.01, 0.02]**	**0.01** [0.00, 0.02]**	**0.02*** [0.01, 0.02]**	-
Mental Health	**0.01** [0.00, 0.02]**	**0.01* [0.00, 0.02]**	**0.01** [0.00, 0.02]**	-	0.01 [0.00, 0.01]	-	**0.01** [0.00, 0.02]**	**0.01* [0.00, 0.02]**	**0.01* [0.00, 0.02]**
Subjective Age Identity	-	0.07 [-0.05, 0.19]	-	0.08 [-0.05, 0.21]	-0.03 [-0.13, 0.07]	0.10 [-0.01, 0.21]	-	-	**0.13* [0.02, 0.24]**
CA*Work Planning	-	**0.01* [0.00, 0.01]**	**0.01* [0.00, 0.01]**	-	-	-	-	-	-
PH*Role Flexiblity	-	**0.01** [0.00, 0.02]**	-	-	-	-	-	-	-
SA*Supportive Management	-	**-0.12* [-0.21, -0.02]**	-	-	-	-	-	-	-
SA*Sense of Community	-	-	-	**-0.11* [-0.24, 0.01]**	**-0.08* [-0.17, 0.01]**	-	-	-	-
R^2	0.382	0.430	0.352	0.309	0.308	0.402	0.499	0.475	0.405

Block 2 Note. These coefficient estimates are based on models that also include the four control variables from block 1.
Block 3 Note. These coefficient estimates are based on models that include the four control variables from block 1, four age variables from block 2, and each of the seven climate variables from block 3, entered individually.
Block 4 Note. These coefficient estimates are based on models that include the four control variables from block 1, four age variables from block 2, and all of the seven climate variables from block 3, entered simultaneously.
Block 5 Note. These coefficient estimates are based on the final models, which reflect the most parsimonious models for each performance construct. Only significant and/or meaningful coefficients are presented;
Decision Making and Social Support constructs are not presented in block 5 because they held no significant or meaningful relationships in the final models.
The figures in brackets next to the coefficient are 95% confidence intervals.
The R^2 statistic in brackets is the change in R^2 from blocks 1 - 2 and 2 - 4.
* $p \leq .05$,
** $p \leq .01$,
*** $p \leq .001$

5.5.1 Model Comparison

This section presents model fit statistics and R^2 values for each block. Parameter estimates and hypotheses testing are presented next. In accordance with stepwise variable selection, the most parsimonious models are presented in block 5. Model fit statistics are not reported for block 3 because the effects of each psychological climate factor were tested individually. Note that current R packages do not support path diagrams for lavaan.mi objects, so the results for each of the final models are presented in section 5.6 (figures 5.7 – 5.12).

Table 5.7 shows that in block 1, control variables explained between 1.3% and 8.7% of the variance in performance, with considerably more variance explained in all levels of proactivity than in proficiency and adaptivity. The fit statistics for models of individual and team performance were within an acceptable range, but SRMR values for organisation-level performance models breached .10, indicating a larger discrepancy between the observed and model-implied correlation matrix (Bentler, 1990; Marsh, Hau & Grayson, 2005). In block 2, age variables explained between 10.8% and 21.4% of unique variance in performance. Age variables accounted for more variability in individual performance than team or organisation performance. A decline in TLI was observed for all models in block 2, indicating that, compared to baseline models, hypothesised models in block 2 were of slightly worse fit than in block 1. However, SRMR decreased for each of the nine models, indicating that hypothesised relationships were more representative of the observed data than in block 1.

Block 4 results were derived from a simultaneous analysis approach encompassing all predictor variables and interaction effects of interest. The measurement component therefore differed between models, except for models where interaction effects were not hypothesised (organisation adaptivity and organisation proactivity). Results show that psychological climate effects accounted for 34.2% of the variance in organisation adaptivity and 24.2% of the variance in organisation proactivity beyond control and age variables. For the remaining models, psychological climate and interaction effects explained between 14.6% and 32.6% of unique variance. Although the data would indicate that age (block 2) explains more unique variance in all individual-level performance than psychological climate predictors and interaction effects (block 4), the order of variable entry can influence both effect size and variance statistics (Chowdhury & Turin, 2020). Further, adjusted R^2 cannot be measured in the semTools package, so inferences made about individual variables relied on the stepwise elimination process conducted in block 5. Except for team proficiency, for which there was a decline in CFI and TLI values, the fit statistics for all models were improved over blocks 1 and 2. A series of hypothesised interactions were specified in the model for team proficiency and, given that CFI and TLI are functions of χ^2, the reduction in values could be a symptom of an overly-complex or misspecified model.

Table 5.8. *Model fit statistics for all models in blocks 1, 2, 4, and 5*

Model fit statistics for all models in blocks 1, 2, 4, and 5.

	Individual Task			Team Member			Organisation Member		
Block 1 (Control Variables)	Proficiency	Adaptivity	Proactivity	Proficiency	Adaptivity	Proactivity	Proficiency	Adaptivity	Proactivity
X^2	1152.27	1170.44	1145.21	1186.63	1156.23	1163.10	1240.46	1194.15	1161.78
df	554	554	554	554	554	554	554	554	554
CFI	0.92	0.92	0.92	0.92	0.92	0.92	0.91	0.92	0.92
TLI	0.91	0.91	0.91	0.90	0.91	0.91	0.90	0.90	0.91
RMSEA	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
SRMR	0.09	0.09	0.09	0.08	0.08	0.09	0.11	0.11	0.10
R^2	0.016	0.028	0.052	0.013	0.023	0.087	0.032	0.014	0.060
Block 2 (Age Variables)	Proficiency	Adaptivity	Proactivity	Proficiency	Adaptivity	Proactivity	Proficiency	Adaptivity	Proactivity
X^2	1341.22	1334.89	1318.32	1352.23	1331.15	1338.84	1405.28	1364.39	1323.98
df	644	644	644	644	644.00	644	644	644	644.00
CFI	0.91	0.91	0.92	0.91	0.91	0.91	0.90	0.91	0.91
TLI	0.89	0.89	0.90	0.89	0.89	0.89	0.88	0.89	0.90
RMSEA	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.05	0.05
SRMR	0.07	0.07	0.07	0.07	0.07	0.08	0.09	0.09	0.08
R^2	0.225 (0.209)	0.242 (0.214)	0.224 (0.172)	0.129 (0.116)	0.141 (0.118)	0.216 (0.129)	0.178 (0.146)	0.147 (0.133)	0.168 (0.108)
Block 4 (All Variables)	Proficiency	Adaptivity	Proactivity	Proficiency	Adaptivity	Proactivity	Proficiency	Adaptivity	Proactivity
X^2	1622.00	1898.35	1523.79	2229.31	1177.75	1643.16	1076.57	886.69	873.97
df	826	946	826	1140	648	840	573	480	480
CFI	0.92	0.91	0.93	0.90	0.93	0.91	0.93	0.93	0.93
TLI	0.91	0.89	0.91	0.88	0.91	0.89	0.91	0.92	0.92
RMSEA	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
SRMR	0.05	0.05	0.06	0.05	0.05	0.05	0.05	0.05	0.05
AIC	62537.27	75311.47	66551.54	68561.78	48918.43	63168.53	54532.76	45226.10	45448.65
R^2	0.407 (0.182)	0.439 (0.197)	0.370 (0.146)	0.341 (0.212)	0.323 (0.182)	0.410 (0.194)	0.504 (0.326)	0.489 (0.342)	0.410 (0.242)
Block 5 (Final Models)	Proficiency	Adaptivity	Proactivity	Proficiency	Adaptivity	Proactivity	Proficiency	Adaptivity	Proactivity
X^2	168.17	726.37	243.18	285.58	351.76	124.60	272.38	116.81	109.25
df	91	350	135	175	195	69	151	76	76
CFI	0.97	0.94	0.97	0.96	0.93	0.97	0.96	0.98	0.98
TLI	0.95	0.92	0.95	0.95	0.95	0.95	0.95	0.97	0.98
RMSEA	0.05	0.05	0.05	0.04	0.05	0.05	0.05	0.04	0.03
SRMR	0.04	0.04	0.06	0.04	0.05	0.04	0.04	0.03	0.03
AIC	22863.15	50339.82	34420.57	24495.20	27667.86	21976.17	28120.49	22551.47	20374.29
R^2	0.382	0.430	0.352	0.309	0.308	0.402	0.499	0.475	0.405

Note.
The R^2 statistic in brackets is the change in R^2 from blocks 1 - 2 and 2 - 4.

5.5.1.1 Individual Proficiency

For individual proficiency, block 5 was of substantially better fit to the data and more parsimonious than previous blocks (CFI = 0.97, TLI = 0.95, RMSEA = 0.05, SRMR = 0.04, AIC = 22863.15). This block included the four control variables and main effects for physical health, mental health, role flexibility, and sense of community, but not interaction effects. A substantial reduction in model complexity resulted in much-improved fit at the expense of a 2.5% decrease in R^2 between block 4 (40.7%) and block 5 (38.2%).

5.5.1.2 Individual Adaptivity

For individual adaptivity, block 5 was moderately better-fitting to the data and more parsimonious than previous blocks (CFI = 0.94, TLI = 0.91, RMSEA = 0.05, SRMR = 0.04, AIC = 50339.82). This block included the four control variables, the main effect for mental health, and three interactions between work planning and calendar age, role flexibility and physical health, and supportive management with subjective age. A marginal reduction in model complexity facilitated the detection of three effects that did not present in block 4 and marginally improved model fit at the expense of a 0.9% decrease in R^2 from block 4 (43.9%) to block 5 (43%).

5.5.1.3 Individual Proactivity

For individual proactivity, block 5 was of substantially better fit to the data and more parsimonious than previous blocks (CFI = 0.97, TLI = 0.95, RMSEA = 0.05, SRMR = 0.06, AIC = 34420.57). This block included the four control

variables and main effects for physical health, mental health, and supportive management, and an interaction effect between work planning and calendar age. A moderate reduction in model complexity facilitated the detection of all effects – none of which were present in block 4 – and resulted in a substantially better-fitting model at the expense of a 1.8% decrease in R^2 between block 4 (37%) and block 5 (35.2%).

5.5.1.4 Team Proficiency

For team proficiency, block 5 was of substantially better fit to the data and more parsimonious than previous blocks (CFI = 0.96, TLI = 0.95, RMSEA = 0.04, SRMR = 0.04, AIC = 24495.20). This block included the four control variables and main effects for physical health and work planning, and an interaction effect between sense of community and subjective age. A substantial reduction in model complexity facilitated the detection of two effects that did not present in block 4 and resulted in a substantially better-fitting model at the expense of a 3.2% decrease in R^2 between block 4 (34.1%) and block 5 (30.9%).

5.5.1.5 Team Adaptivity

For team adaptivity, block 5 was of moderately better fit to the data and more parsimonious than previous blocks (CFI = 0.95, TLI = 0.93, RMSEA = 0.05, SRMR = 0.05, AIC = 27667.86). This block included the four control variables and main effects for physical health, mental health, and work planning, and an interaction between sense of community and subjective age. A moderate

reduction in model complexity facilitated the detection of three effects that did not present in block 4 and resulted in a moderately better-fitting model at the expense of a 1.5% decrease in R^2 between block 4 (32.3%) and block 5 (30.8%).

5.5.1.6 Team Proactivity

For team proactivity, block 5 was of substantially better fit to the data and more parsimonious than previous blocks (CFI = 0.97, TLI = 0.95, RMSEA = 0.05, SRMR = 0.04, AIC = 21976.17). This block included the four control variables and main effects for calendar age, physical health, subjective age, role flexibility, and appreciation, but not interaction effects. A substantial reduction in model complexity resulted in much-improved fit at the expense of a 0.8% decrease in R^2 between block 4 (41%) and block 5 (40.2%).

5.5.1.7 Organisation Proficiency

For organisation proficiency, block 5 was of substantially better fit to the data and more parsimonious than previous blocks (CFI = 0.96, TLI = 0.95, RMSEA = 0.05, SRMR = 0.04, AIC = 28120.49). This block included the four control variables and main effects for physical health, mental health, work planning, supportive management, and sense of community, but not interaction effects. A moderate reduction in model complexity resulted in much-improved fit at the expense of a 0.5% decrease in R^2 between block 4 (50.4%) and block 5 (49.9%).

5.5.1.8 Organisation Adaptivity

For organisation adaptivity, block 5 was of substantially better fit to the data and more parsimonious than previous blocks (CFI = 0.98, TLI = 0.97, RMSEA = 0.04, SRMR = 0.03, AIC = 22551.47). This block included the four control variables and main effects for physical health, mental health, work planning, and supportive management, but not interaction effects. A substantial reduction in model complexity resulted in much-improved fit at the expense of a 1.4% decrease in R^2 between block 4 (48.9%) and block 5 (47.5%).

5.5.1.9 Organisation Proactivity

For organisation proactivity, block 5 was of substantially better fit to the data and more parsimonious than previous blocks (CFI = 0.98, TLI = 0.98, RMSEA = 0.03, SRMR = 0.03, AIC = 20374.29). This block included the four control variables and main effects for mental health, subjective age, role flexibility, and supportive management, but not interaction effects. A substantial reduction in model complexity resulted in much-improved fit at the expense of a 1.4% decrease in R^2 between block 4 (41.9%) and block 5 (40.5%).

5.5.2 Age and Performance

Physical health, mental health, and subjective age identity were scaled such that a higher score was associated with a more positive reflection of ageing, while raw scores were retained for calendar age. Calendar age was not hypothesised to have a main effect on performance but was included in the hypotheses for interaction effects in section 3.4.1. Because the observed

values of physical health and mental health ranged between 28.25 and 64.21, and 22.31 and 58.80 respectively, corresponding semi-standardised regression coefficients (b_{Sj}) were calculated to aid interpretability. To test the predictive power of age constructs specified in hypotheses 1 – 4, a series of LRT tests were undertaken in block 4 by constraining parameters concerning each age and performance construct. In conjunction with block 5 parameter estimates, LRT tests were used to determine the level of support for hypotheses 1 – 4.

In block 2, which contained control and age variables, physical health was not related to organisation proactivity, but was positively related to the remaining eight performance constructs (B = 0.01 – 0.03, b_{Sj} = 0.09 – 0.23) and most strongly related to individual proficiency. Mental health was positively related to all performance constructs (B = 0.01, b_{Sj} = 0.06 – 0.10) except for team proficiency. Subjective age identity was positively related to all performance constructs (B = 0.17 – 0.22, b_{Sj} = 0.10 – 0.13) except for team adaptivity. Calendar age was negatively related to individual adaptivity (B = -0.02), individual proactivity (B = -0.01), and team proactivity (B = -0.01), but not to the other six performance constructs.

Block 4 results were derived from a simultaneous analysis approach encompassing all predictor variables and interaction effects of interest. Similar to block 2, physical health was not related to organisation proactivity, but positively related to the remaining eight performance constructs (B = 0.01 – 0.02, b_{Sj} = 0.09 – 0.19). Mental health was positively related only to individual

proficiency and proactivity, and organisation proficiency and adaptivity (B = 0.01, b_{Sj} = 0.07 – 0.09). No significant effects were observed for subjective age or calendar age with any of the nine performance constructs in block 4.

Block 5 represented the most parsimonious models of each performance construct after stepwise variable selection determined by a combination of effect size, significance, interaction effects, goodness of fit, and the proportion of variance accounted for given the reduction in model complexity. The effect of physical health remained consistent between block 2, 4, and 5 in that there was no evidence to support a significant effect for organisation proactivity, but there was a positive effect for the remaining eight performance constructs (B = 0.01 – 0.02, b_{Sj} = 0.11 – 0.20). In block 5, mental health was positively related to all individual and organisation performance constructs (B = 0.01, b_{Sj} = 0.07 – 0.10), but not to any team performance constructs. The only significant effect of subjective age was for organisation proactivity (B = 0.13, b_{Sj} = 0.07), and there were no significant main effects for calendar age on any of the nine performance constructs.

5.5.2.1 H1: Physical health is positively associated with individual (a) proficiency, (b) adaptivity, and (c) proactivity

In block 2, physical health was positively related to individual proficiency, B = 0.03 (b_{Sj} = 0.23), 95% CI [0.02, 0.03], adaptivity, B = 0.02 (b_{Sj} = 0.17), 95% CI [0.01, 0.03], and proactivity, B = 0.02 (b_{Sj} = 0.19), 95% CI [0.02, 0.04]. In block 4, physical health remained positively related to individual proficiency, B = 0.02

(b_{Sj} = 0.20), 95% CI [0.02, 0.03], adaptivity, B = 0.02 (b_{Sj} = 0.19), 95% CI [0.01, 0.03], and proactivity, B = 0.02 (b_{Sj} = 0.18), 95% CI [0.01, 0.03].

After stepwise variable selection and in block 5, physical health remained positively related to individual proficiency, B = 0.02 (b_{Sj} = 0.20), 95% CI [0.01, 0.03], adaptivity, B = 0.02 (b_{Sj} = 0.18), 95% CI [0.01, 0.03], and proactivity, B = 0.02 (b_{Sj} = 0.19), 95% CI [0.01, 0.03]. Additionally, the data indicated that the full model and null model constraining physical health were significantly different for individual proficiency, F (1, 6568) = 32.50, $p \leq 0.001$, adaptivity, F (1, 22866) = 29.18, $p \leq 0.001$, and proactivity, F (1, 18052) = 22.76, $p \leq 0.001$. Thus, hypothesis 1 is fully supported.

5.5.2.2 H2: Mental health is positively associated with (a) individual proactivity, (b) team proactivity, and (c) organisation proactivity

In block 2, mental health was positively related to individual proactivity, B = 0.01 (b_{Sj} = 0.08), 95% CI [0.01, 0.03], team proactivity, B = 0.01 (b_{Sj} = 0.07), 95% CI [0.00, 0.02], and organisation proactivity, B = 0.01 (b_{Sj} = 0.10), 95% CI [0.01, 0.02]. In block 4, mental health remained positively related to individual proactivity, B = 0.01 (b_{Sj} = 0.08), 95% CI [0.00, 0.02], but not to team or organisation proactivity.

After stepwise variable selection and in block 5, mental health was positively related to individual proactivity, B = 0.01 (b_{Sj} = 0.09), 95% CI [0.00, 0.02], and organisation proactivity, B = 0.01 (b_{Sj} = 0.07), 95% CI [0.00, 0.02], but not to team proactivity. Additionally, a series of LRT tests indicated that the full model

and null model constraining mental health were significantly different for individual proactivity, F (1, 2487) = 5.95, $p \leq 0.05$, team proactivity, F (1, 2555) = 4.30, $p \leq 0.05$, and organisation proactivity, F (1, 2525) = 5.20, $p \leq 0.05$. Hypothesis 2 is therefore supported for (a) individual and (c) organisation proactivity, but only partially supported for (b) team proactivity.

5.5.2.3 H3: Subjective age is positively associated with (a) individual adaptivity, (b) team adaptivity, and (c) organisation adaptivity

In block 2, subjective age identity was positively related to individual adaptivity, B = 0.21 (b_{Sj} = 0.12), 95% CI [0.10, 0.33] and organisation adaptivity, B = 0.19 (b_{Sj} = 0.11), 95% CI [0.07, 0.31], but not to team adaptivity. In block 4 and block 5, there were no significant main effects between subjective age and adaptivity at all three levels. Results from LRT tests indicated that the full model and null model constraining subjective age in block 4 were not significantly different for individual adaptivity, F (1, 16471) = 2.83, p = 0.09, team adaptivity, F (1, 8228) = 0.01, p = 0.93, or organisation adaptivity, F (1, 3939) = 0.62, p = 0.43. Thus, hypothesis 3 is not supported.

5.5.2.4 H4: Subjective age is positively associated with (a) individual proactivity, (b) team proactivity, and (c) organisation proactivity

In block 2, subjective age identity was positively related to individual proactivity, B = 0.21 (b_{Sj} = 0.12), 95% CI [0.10, 0.33], team proactivity, B = 0.19 (b_{Sj} = 0.11), 95% CI [0.08, 0.29], and organisation proactivity, B = 0.22 (b_{Sj} = 0.13), 95% CI [0.11, 0.34]. In block 4, subjective age was not significantly

related to proactivity at any level, but in block 5, subjective age was positively related to organisation proactivity, B = 0.13 (b_{Sj} = 0.07), 95% CI [0.01, 0.23], but not to individual or team proactivity.

Results from LRT tests indicated that the full model and null model constraining subjective age were significantly different for team proactivity, F (1, 21191) = 3.77, $p \leq 0.05$, but not for individual or organisation proactivity. Hypothesis 4 is therefore only partially supported for (c) organisation proactivity, but not for (a) individual or (b) team proactivity.

5.5.3 Age, Psychological Climate, and Performance

This section will report the main effects for climate constructs (H5, H8, and H10) and interaction effects between age and climate constructs (H6, H7, H9, and H10). Semi-standardised coefficients for climate effects are not reported in this section because they were measured on identical scales.

Due to the complexity of the model adopting a simultaneous analytical approach (block 4), the main effects of climate and interactions with age were firstly tested in block 3 to facilitate detection. These effects were then incorporated into block 4 and included as part of the respecification process. As such, statistics for interaction terms in block 3 and block 4 will not be reported, but can be found in Appendix 5. Interaction terms that are significant in block 5 were probed to understand how the effect of age on performance changes at different levels of climate. This was achieved by conducting simple slopes and graphic plotting corresponding to high, normal, and low levels of the relevant climate characteristic (Aiken & West, 1991; Cohen et al., 2003).

In block 3, all climate characteristics were significantly and positively associated with all performance constructs. These results were used to inform the inclusion of variables in block 4 and not used to determine support for hypotheses.

In block 4, the only significant effect among autonomy-supportive climate characteristics was for role flexibility, which was positively related to individual proficiency and adaptivity, team adaptivity and proactivity, and organisation proactivity (B = 0.14 – 0.21). Of the competence-supportive climate characteristics, appreciation was positively related to team proactivity (B = 0.26), and supportive management was positively related to organisation adaptivity (B = 0.19). No significant effects were observed between social support or sense of community with any construct of performance.

In block 5, work planning was positively related to individual proactivity, organisation proficiency, and adaptivity at the team and organisation level (B = 0.12 – 0.25). Work planning also moderated the relationship between calendar age with individual adaptivity and proactivity. Role flexibility was positively related to individual and team proficiency, team and organisation proactivity, and team adaptivity (B = 0.13 – 0.25), and also moderated the relationship between physical health and individual adaptivity. Like block 4, decision making was not significantly associated with any performance construct.

Of the competence-supportive climate characteristics, appreciation remained positively related to team proactivity (B = 0.09). Supportive management was positively related to individual adaptivity and proactivity, and to all three performance constructs at the organisation level (B = 0.07 – 0.13). Additionally, supportive management moderated the relationship between subjective age and individual adaptivity.

Of the relatedness-supportive climate characteristics, sense of community was positively related to proficiency at all three levels, and to team adaptivity (B = 0.07 – 0.15). Additionally, sense of community moderated the relationship between subjective age with team proficiency and adaptivity. Like block 4, social support was not significantly associated with any performance construct.

5.5.3.1 H5: Autonomy-Supportive climate characteristics (decision-making, work planning, role flexibility) are positively associated with individual (a) proficiency, (b) adaptivity, and (c) proactivity

In block 4, role flexibility was positively associated with individual proficiency, B = 0.17, 95% CI [0.04, 0.31], and adaptivity, B = 0.14, 95% CI [0.01, 0.28], but not to proactivity. In block 5, role flexibility remained positively associated with individual proficiency, B = 0.15, 95% CI [0.06, 0.23], and adaptivity, B = 0.15, 95% CI [0.01, 0.30], but not to proactivity. Work planning was positively related to individual proactivity, B = 0.15, 95% CI [0.07, 0.24], but not to proficiency or adaptivity. Decision making was not significantly associated with any individual performance construct in blocks 4 and 5. Thus, hypotheses 5 is

partially supported for individual (a) proficiency, (b) adaptivity, and (c) proactivity.

5.5.3.2 H6: The Autonomy-Supportive climate characteristics of work planning and/or role flexibility will moderate the relationship between age and (a) individual proficiency, (b) adaptivity, and (c) proactivity, such that being or feeling older is more negatively related to performance when characteristics are low, and positive or less negative when autonomy-climate characteristics are high.

In block 3, there was a significant interaction between work planning and calendar age for individual adaptivity and proactivity, but not for proficiency. These effects became nonsignificant in block 4. In block 5, there was a significant interaction between work planning and calendar age for individual adaptivity, B = -0.006, 95% CI [-0.01, 0.00], and proactivity, B = -0.005, 95% CI [-0.01, 0.00], but not for individual proficiency. There were no significant interaction effects observed for subjective age or role flexibility in relation to hypothesis 6.

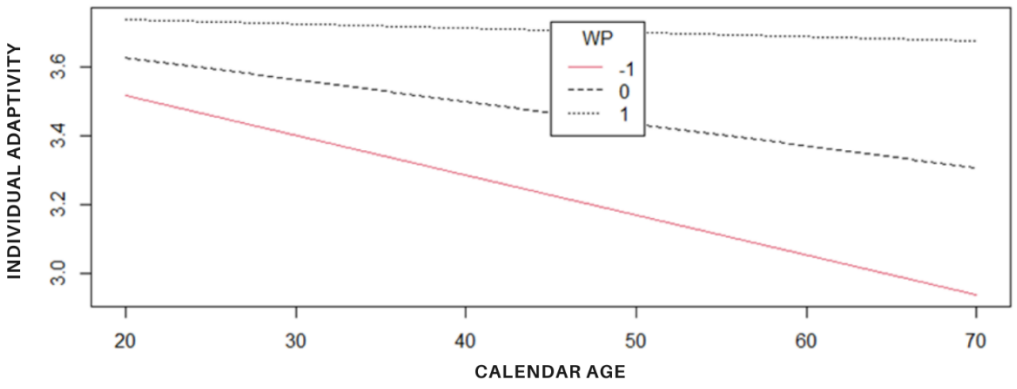
At average levels of work planning, the effect of calendar age on individual adaptivity is negative albeit not significant, B = -0.006, z = -1.412, p = 0.158. As hypothesised, the effect of calendar age on individual adaptivity is more negative when work planning is low, B = -0.012, z = -2.74, p = 0.013, such that adaptive behaviours decrease more steeply with increasing age. When work planning is high, the effect of calendar age is less negative and approaching

zero, B = -0.001, z = 0.23, p = 0.819, indicating no evidential difference in adaptivity across the lifespan.

Table 5.9. Simple slopes for the effects of calendar age on individual adaptivity at low, average, and high levels of work planning

	Individual Adaptivity			
	B	SE	*z*	*p*
Low Work Planning				
Intercept	3.753	0.199	18.864	0.000
Calendar Age	**-0.012***	0.005	-2.740	0.013
Average Work Planning				
Intercept	3.761	0.194	19.418	0.000
Calendar Age	-0.006	0.005	-1.412	0.158
High Work Planning				
Intercept	3.768	0.217	17.335	0.000
Calendar Age	-0.001	0.005	0.228	0.819

Figure 5.1. Interaction plot representing the simple effect of calendar age on individual adaptivity at low, average, and high values of work planning (WP)

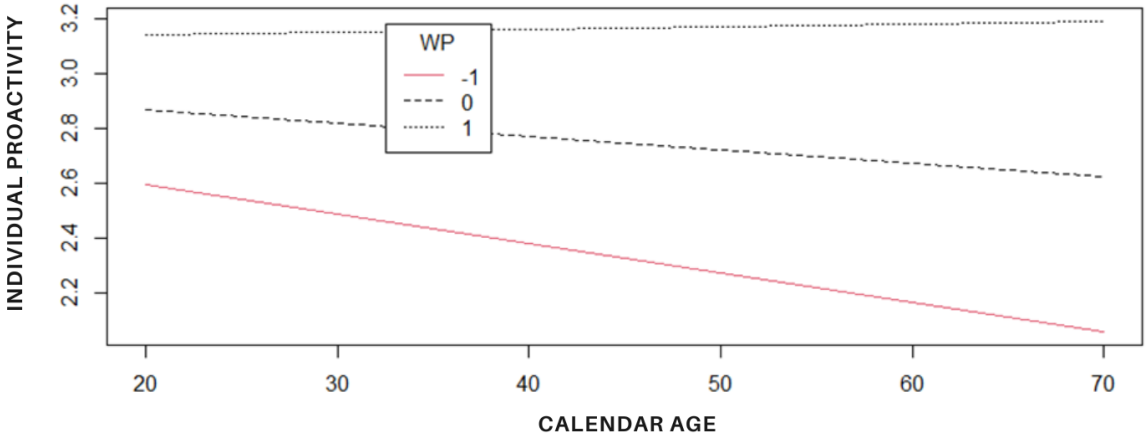


At average levels of work planning, the effect of calendar age on individual proactivity is negative albeit not significant, B = -0.005, z = -1.072, p = 0.284. When work planning is low, the effect of calendar age on individual proactivity is more negative, B = -0.011, z = -2.24, p = 0.025, such that proactive behaviours decrease more steeply with increasing age. When work planning is high, the negative effects of calendar age turn slightly positive, albeit not significant, B = 0.001, z = 0.19, p = 0.851.

Table 5.10. Simple slopes for the effects of calendar age on individual proactivity at low, average, and high levels of work planning

	Individual Proactivity			
	B	SE	*z*	*p*
Low Work Planning				
Intercept	2.811	0.207	13.568	0.000
Calendar Age	**-0.011***	0.005	-2.242	0.025
Average Work Planning				
Intercept	2.965	0.203	14.583	0.000
Calendar Age	-0.005	0.005	-1.072	0.284
High Work Planning				
Intercept	3.119	0.208	15.011	0.000
Calendar Age	0.001	0.006	0.188	0.851

Figure 5.2. Interaction plot representing the simple effect of calendar age on individual proactivity at low, average, and high values of work planning



5.5.3.3 H7: The Autonomy-Supportive climate characteristics of work planning and/or role flexibility will moderate the relationship between physiological age and individual (a) proficiency, (b) adaptivity, and (c) proactivity, such that the effect of age is less positive or negative when climate characteristics are low, and more positive when climate characteristics are high.

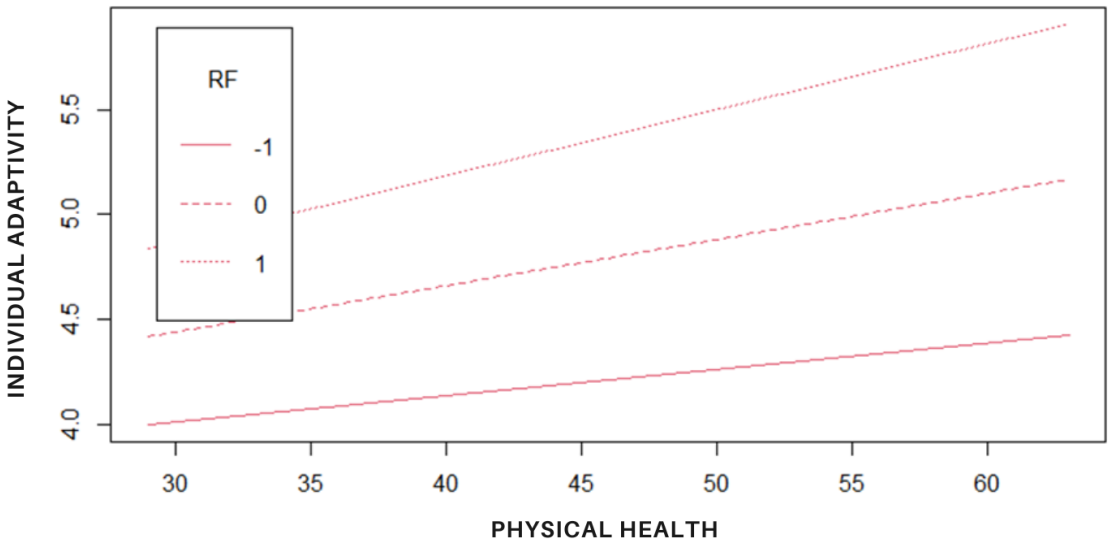
In block 3, there was a significant interaction between work planning and mental health for individual proficiency, but not for adaptivity or proactivity. This effect was not observed in blocks 4 or 5. There was also a significant interaction between role flexibility and physical health for individual proficiency and adaptivity, but not for proactivity. In block 4, the only significant interaction observed pertaining to hypothesis 7 was between physical health and role flexibility. This remained the only significant interaction in block 5, B = 0.009, 95% CI [0.00, 0.02].

At average levels of role flexibility, the effect of physical health on individual adaptivity is positive, B = 0.022, z = 5.71, p < 0.001. As hypothesised, the effect of physical health on individual adaptivity is less positive when role flexibility is low, B = 0.013, z = 2.67, p < 0.001, and more positive when role flexibility is high, B = 0.031, z = 5.76, p < 0.001. This is indicative of a reinforcement effect in that the positive effect of age is reinforced when role flexibility is high, and weakened when role flexibility is low.

Table 5.11. Simple slopes for the effects of physical health at low, average, and high levels of role flexibility

	Individual Adaptivity			
	B	SE	*z*	*p*
Low Role Flexiblity				
Intercept	3.627	0.200	18.130	0.000
Physical Health	**0.013****	0.005	2.672	0.008
Average Role Flexiblity				
Intercept	3.778	0.185	20.416	0.000
Physical Health	**0.022*****	0.004	5.713	0.000
High Role Flexiblity				
Intercept	3.929	0.197	19.898	0.000
Physical Health	**0.031*****	0.005	5.755	0.000

Figure 5.3. Interaction plot representing the simple effect of physical health on individual adaptivity at low, average, and high values of role flexibility



5.5.3.4 H8: Competence-Supportive climate characteristics (appreciation and supportive management) are positively associated with (a) individual and proficiency, (b) individual adaptivity, (c) individual proactivity, (d) organisation proficiency, (e) organisation adaptivity, and (f) organisation proactivity

In block 4, the only significant effect among hypothesised paths was for supportive management on organisation adaptivity. In block 5, supportive management was not related to individual proficiency, but was positively related to individual adaptivity, B = 0.07, 95% CI [0.00, 0.14], individual proactivity, B = 0.08, 95% CI [0.00, 0.15], organisation proficiency, B = 0.10, 95% CI [0.03, 0.17], organisation adaptivity, B = 0.13, 95% CI [0.06, 0.21], and organisation proactivity, B = 0.09, 95% CI [0.03, 0.16]. Appreciation was not significantly related to any hypothesised performance construct in block 5.

Thus, hypothesis 8 is partially supported for all hypothesised paths except for (a) individual proficiency.

5.5.3.5 H9: The Competence-Supportive climate characteristics of (a) appreciation and (b) supportive management will moderate the relationship between age and individual performance, as well as organisation proficiency, such that being or feeling older is more negatively related to performance when characteristics are low, and positive or less negative when competence-climate characteristics are high.

In block 3, there was a significant interaction between supportive management and subjective age for all individual performance constructs, but not for organisational proficiency. There was a significant interaction between calendar age and appreciation for individual adaptivity and proactivity in addition to organisation proficiency, but not for individual proficiency. In keeping with block 4, the only significant interaction pertaining to hypothesis 8 in block 5 was between subjective age and supportive management, B = -0.115, 95% CI [-0.21, -0.02].

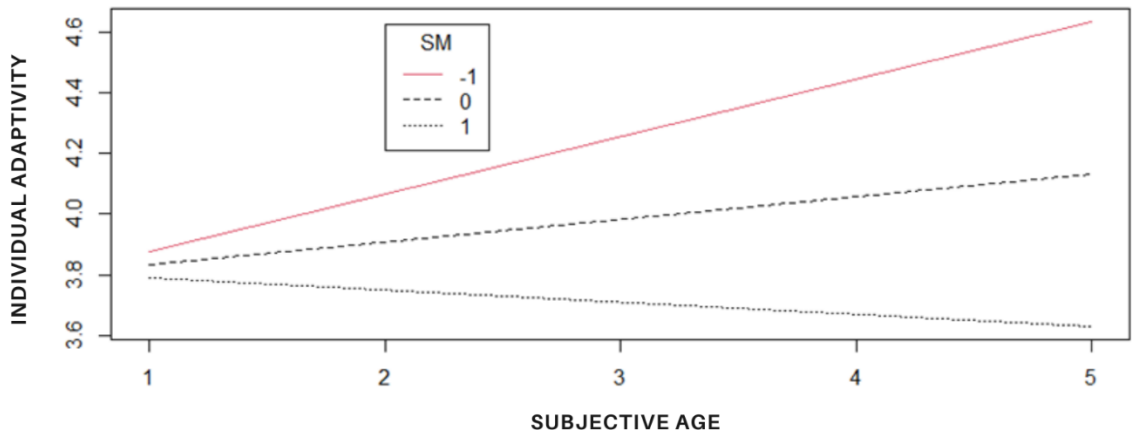
At average levels of supportive management, the effect of subjective age (increasing youthfulness) on individual adaptivity is positive albeit not significant, B = 0.074, z = 1.22, p = 0.221. When supportive management is low, this effect intensifies, B = 0.189, z = 2.56, p = 0.01, such that youthfulness is associated with substantially higher adaptivity. When supportive management is high, however, this effect is reversed, B = -0.041, z = -0.52, p

= 0.605, such that the disparity in adaptivity between those who feel young and old is much smaller.

Table 5.12. Simple slopes for conditional effects of subjective on individual adaptivity age at low, average, and high levels of sense of community

	Individual Adaptivity			
	B	SE	*z*	*p*
Low Supportive Management				
Intercept	3.688	0.197	18.717	0.000
Subjective Age	**0.189****	0.074	2.564	0.010
Average Supportive Management				
Intercept	3.761	0.194	19.418	0.000
Subjective Age	0.074	0.061	1.223	0.221
High Supportive Management				
Intercept	3.833	0.197	19.464	0.000
Subjective Age	-0.041	0.079	-0.517	0.605

Figure 5.4. Interaction plot representing the simple effect of subjective age on individual adaptivity at low, average, and high values of supportive management



5.5.3.6 H10: Relatedness-Supportive climate characteristics (social support and sense of community) are positively associated with team (a) proficiency, (b) adaptivity, and (c) proactivity

There were no significant associations between social support and sense of community with hypothesised performance constructs in block 4, nor between social support and performance in block 5. In block 5, sense of community was positively related to team proficiency, B = 0.15, 95% CI [0.04, 0.25], and adaptivity, B = 0.07, 95% CI [0.00, 0.14], but not to proactivity. Thus, hypothesis 10 is partially supported for team (a) proficiency and (b) adaptivity, but not for (c) proactivity.

5.5.3.7 H11: The Relatedness-Supportive climate characteristics of social support and/or sense of community will moderate the relationship between age (felt or actual) and team (a) proficiency, (b) adaptivity, and (c) proactivity, such that being or feeling older is more negatively related to performance when characteristics are low, and positive or less negative when relatedness-climate characteristics are high.

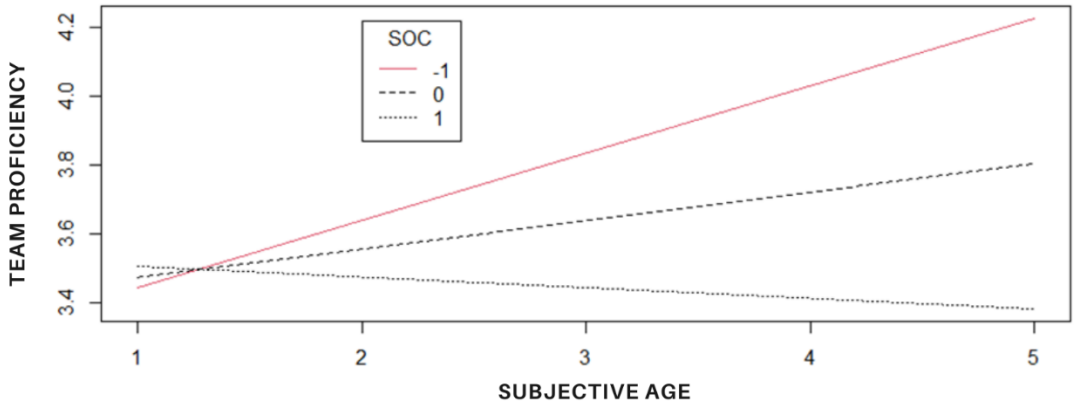
In block 3, there were significant interactions between sense of community and subjective age for team proficiency and adaptivity, and between sense of community and calendar age for team proactivity. In block 4, the only significant interaction was between sense of community and subjective age for team proficiency. In block 5, there were significant interactions between sense of community and subjective age for team proficiency, B = -0.114, 95% CI [-0.24, 0.01], and adaptivity, B = -0.082, 95% CI [-0.17, 0.01], but not for proactivity.

At average levels of sense of community, the effect of subjective age (increasing youthfulness) on team proficiency is positive albeit not significant, B = 0.082, z = 1.23, p = 0.22. When sense of community is low, this effect intensifies, B = 0.196, z = 2.13, p = 0.033, such that increasing youthfulness is associated with substantially higher proficiency. When sense of community is high, however, this effect is reversed, B = -0.031, z = -0.35, p = 0.729, such that the disparity in proficiency between those who feel young and old is much smaller.

Table 5.13. Simple slopes for conditional effects of subjective age on team proficiency at low, average, and high levels of sense of community

	Team Proficiency			
	B	SE	*z*	*p*
Low Sense of Community				
Intercept	3.245	0.229	14.185	0.000
Subjective Age	**0.196***	0.092	2.128	0.033
Average Sense of Community				
Intercept	3.391	0.222	15.304	0.000
Subjective Age	0.082	0.067	1.227	0.220
High Sense of Community				
Intercept	3.537	0.227	15.580	0.000
Subjective Age	-0.031	0.090	-0.347	0.729

Figure 5.5. Interaction plot representing the simple effect of subjective age on team proficiency at low, average, and high values of sense of community

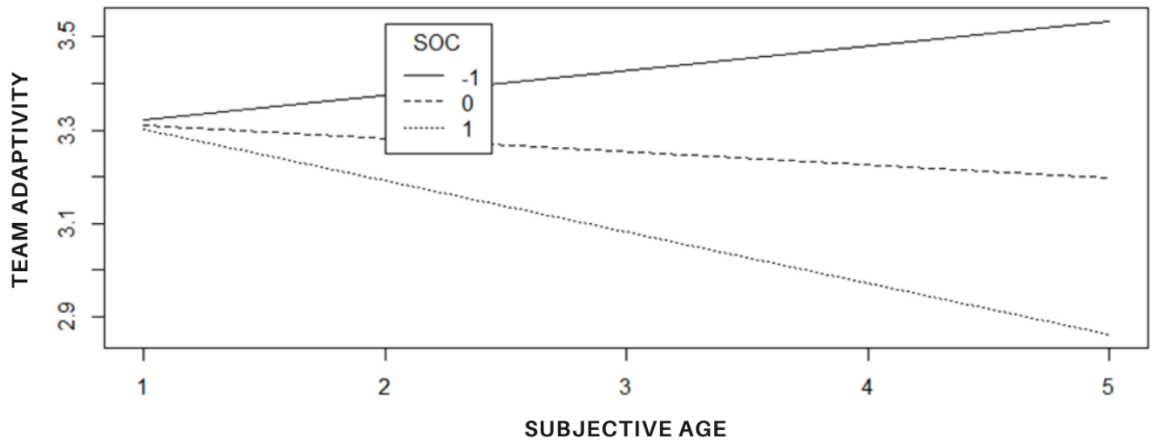


In contrast to team proficiency, the effect of subjective age (increasing youthfulness) on team adaptivity is negative albeit not significant, B = -0.023, z = -0.55, p = 0.581. This effect intensifies when sense of community is high, B = -0.11, z = -1.59, p = 0.113, such that those who feel older perform better when perceiving a higher sense of community. When sense of community is low, this effect turns positive, B = 0.053, z = 0.77, p = 0.44, such that those who feel younger has a stronger effect on adaptivity when sense of community is low.

Table 5.14. Simple slopes for conditional effects of subjective age on team adaptivity at low, average, and high levels of sense of community

	Team Adaptivity			
	B	SE	*z*	*p*
Low Sense of Community				
Intercept	3.268	0.215	15.177	0.000
Subjective Age	0.053	0.069	0.772	0.440
Average Sense of Community				
Intercept	3.339	0.212	15.786	0.000
Subjective Age	-0.028	0.051	-0.552	0.581
High Sense of Community				
Intercept	3.411	0.214	15.950	0.000
Subjective Age	-0.110	0.069	-1.586	0.113

Figure 5.6. Interaction plot representing the simple effect of subjective age on team adaptivity at low, average, and high values of sense of community



5.6 Sample A Results Summary

This chapter described how sample A data was prepared and analysed before presenting results of SEM. In these models, simple effects and interactions were tested using a combination of four constructs of age (mental health, physical health, subjective age, calendar age), nine constructs of work-role performance (proficient, adaptive, and proactive behaviours directed towards individual, team, and organisation responsibilities), and seven constructs of psychological climate which were grounded in three fundamental psychological needs: autonomy, competence, and relatedness.

Findings indicated that better physical health was associated with higher performance in all constructs except for organisation proactivity. Further, this effect was moderated by role flexibility, such that its effects were more positive at higher levels of role flexibility, and less positive at lower levels. Likewise, better mental health was associated with higher performance in all individual and organisation performance constructs, and this positive effect remained stable irrespective of psychological climate.

In contrast, a conditional effect was observed for subjective age on certain performance behaviours dependent on psychological climate. At low levels of climate, the effect of subjective age was positive and significant, indicative of a positive association between youthfulness and performance. This conditional effect was observed at low levels of supportive management for individual adaptivity and low levels of sense of community for team proficiency. Similar findings were observed for team adaptivity, although a steeper trajectory

emerged when sense of community was high, indicating that feeling younger becomes less – rather than more – important when sense of community is high.

Similar to subjective age, evidence did not support a main effect for calendar age with performance. However, there was an interaction between calendar age and work planning for both individual adaptivity and proactivity which was indicative of a synergistic interaction effect. Specifically, the age-performance trajectory steepens substantially more when work planning is low and is mitigated when work planning is high.

Except for decision-making – which did not have a significant effect in block 5 – autonomy-supportive climate characteristics (work planning and role flexibility) were positively associated with all performance behaviours. In addition to moderating the relationship between calendar age with individual adaptivity and proactivity, work planning had a positive main effect on adaptivity (team and organisation) and proficiency (organisation). Although there was no evidence to support a moderating effect, role flexibility was positively related to proficiency (individual and team), adaptivity (individual), and proactivity (team and organisation).

In addition to moderating the relationship between subjective age and individual adaptivity, supportive management had a positive main effect on organisational performance behaviours as well as individual proactivity. The only significant effect for appreciation was with team proactivity. Sense of

community had a moderating effect on team proficiency and adaptivity, and also had a positive main effect on individual and organisation proficiency. Social support was not significantly related to any of the performance constructs.

Figure 5.7. Block 5 model for individual-task performance (without interaction and conditional effects)

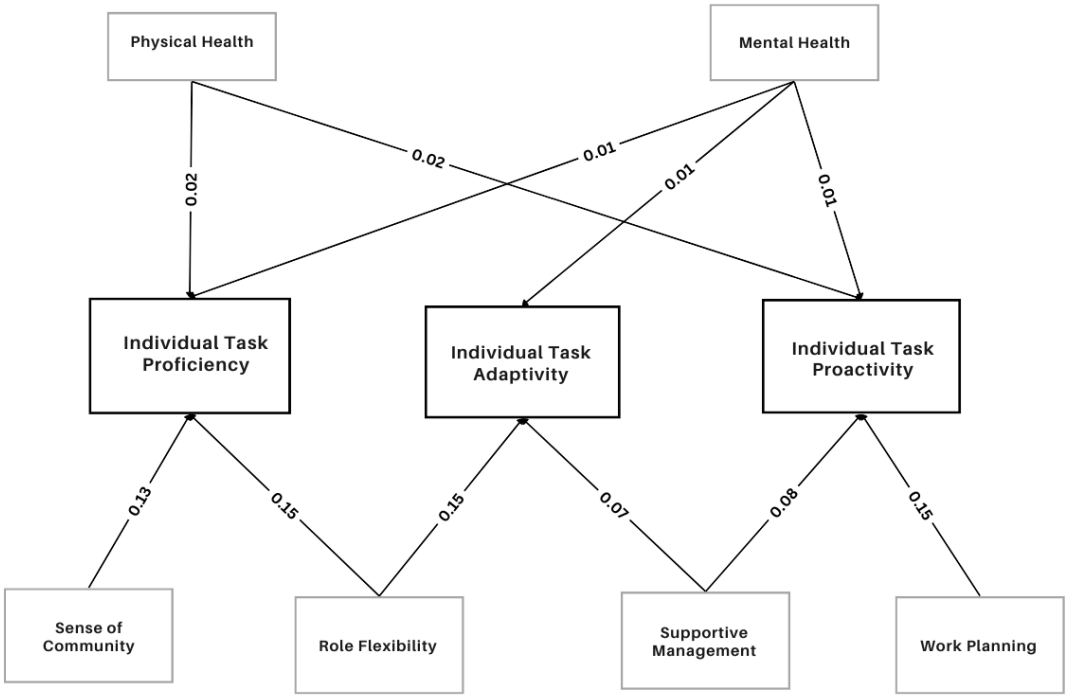


Figure 5.8. Block 5 interaction and conditional effects for individual adaptivity

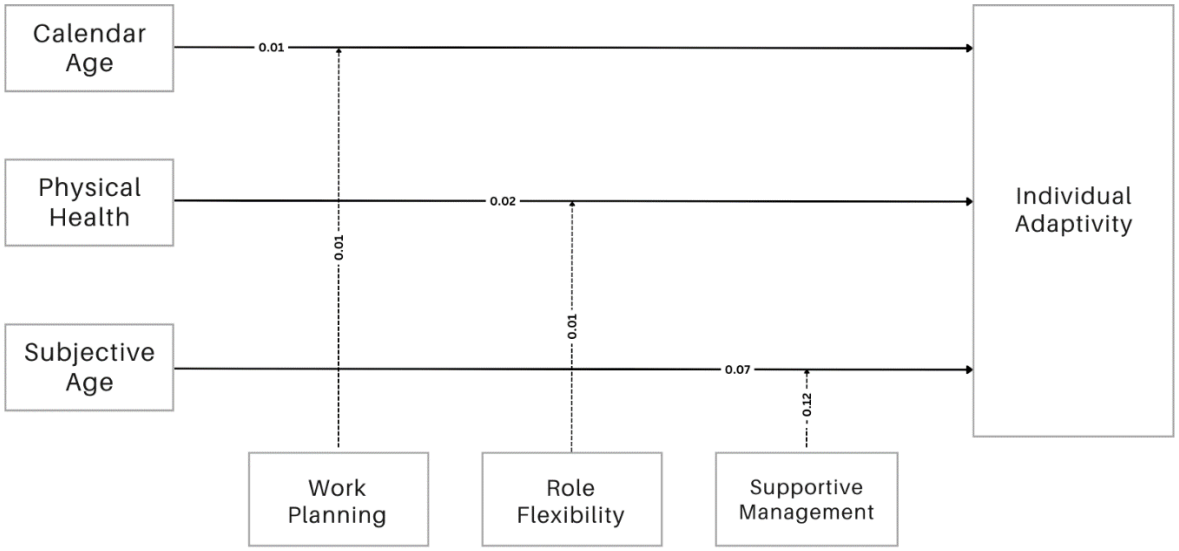


Figure 5.9. Block 5 interaction and conditional effects for individual proactivity

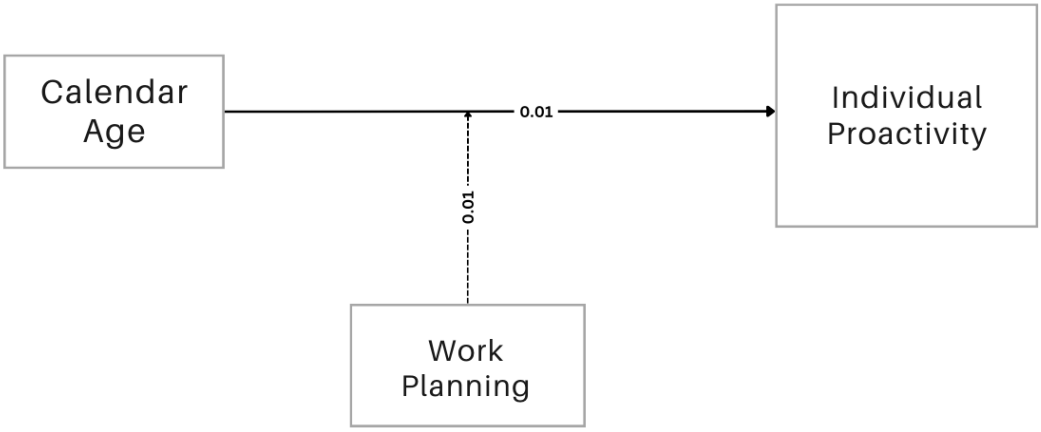


Figure 5.10. Block 5 model for team-member performance (without interaction and conditional effects)

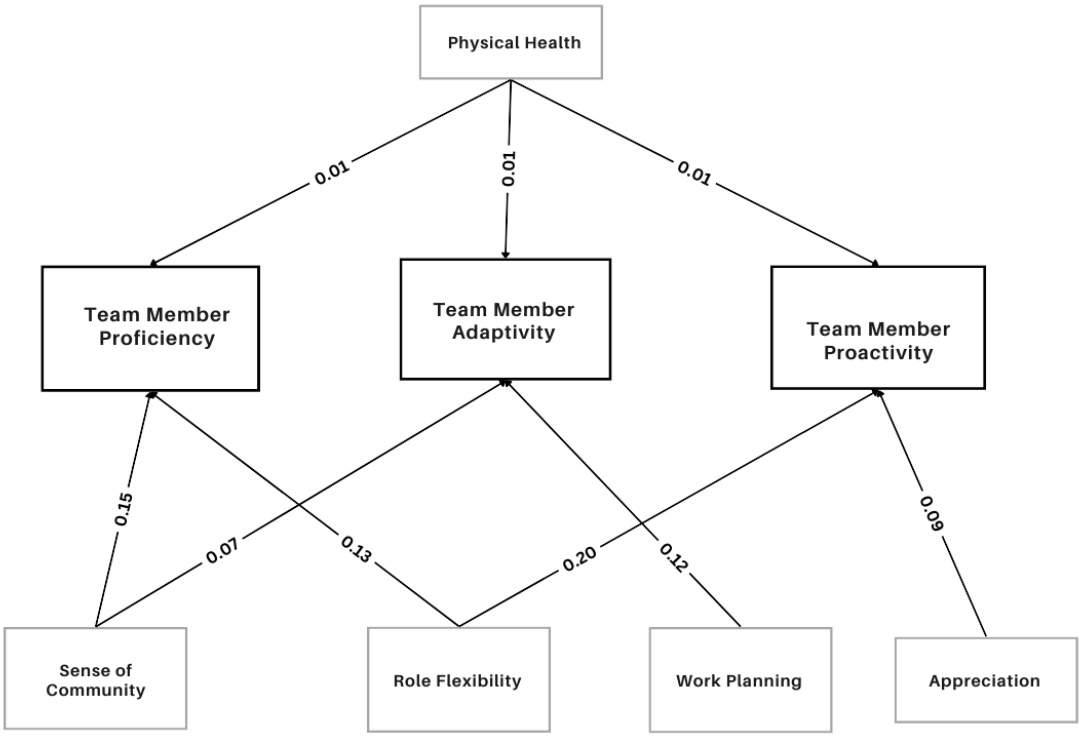


Figure 5.11. Block 5 interaction and conditional effects for team proficiency and adaptivity

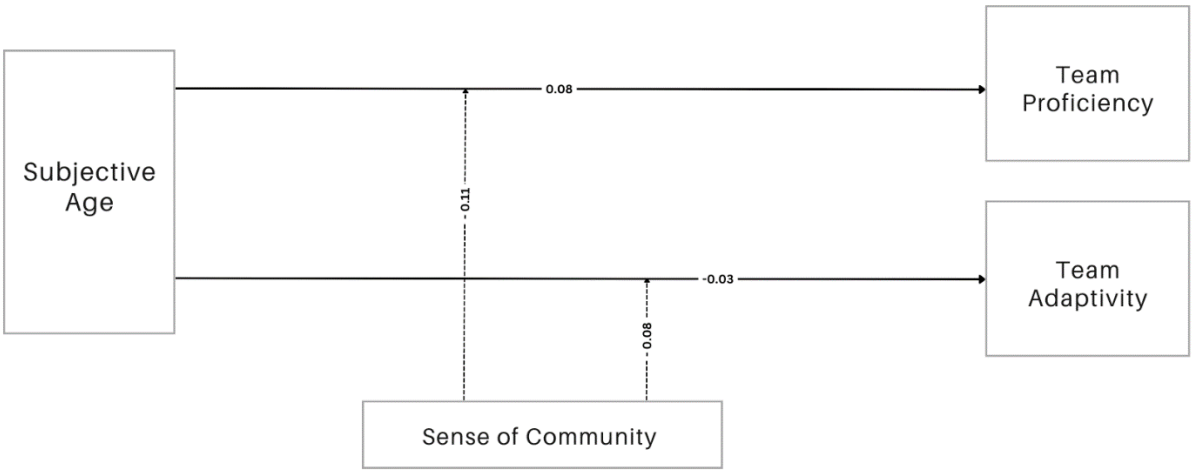
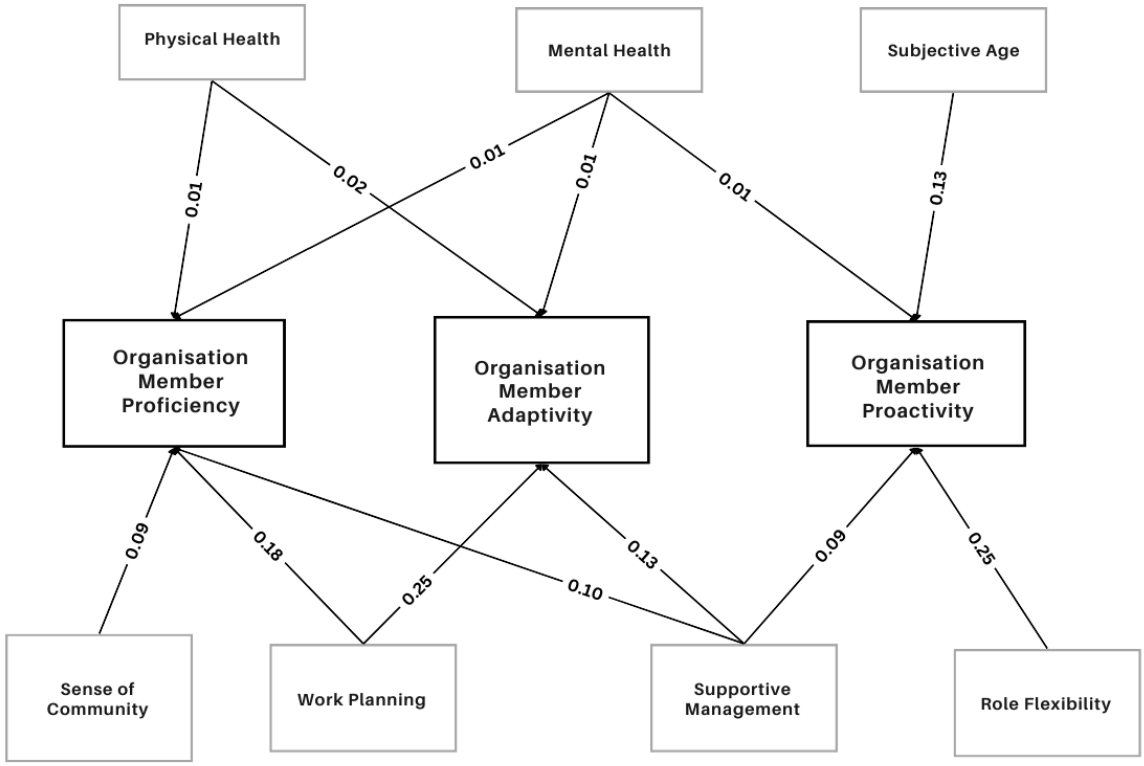


Figure 5.12. Block 5 model for organisation-member performance



Chapter 6: Results: Sample B

This chapter will outline the framework for, and results obtained from analysing sample B data. Firstly, descriptive statistics pertaining to the sample demographic are summarised. Next, the framework for dyadic data analysis is outlined, including data preparation, testing for nonindependence, normality tests, and differentiating within-dyads and between-dyads variables. One-way repeated measures ANOVA tests are used to test differences between employee and supervisor ratings of performance whilst accounting for the interdependent nature of the data. Finally, main and interaction effects are tested by estimating hierarchical linear regression models for each of the nine performance constructs. The purpose of sample B data is to understand differences between self and supervisor ratings of performance based on employee age. As such, psychological climate variables are not included in the analysis of sample B data.

6.1 Descriptive Statistics

The descriptive statistics presented in this section refer only to employees. The average mean age for employees in sample B (n = 56) was 34.96 years, ranging from 18 to 59 years of age. On average, most employees felt similar to their calendar age (m of subjective age = 2.88). Participants were mostly male (64.29%), with the remaining participants identifying as female. There was a similar number of single (41.07%) and partnered (46.43%) participants. Around half of the sample held a higher-education qualification (46.43%), while

fewer participants had qualifications in secondary (28.57%) or further (25%) education.

Organisational tenure (*m* = 5.42 years) and job tenure (*m* = 5.32 years) were similar, though organisational tenure had a higher range (0 – 30 years) than job tenure (0 – 23 years). The majority of participants were employed on a full-time contract (67.86%) compared to part-time (21.43%) or zero hour (8.93%) contracts. Most participants occupied operational job roles (57.14%), with fewer occupying support (30.36%) and managerial (12.5%) roles. The smaller percentage of those occupying managerial roles was expected due to the nature of the sample. The mean number of employees managed was 1.43 and ranged between 0 – 20.

Around 39% of participants said that they worked shifts, and just over a third had transitioned from office-based work to remote working (33.93%) since the Covid-19 pandemic. The mean score for Covid-19 impact was 2.24, suggesting that, on average, participants had experienced approximately two significant changes due to the pandemic.

Table 6.1. Descriptive Statistics for Sample B

Descriptive Statistics of Demographic Variables for Sample B

Measures	*M*	*SD*	Range	Frequency (%)
Age				
Calendar Age	34.96	11.68	18 - 59	-
Job Tenure	5.32	5.48	0 - 23	-
Organisational Tenure	5.42	6.01	0 - 30	-
Subjective Age Identity	2.88	0.43	2 - 4	-
Physical Health	53.02	7.87	26.91 - 63.69	-
Mental Health	50.30	9.59	21.90 - 61.63	-
Gender				
Male	-	-	-	36 (64.29)
Female	-	-	-	20 (35.71)
Other				
Education				
Secondary	-	-	-	16 (28.57)
Further	-	-	-	14 (25)
Higher	-	-	-	26 (46.43)
Civil Status				
Single	-	-	-	23 (41.07|)
Married or Domestic Partnership	-	-	-	26 (46.43)
Divorced	-	-	-	7 (12.5)
Job Role				
Number of Employees Managed	1.43	3.80	0 - 20	-
Covid Impact	2.24	1.19	0 - 6	-
Shift Worker	-	-	-	22 (39.29)
Transitioned from Office to Remote Work since Co	-	-	-	19 (33.93)
Role Responsibility				
Managerial	-	-	-	7 (12.5)
Operational	-	-	-	32 (57.14)
Support	-	-	-	17 (30.36)
Contract				
FT	-	-	-	39 (67.86)
PT	-	-	-	12 (21.43)
Zero Hours	-	-	-	5 (8.93)

6.2 Framework for Dyadic Data Analysis

This section precedes the results section and outlines the framework for dyadic data analysis. Data preparation techniques that precede dyadic data analysis are described and the concept of nonindependence is discussed and tested to establish the dyadic data structure and corresponding method of analysis. An explanation for the use of repeated-measures ANOVA is presented next, before outlining the procedure for hierarchical linear modelling.

Whereas sample A provided an understanding of relationships between age, psychological climate, and performance, the purpose of sample B was to determine whether the effect of age on performance differs between self and supervisor ratings of performance in 56 distinguishable supervisor-employee dyads.

6.2.1 Data Preparation

The primary aim for sample B was to understand the role of age in the differences between employee and supervisor ratings of performance. Thus, age, performance, and control variables (gender and organisation tenure) were used in sample B analyses. Although the coding of data was identical to that of sample A so to interpret results more easily (e.g., a higher score is associated with better physical health for both samples), the preparation for sample B data was simplified and guided by the test for dyadic nonindependence (chapter 6.2.2).

Sample B employed a standard dyadic design that included the role type (i.e., employee or supervisor) as the within-dyad dichotomous variable. This was done to distinguish – both conceptually and empirically – between the 1) roles and 2) performance ratings of supervisors and employees. Although supervisors were part of multiple dyads (i.e. managed more than one employee), the one-for-many approach was unsuitable given that supervisors were only part of a small number of dyads. The structure of each dyad remained identical to allow self and supervisor ratings of performance to be distinguished within each dyad. For this reason, no empirical tests were required for the purposes of distinguishability (Kenny, Kashy & Cook, 2006). As is recommended by pioneers in dyadic analysis, the distinguishing variable (i.e., role type) was effect coded as 0.5 (employees) and -0.5 (supervisors) to represent the within-dyad difference on each performance construct.

Beyond preliminary coding, mean-centering was the only transformation made to age variables so that main effects and interaction effects could be interpreted as average effects, rather than simple effects. This is because attitudes vary in determining what constitutes an ‘older’ person depending on role requirements and industry expectations, and so retaining the continuous nature of chronological age is often most appropriate (Infurna, Gersthorf & Lachman, 2015; Zacher & Rudolph; 2023). Age was left as a continuous predictor and mean-centred so that it could be interpreted meaningfully along with role. Because age constructs represented employee age, they were categorised as a between-dyads variable in that scores were identical within dyads but differed from dyad to dyad. Thus, the combination of effect coding

and mean-centering provided for simpler interpretation of coefficients when conducting the hierarchical linear regression models because it allowed the grand mean for performance to be estimated across both role and age.

6.2.2 Testing for Nonindependence

Nonindependence in a variable refers to the degree of similarity between the two members of the dyad on an outcome variable (Kashy & Kenny, 2014; Kashy & Donnellan, 2018). Statistical methods for dyadic data are often dictated by the existence of nonindependence in outcome variables, the degree of which needs to be assessed for in employee-supervisor dyads. In other words, because outcomes were measured for each individual, the statistical approach must model the nonindependence between dyad members' scores (Kashy & Kenny, 2014; Kashy & Donnellan, 2018).

To measure nonindependence for ordered performance ratings where member scores can be distinguished, all 27 performance item scores for both members of the dyad were correlated using Pearson bivariate correlations (Kenny, Kashy & Cook, 2006). Interaction effects were tested between member role and five constructs of age (calendar age, subjective age identity, organisational tenure, physical health, and mental health), so these variables were also controlled for while testing for nonindependence using the ppcor package (Seongho, 2023) in R Studio. Because there is no specific function to calculate confidence intervals within the ppcor package, a new function was written in using code that computes confidence intervals for each partial correlation coefficient.

Although measured in the same way as a Pearson product-moment correlation coefficient, there are few guidelines as to what constitutes a strong or weak degree of nonindependence (Kenny, Kashy & Cook, 2006; Kashy & Kenny, 2014). For the purposes of this thesis, correlation coefficients that are considered moderately strong or above (i.e., ≥ 0.60; Dancey & Reidy, 2007) are viewed as nonindependent. Table 6.2 shows that all partial correlation coefficients met this threshold (r = 0.67 – 0.80). The dyad was considered to be suitable as the unit of analysis such that between-dyad and within-dyad variation could be modelled into the analyses. Compound symmetry was unsuitable because that would assume equal variances across dyad members, so statistical methods indicated heterogeneous compound symmetry to allow variances to differ across dyad members.

With this in mind, the data was organised using the dyad-structure, whereby each row represented one dyad, and each column represented a member rating of performance. This data structure supported the straightforward computation of repeated measures statistical tests.

Table 6.2. Pearson bivariate correlation coefficients for nonindependence testing

Pearsons Bivariate Partial Correlation Coefficients between supervisor and employee performance ratings for nonindependency testing

	r	**95% CI**
Individual-Task Proficiency	0.71	[0.65, 0.76]
Individual-Task Adaptivity	0.76	[0.71, 0.81]
Individual-Task Proactivity	0.74	[0.68, 0.79]
Team-Member Proficiency	0.67	[0.60, 0.73]
Team-Member Adaptivity	0.72	[0.66, 0.77]
Team-Member Proactivity	0.80	[0.76, 0.84]
Organisation-Member Proficiency	0.77	[0.72, 0.81]
Organisation-Member Adaptivity	0.67	[0.60, 0.73]
Organisation-Member Proactivity	0.77	[0.72, 0.81]

Note. $N = 112$;
All coefficients are significant at $p \leq .001$.
All correlation coefficients are controlled for with calendar age, subjective age, organisational tenure, physical health, and mental health.

6.3 Dyadic Analysis Procedure and Results

This section firstly presents the results obtained from a series of repeated measures one-way ANOVAs, the purpose of which was to test for differences in performance ratings between employees and supervisors. Subsequently, the results of hierarchical linear modelling are reported to test whether the effect of age on performance differs between supervisors and employees. For clarity, this section refers to employee ratings of their own performance as self-ratings; supervisor ratings of employee performance are termed supervisor

ratings, and age solely refers to the calendar age of employees. Role is treated as a within-dyads variable, and calendar age is treated as a between-dyads variable.

6.3.1 Step one: the effect of role on performance

For the first objective – understanding whether performance ratings differ between supervisors and employees – a one-way repeated-measures ANOVA was used. Unlike traditional designs, analysing dyadic data requires the dyad – rather than the person – to be measured twice, thus treating the dyad member as the repeated factor (Kashy & Kenny, 2014). Three sources of variation arise during this process: 1) the effect of each dyad on performance, 2) the effect of the within-dyads variable (i.e., member role), and 3) the interaction between the member role and the dyad, which assesses the degree to which the effect of the member role varies from dyad to dyad (Kashy & Kenny, 2014; Kashy & Donnellan, 2018). A paired *t*-test could also be used and should yield a similar result and *p* value.

The standard effect size must be adjusted as a function of the intraclass correlation in order to ascertain the size of the difference between employee and supervisor ratings for each performance construct (Kenny, Kashy & Cook, 2006). To do this, adjusted Cohen's *d* was calculated following instructions from Kenny, Kashy and Cook (2006, p. 64) so to control for the effect of between-dyads and within-dyads variables.

6.3.1.1 H12: Supervisor ratings of performance are lower than self-ratings of performance

Table 6.3 shows that employee self-ratings of performance for all nine constructs were higher than supervisor ratings. To test whether the two means across all nine constructs are statistically significant, a series of repeated-measures one-way ANOVA's were conducted which treated dyad members (i.e., supervisor and employee) as the repeated factor.

Table 6.3. Means, standard deviations, and Cronbach's alpha for employee and supervisor performance

Means, standard deviations, and alpha reliability for employee and supervisor performance

	Employee			Supervisor		
Variable	***M***	***SD***	***α***	***M***	***SD***	***α***
Individual-Task Proficiency	3.96	0.67	0.84	3.89	0.96	0.95
Individual-Task Adaptivity	3.75	0.73	0.85	3.58	1.02	0.94
Individual-Task Proactivity	3.36	0.68	0.82	3.09	0.99	0.94
Team-Member Proficiency	4.10	0.67	0.79	4.03	0.94	0.94
Team-Member Adaptivity	3.80	0.61	0.71	3.59	0.92	0.90
Team-Member Proactivity	3.33	0.79	0.85	3.20	1.00	0.94
Organisation-Member Proficiency	3.99	0.70	0.92	3.81	0.78	0.90
Organisation-Member Adaptivity	3.79	0.71	0.89	3.57	0.96	0.91
Organisation-Member Proactivity	3.32	0.82	0.87	3.11	1.00	0.92

Note. $N = 112$

At the individual level, there was a significant difference between self-ratings and supervisor ratings for proactivity, F (1, 55) = 9.17, $p \leq 0.01$, but not for proficiency, F (1, 55) = 0.73, p = 0.40, or for adaptivity, F (1, 55) = 3.50, p = 0.07. Despite the significant result, the difference in proactivity between groups was small, d = 0.32, 95% CI [-0.06, 0.69]. Thus, for individual performance, hypothesis 11 was only supported for proactivity.

At the team level, there was a significant difference between self-ratings and supervisor ratings for adaptivity, F (1, 55) = 5.92, $p \leq 0.05$, but not for proficiency, F (1, 55) = 0.49, p = 0.49, or for proactivity, F (1, 55) = 2.96, p = 0.09. Despite the significant result, the difference in adaptivity between groups was small, d = 0.27, 95% CI [-0.11, 0.64]. Thus, for team performance, hypothesis 11 was only supported for adaptivity.

At the organisation level, there was a significant difference between self-ratings and supervisor ratings for proficiency, F (1, 55) = 6.91, $p \leq 0.05$, adaptivity, F (1, 55) = 5.62, $p \leq 0.05$, and proactivity, F (1, 55) = 5.98, $p \leq 0.05$. Despite the significant results, the difference between groups was small for proficiency, d = 0.24, 95% CI [-0.13, 0.62], adaptivity, d = 0.27, 95% CI [-0.11, 0.64], and proactivity, d = 0.23, 95% CI [-0.15, 0.60]. Thus, for organisation performance, hypothesis 11 was supported for proficiency, adaptivity, and proactivity.

Table 6.4. One-way repeated measures ANOVA and Cohen d results

Repeated measures one-way ANOVA and Cohen d results

Variable	*DFn*	*DFd*	*F*	*p*	*d*	95% CI
Individual-Task Proficiency	1	55	0.73	0.397	0.09	[-0.28, 0.47]
Individual-Task Adaptivity	1	55	3.50	0.067	0.19	[-0.19, 0.56]
Individual-Task Proactivity	1	55	9.17	0.004	0.32	[-0.06, 0.69]
Team-Member Proficiency	1	55	0.49	0.489	0.08	[-0.29, 0.45]
Team-Member Adaptivity	1	55	5.92	0.018	0.27	[-0.11, 0.64]
Team-Member Proactivity	1	55	2.96	0.091	0.15	[-0.22, 0.53]
Organisation-Member Proficiency	1	55	6.91	0.011	0.24	[-0.13, 0.62]
Organisation-Member Adaptivity	1	55	5.62	0.021	0.27	[-0.11, 0.64]
Organisation-Member Proactivity	1	55	5.98	0.018	0.23	[-0.15, 0.60]

Note. $N = 112$

6.3.2 Step two: hierarchical linear modelling and interaction effects

To test the extent to which employees rate performance higher than supervisors at different ages, a series of hierarchical linear models were estimated using the generalised least squares estimator because the effect was the same across all dyads (i.e., the effect of role type on performance). The gls() and intervals() functions in the nlme package (Pinheiro & Bates, 2022) were used for estimation and to calculate 95% confidence intervals for each model. In gls(), each model is specified such that it requests the variance of intercepts across dyads, which is the equivalent of the random intercept in traditional multilevel modelling and models the nonindependence of scores for the two dyad members.

Age variables were unsuitable for recoding into dummy or categorical variables and so a mixed-model ANOVA was inappropriate. Instead, age was treated as a between-dyads variable and mean-centred prior to parameter estimation. Gender and organisational tenure were included as control variables. Because role-member was also effects-coded, the main effects and interaction effects specified in the model could be interpreted as reasonable estimates, which would not be the case if effects coding and mean centering were not used conjointly (ARC, 2021). Additionally, if one variable is between-dyads and one variable is within-dyads, then their interaction is deemed to be within-dyads (Kenny, Kashy & Cook, 2006).

As such, this model would be analogous to the actor-partner interdependence model if for the inclusion of supervisor age. In this instance, however, we are only interested in investigating the effect of employee age on both employee ratings and supervisor ratings of performance, as well as the interaction between role type and age. This interaction is atypical to actor-partner interactions because it only tests whether the relationship between an employee's age and their performance ratings differs between employees and supervisors. Thus, the interaction effect refers to the difference between slopes (i.e., the difference in trajectories between employees and supervisors), while the role coefficient refers to the difference in intercepts.

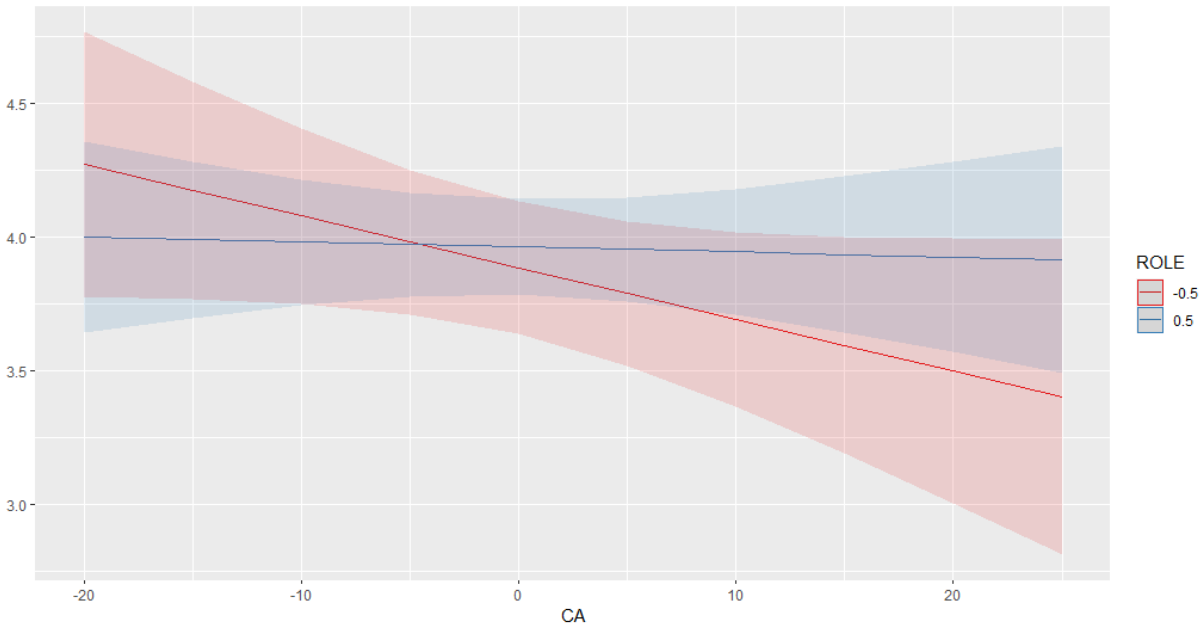
6.3.2.1 H13: There exists an interaction effect between age and role-member, such that supervisors rate performance more negatively than employees.

Hypothesis 13 builds on hypothesis 12 by testing for age-differential effects of role (i.e., supervisor and employee) on performance behaviours. This section presents the results of hierarchical modelling, treating each of the nine performance constructs as separate dependent variables. Unlike sample A, which comprised a series of complex structural models, the significance threshold for sample B was set at $p < 0.05$ owing to reduced complexity. Graphs and simple slopes are presented only for significant interaction effects, where the slope for self-ratings is labelled 0.5 and supervisor ratings -0.5. Full results can be viewed in table 6.5, 6.6, and 6.7.

For individual proficiency, there was no evidence of a significant main effect for age or role, indicating that there were no significant differences between

self-ratings and supervisor ratings for proficiency, nor a significant change in proficiency due to age (see figure 6.1). There was, however, a significant interaction between age and role, *b* = 0.02, 95% CI [0.00, 0.03], which is indicative of a crossover interaction such that its effect is dependent on whether employees or supervisors are rating performance. Specifically, the effect of age on proficiency is more negative for supervisor ratings, *b* = -0.02, 95% CI [-0.04, 0.00], and weakens both in effect and significance for self-ratings, *b* = 0.00, 95% CI [-0.02, 0.01].

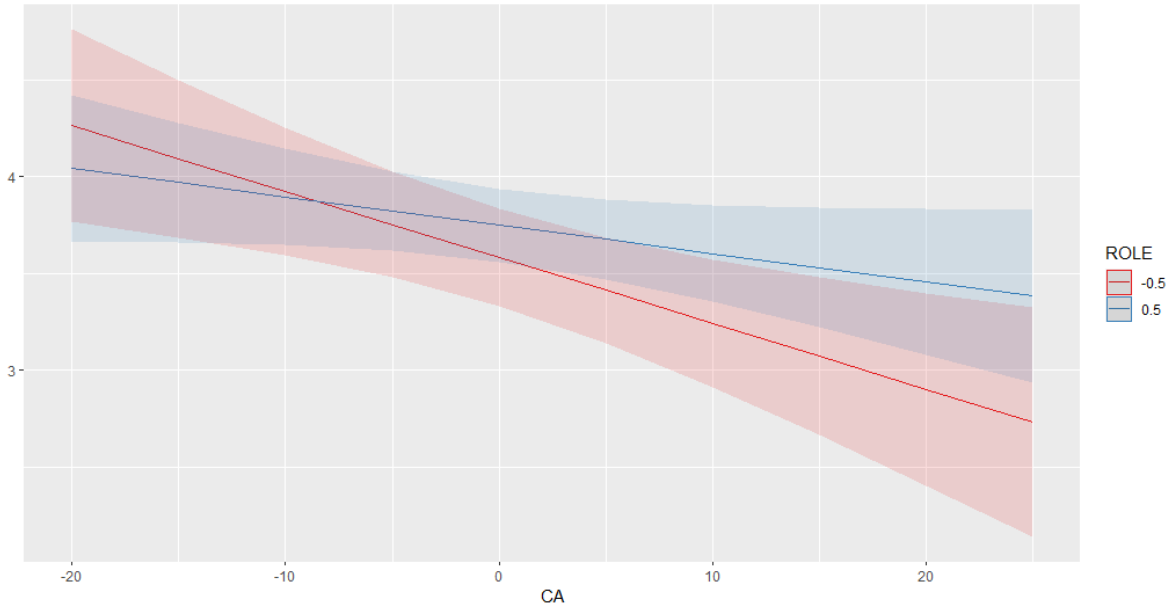
Figure 6.1. Interaction effect of age and role-member on individual proficiency



For individual adaptivity, age was negatively related, *b* = -0.02, 95% CI [-0.04, -0.01], and role was positively related, *b* = 0.17, 95% CI [0.00, 0.33], such that self-ratings of adaptivity were higher than supervisor ratings and that, on average, overall ratings of adaptivity declined with increasing age (see figure

6.2). Further, there was a significant interaction between age and role, *b* = 0.02, 95% CI [0.00, 0.33], indicating that the effect of age on adaptivity differed among supervisors and employees. Specifically, the effect of age on adaptivity is more negative for supervisor ratings, *b* = -0.03, 95% CI [-0.06, -0.01], and less negative for self-ratings, *b* = -0.01, 95% CI [-0.03, 0.00].

Figure 6.2. Interaction effect of age and role-member on individual adaptivity



For individual proactivity, there was a positive main effect for role, *b* = 0.27, 95% CI [0.10, 0.44], but no evidence of a main effect for age, thus signifying that self-ratings of proactivity were higher than supervisor ratings, but that age did not have a significant effect on the overall trajectory of proactivity. In addition to this, there was no evidence of an interaction between role and age, indicating that age-proactivity trajectories at the individual level do not significantly differ between groups.

Table 6.5. Hierarchical linear regression and interaction effects between age and role-member on individual-task performance

Hierchical linear regression models for individual performance constructs

	Individual Task Proficiency			
Effect	B	95% CI	*t*	*p*
Calendar Age	-0.01	[-0.03, 0.01]	-1.21	0.229
(E*E)	0.00	[-0.02, 0.01]	-0.23	0.816
(E*S)	-0.02	[-0.04, 0.00]	-1.77	0.080
Role	0.08	[-0.10, 0.25]	0.89	0.380
CA*Role	0.02*	[0.00, 0.03]	2.32	< 0.05
	Individual Task Adaptivity			
Effect	B	95% CI	*t*	*p*
Calendar Age	-0.02**	[-0.04, -0.01]	-2.70	< 0.01
(E*E)	-0.01	[-0.03, 0.00]	-1.77	0.080
(E*S)	-0.03**	[-0.06, -0.01]	-3.10	< 0.01
Role	0.17*	[0.00, 0.33]	1.97	0.051
CA*Role	0.02**	[0.00, 0.03]	2.65	< 0.01
	Individual Task Proactivity			
Effect	B	95% CI	*t*	*p*
Calendar Age	-0.01	[-0.03, 0.01]	-1.39	0.169
(E*E)	-0.01	[-0.02, 0.01]	-0.73	0.466
(E*S)	-0.02	[-0.04, 0.00]	-1.70	0.093
Role	0.27**	[0.10, 0.44]	3.09	< 0.01
CA*Role	0.01	[0.00, 0.03]	1.76	0.082

Note.
Df for all models: 112 total; 108 residual;
E*E denotes the effect of employee age on employee-rated performance;
E*S denotes the effect of employee age on supervisor-rated performance;
* $p \leq .05$,
** $p \leq .01$,
*** $p \leq .001$

For team proficiency, there was no evidence of a significant main effect for age or role, suggesting that there were no significant differences between self-ratings and supervisor ratings, nor a significant change in proficiency due to age. Similarly, there was no evidence of an interaction between role and age, indicating that age-proficiency trajectories at the team level do not differ significantly between groups.

For team adaptivity, age was negatively related, b = -0.02, 95% CI [-0.04, -0.01], and role was positively related, b = 0.21, 95% CI [0.04, 0.38], such that self-ratings of adaptivity were higher than supervisor ratings and that, on average, overall ratings of adaptivity declined with increasing age. There was no evidence of an interaction between role and age, indicating that the negative age-adaptivity trajectories at the team level are similar for self-ratings and supervisor ratings.

For team proactivity, there was no evidence of a significant main effect for age or role, suggesting that there were no significant differences between self-ratings and supervisor ratings, nor a significant change in proactivity due to age. Similarly, there was no evidence of an interaction between role and age, indicating that age-proactivity trajectories at the team level do not differ significantly between groups.

Table 6.6. Hierarchical linear regression and interaction effects between age and role-member on team-member performance

Hierchical linear regression models for team performance constructs

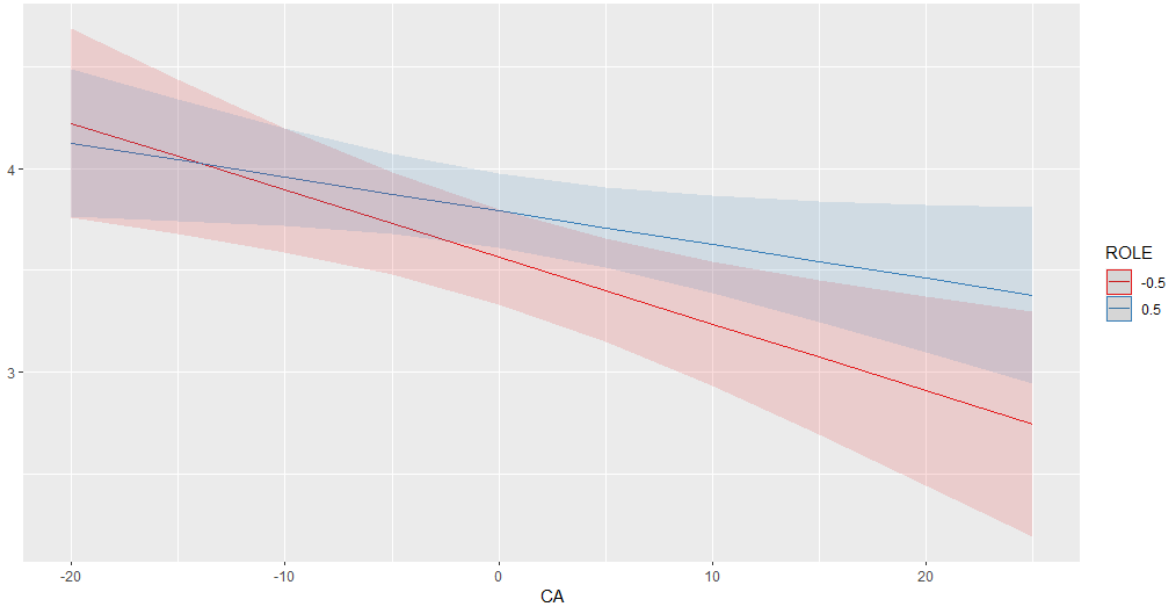
		Team Member Proficiency		
Effect	B	95% CI	*t*	*p*
Calendar Age	0.00	[-0.02, 0.01]	-0.57	0.569
(E*E)	0.00	[-0.02, 0.01]	-0.24	0.808
(E*S)	-0.01	[-0.03, 0.01]	-0.72	0.472
Role	0.07	[-0.12, 0.25]	0.69	0.489
CA*Role	0.01	[-0.01, 0.02]	0.74	0.462
		Team Member Adaptivity		
Effect	B	95% CI	*t*	*p*
Calendar Age	-0.02**	[-0.04, -0.01]	-2.82	< 0.01
(E*E)	-0.02**	[-0.03, 0.00]	-2.67	< 0.01
(E*S)	-0.03*	[-0.05, -0.01]	-2.55	< 0.05
Role	0.21*	[0.04, 0.38]	2.44	< 0.05
CA*Role	0.01	[-0.01, 0.02]	1.10	0.275
		Team Member Proactivity		
Effect	B	95% CI	*t*	*p*
Calendar Age	-0.01	[-0.03, 0.01]	-0.74	0.463
(E*E)	-0.01	[-0.03, 0.01]	-1.11	0.270
(E*S)	0.00	[-0.03, 0.02]	-0.38	0.703
Role	0.14	[-0.02, 0.30]	1.72	0.089
CA*Role	0.01	[-0.02, 0.01]	-0.81	0.418

Note.
Df for all models: 112 total; 108 residual;
E*E denotes the effect of employee age on employee-rated performance;
E*S denotes the effect of employee age on supervisor-rated performance;
* $p \leq .05$,
** $p \leq .01$,
*** $p \leq .001$

For organisation proficiency, age was negatively related, *b* = -0.02, 95% CI [-0.03, -0.00], and role was positively related, *b* = 0.18, 95% CI [0.05, 0.31], such that self-ratings of proficiency were higher than supervisor ratings and that, on average, overall ratings of proficiency declined with increasing age. There was no evidence of an interaction between role and age, indicating that the negative age-proficiency trajectories at the organisation level are similar for self-ratings and supervisor ratings.

For organisation adaptivity, age was negatively related, *b* = -0.02, 95% CI [-0.04, -0.01], and role was positively related, *b* = 0.23, 95% CI [0.04, 0.41], such that self-ratings of adaptivity were higher than supervisor ratings and that, on average, overall ratings of adaptivity declined with increasing age. Further, there was a significant interaction between age and role, *b* = 0.02, 95% CI [0.00, 0.33], indicating that the effect of age on adaptivity differed among supervisors and employees. Specifically, the effect of age on adaptivity is more negative for supervisor ratings, *b* = -0.03, 95% CI [-0.05, -0.01], and less negative for self-ratings, *b* = -0.02, 95% CI [-0.03, 0.00].

Figure 6.3. Interaction effect of age and role-member on organisation-member adaptivity



For organisation proactivity, there was a positive main effect for role, *b* = 0.21, 95% CI [0.04, 0.37], but no evidence of a main effect for age, thus signifying that self-ratings of proactivity were higher than supervisor ratings, but that age did not have a significant effect on the overall trajectory of proactivity. However, there was a significant interaction between age and role, *b* = 0.02, 95% CI [0.00, 0.03], indicating that the effect of age on proactivity differed among supervisors and employees. Specifically, the effect of age on proactivity is more negative for supervisor ratings, *b* = -0.02, 95% CI [-0.04, 0.00], and less negative for self-ratings, *b* = 0.00, 95% CI [-0.02, 0.02].

Figure 6.4. Interaction effect of age and role-member on organisation-member proactivity

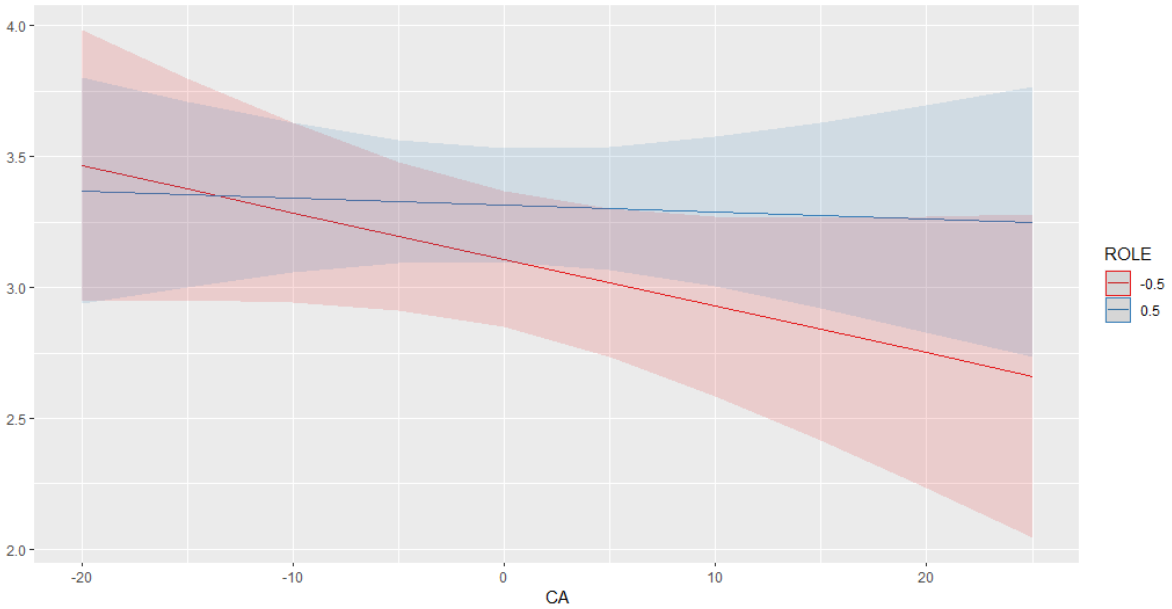


Table 6.7. Hierarchical linear regression and interaction effects between age and role-member on organisation-member performance

Hierchical linear regression models for organisation performance constructs

	Organisation Member Proficiency			
Effect	B	95% CI	*t*	*p*
Calendar Age	-0.02*	[-0.03, 0.00]	-2.53	< 0.05
(E*E)	-0.02	[-0.03, 0.00]	-1.92	0.058
(E*S)	-0.02**	[-0.04, -0.01]	-2.79	< 0.01
Role	0.18**	[0.05, 0.31]	2.66	< 0.01
CA*Role	0.01	[0.00, 0.02]	1.49	0.138

	Organisation Member Adaptivity			
Effect	B	95% CI	*t*	*p*
Calendar Age	-0.02**	[-0.04, -0.01]	-3.00	< 0.01
(E*E)	-0.02*	[-0.03, 0.00]	-2.08	< 0.05
(E*S)	-0.03**	[-0.05, -0.01]	-3.22	< 0.01
Role	0.23*	[0.04, 0.41]	2.44	< 0.05
CA*Role	0.02*	[0.00, 0.03]	2.02	< 0.05

	Organisation Member Proactivity			
Effect	B	95% CI	*t*	*p*
Calendar Age	-0.01	[-0.03, 0.01]	-1.03	0.303
(E*E)	0.00	[-0.02, 0.02]	-0.30	0.780
(E*S)	-0.02	[-0.04, 0.00]	-1.60	0.122
Role	0.21*	[0.04, 0.37]	2.52	< 0.05
CA*Role	0.02*	[0.00, 0.03]	2.12	< 0.05

Note.
Df for all models: 112 total; 108 residual;
E*E denotes the effect of employee age on employee-rated performance;
E*S denotes the effect of employee age on supervisor-rated performance;
* $p \leq .05$,
** $p \leq .01$,
*** $p \leq .001$

6.4 Sample B Results Summary

This chapter used dyadic data analysis to investigate differences between self-ratings and supervisor ratings of employee performance, and to understand the degree to which employee age affected these ratings. To do this, a series of one-way repeated measures ANOVA tests were conducted to test for significant differences between employee and supervisor ratings of performance. This uncovered differences in ratings for organisation-level performance, but not for individual or team performance. To test for the role of age, a series of hierarchical linear models were used to test interaction effects between role-member (i.e., supervisor and employee) and age.

Findings showed that age was more negatively related to supervisor ratings than self-ratings for proficiency (individual), adaptivity (individual and organisation), and proactivity (organisation). Age had a reinforcing effect on differences between supervisor and self-ratings of organisation-member performance. However, there were no significant differences in ratings for individual proficiency, and only a very small, albeit not significant difference for individual adaptivity. When introducing an interaction effect between age and role-member whilst modelling nonindependence between and within dyads, plots revealed that increasing age was associated with a steep decline in performance for supervisor ratings. Upon probing each interaction, the effect of calendar age on performance for supervisor ratings were substantially more negative than self-ratings, which were either weak or of no effect.

Chapter 7: Discussion

The aim of this thesis was to examine the role of psychological climate in relationships between age and performance. This chapter will begin by restating the rationale in support of this aim and outlining the objectives used to address the gaps in research. Next, a concise summary of the key findings will be presented, before interpreting each of these findings in light of existing literature. This chapter will be followed by the conclusion, which describes the theoretical and practical implications of these findings whilst suggesting directions for future research based on both implications and limitations.

7.1 Research Overview and Objectives

Three conclusions were formed as a result of a review and synthesis of the literature on dimensions of age, work performance, and psychological climate. Firstly, the decline in labour participation rates and steady increase in workforce age has given rise to noteworthy implications associated with financial stability, pension sustainability, and healthcare provision (WHO, 2022; BLS, 2022). The primary affected stakeholders – older workers – are now being urged to delay retirement and fill workforce gaps in a bid to help tackle these challenges (Eurofound, 2021). In support of this, there has been a widespread revision of legislation and policy (see chapter 2.1) associated with retirement and pension age and rewritten laws to protect against age-related discrimination (DWP, 2017; MOJ, 2021). In spite of this, research indicates that work-related assumptions about and treatment of this demographic are negative (e.g., Posthuma & Campion, 2009; Van Woerkom,

2020; Eurofound, 2021), which has been supported by biases against older workers, from selection bias to training inclusion (CIPD, 2022). These stereotypes and assumptions disincentivise older workers to delay retirement or reenter employment.

Second, age and performance are such broad concepts that the research pool has become somewhat fragmented and, in some cases, conflicting. In keeping with existing research, a review of the literature provided no evidence to support a relationship between calendar age with individual-task performance. However, the generational shift has resulted in heightened importance of understanding broader contextual factors in examining age-performance trajectories, which do not exist in a vacuum (Cheng, 2014; Zacher, 2015; Zacher & Rudolph, 2017). Of the more prominent contextual factors to influence the relationship, job complexity has shown potential to offset declines and, in some instances, increase performance in later-life (e.g., Sturman, 2003; Hedge & Borman, 2019; Karanika-Murray et al., 2022).

On the other hand, research would suggest that those who are or who feel older may struggle to utilise crystallised intelligence and therefore experience higher levels of job strain or perform worse in complex tasks (e.g. Hayes et al., 2015). In such situations, higher levels of autonomy and control have been found to decrease job strain (e.g. Li, Burch & Lee, 2017) and promote future-oriented performance behaviours (e.g., Zhang & Farndale, 2021; den Boer, 2021). This is just one example (see Chapter 3.3 for more examples) that demonstrates variability in the ageing process and interdependencies between

work characteristics that challenge assumptions about age-performance trajectories.

Third, there is a distinct lack of research which holistically and practically examines relationships between age and performance; that is, to understand the role of workplace factors across the chronological and subjective lifespan in serving to help or hinder performance (Schalk et al., 2010; Zacher, 2015; Goštautaitė & Bučiūnienė, 2015; Zacher & Rudolph, 2017; Chen & Gardiner, 2019). Although recent research examines the relationship more laterally, the core pool of research is occupied by unidimensional relationships between age and performance that do not capture the contextual influence of the workplace. Without recognising these factors, calendar age can more easily be used as a proxy for declines in work performance, leading to further exacerbation of ageist assumptions and feelings of discouragement among older workers. A more robust investigation into the ageing process may uncover, for example, differences in proactive behaviour due to physiological disparities between younger and older employees.

Based on these findings, the objectives of the study were four-fold:

1. To simultaneously examine the chronological, physiological, and subjective effects of ageing on individual performance

2. To investigate the direction and strength of these effects using a multidimensional framework of work-role performance that measures

proficient, adaptive, and proactive behaviours directed towards individual, team, and organisation responsibilities.

3. Determine whether psychological climate characteristics underpinned by the psychological needs of autonomy, competence, and relatedness differentially moderate relationships between age and performance constructs.

4. Explore whether the effects of age on performance differs between employees and their supervisors

7.2 Summary of Key Findings

The advantages of SEM meant that objectives 1 – 3 could be analysed seamlessly and simultaneously (sample A). The results from dyadic data analysis (sample B) informed objective 4. Table 7.1 provides a summary of the hypotheses tested throughout this thesis with a brief description of the results which informed the hypothesis support outcome.

Table 7.1. Summary of key findings

Hypothesis	Hypothesis Support	Findings
H1: Physical health is positively associated with individual performance	Full	An increase in physical health (i.e., better physical health) was associated with an increase in individual proficiency, adaptivity, and proactivity. (Chapter 5.5.2)
H2: Mental health is positively associated with proactivity	Partial	An increase in mental health (i.e., better mental health) was associated with an increase in individual and organisation proactivity, but not with team proactivity. (Chapter 5.5.2)
H3: Subjective age is positively associated with adaptivity	Rejected	In block 2 (age and performance), an increase in subjective age (i.e., increasing youth) was positively associated with individual and organisation adaptivity. However, no effects were observed when controlling for the effects of climate. (Chapter 5.5.2)
H4: Subjective age is positively associated with proactivity	Partial	In block 2 (age and performance), an increase in subjective age (i.e., increasing youth) was positively associated with proactivity at all three levels. When controlling for the effects of climate, the only positive effect was for organisation proactivity. (Chapter 5.5.2)

H5: Autonomy climate characteristics are positively associated with individual performance	Partial	Work planning was positively related to individual proactivity, and role flexibility was positively related to individual proficiency and adaptivity. Decision making was not significantly associated with individual performance. (Chapter 5.5.3)
H6: Work planning and/or role flexibility moderate the relationship between age (subjective and chronological) and individual performance	Partial	Work planning moderated the relationships between calendar age and individual adaptivity and proactivity, such that the effect of calendar age on performance was more negative when work planning was low, and less negative or positive when work planning was high. No interaction effects were observed for individual proficiency. (Chapter 5.5.3)
H7: Work planning and/or role flexibility moderate the relationship between subjective health (physical and mental health) and individual performance	Partial	Role flexibility moderated the relationship between physical health and individual adaptivity, such that the positive effects of physical health strengthened when role flexibility was high, and weakened when role flexibility was low. No interaction effects were observed for individual proficiency or proactivity. (Chapter 5.5.3)

H8: Competence climate characteristics are positively associated with individual and organisation performance	Partial	Supportive management was positively associated with individual adaptivity, individual proactivity, and organisation proficiency. Appreciation was not significantly associated with any hypothesised performance construct. (Chapter 5.5.3)
H9: Competence climate characteristics moderate the relationship between age (chronological and subjective) and individual performance, as well as organisation-member proficiency	Partial	Supportive management moderated the relationship between subjective age and individual adaptivity, such that increasing youth was associated with higher adaptivity in environments with low managerial support. This effect weakened when managerial support was high, lessening the importance of feeling young or old. (Chapter 5.5.3)
H10: Relatedness climate characteristics are positively associated with team-member performance	Partial	Team proficiency and adaptivity were both positively predicted by sense of community. Social support was not significantly associated with any performance construct. (Chapter 5.5.3)

H11: Relatedness climate characteristics moderate the relationship between age (chronological and subjective) and team-member performance	Partial	Sense of community moderated the relationships between subjective age and team proficiency and adaptivity. For team proficiency, increasing youth was associated with higher proficiency in environments with a low sense of community. This effect weakened when perceived sense of community is high, lessening the importance of feeling young or old. For team adaptivity, increasing youth was associated only with a slight increase in adaptivity when sense of community was low. This effect was reversed in high levels of sense of community, indicating that those who feel older are more adaptive when perceiving a high sense of community. (Chapter 5.5.3)
H12: Supervisor ratings of performance are lower than self-ratings of performance	Partial	Supervisor ratings were significantly lower than self-ratings for individual proactivity, team adaptivity, and all organisation-level performance constructs. (Chapter 6.3.1)
H13: Age is more negatively related to supervisor-rated performance than self-related performance	Partial	Age was more negatively related to supervisor-rated performance than self-rated performance for individual proficiency, individual and organisation adaptivity, and organisation proactivity. (Chapter 6.3.2)

Other findings not captured by hypotheses	-	Except for organisation proactivity, physical health was positively associated with all performance constructs. Mental health was positively associated with proficiency, adaptivity, and proactivity at the individual and organisation level. Jointly, work planning and role flexibility (autonomy climate characteristics) were positively associated with proficiency, adaptivity, and proactivity at all three levels. Supportive management was positively related to organisation performance. Appreciation was positively related to team proactivity. Sense of community was the only individual climate characteristic related to proficiency at all three levels.

7.3 Discussion of Key Findings

This section will interpret and describe how key findings coincide with or contrast to the existing body of literature on age and performance at work. Although the relationship between age and performance is the focus of this thesis, any notable effects of psychological climate on performance outcomes are also discussed. Because age variables were controlled for, the effects of psychological climate on performance outcomes are considered to be beneficial to employees of all ages.

7.3.1 The effect of calendar age on core adaptive and proactive behaviours turns negative when the ability to plan and schedule work is restricted

Consistent with the body of evidence (e.g., Clark, Oswald, & Warr, 1996; Ng & Feldman, 2008; Karanika-Murray et al., 2022; Gemmano, Manuti, & Giancaspro, 2022), there were no main effects observed for calendar age on proficiency, adaptivity, or proactivity when controlling for the effects of psychological climate. This finding indicated that the age of an employee has a negligible impact on their ability to perform a task, even in situations where climate characteristics are viewed unfavourably. This is likely because task proficiency mostly requires average cognitive functioning, such as short-term memory and sustained attention, and is therefore less affected by changes occurring across the lifespan (Ilmarinen, 2006; Davies et al., 2013).

The lack of a main effect for calendar age aligns with the majority of research, which has thus far found minimal evidence to support a linear relationship between age with adaptivity (e.g., O'Connell et al., 2008; Ng & Feldman, 2008; 2012; Kunze et al., 2013; Gemmano et al., 2022) and proactivity (e.g., Ng & Feldman, 2008; Bertolino, Zacher, & Kooij, 2015; Gemmano, Manuti, & Giancaspro, 2022). At first glance, this may seem paradoxical because younger employees engage in future-oriented proactive behaviours and older workers engage in present-oriented proactive behaviours (e.g., Strauss et al., 2011; Van Veldhoven & Dorenbosch, 2008). However, individual-task proactivity is more aligned with present-oriented behaviour (i.e., relating to core tasks) than future-oriented proactive behaviour (i.e., relating to growth or extra-role responsibilities). Thus, the findings for individual task-related adaptive and proactive behaviours are alike, supporting the notion that employees who are able to dynamically respond to uncertainty are also more likely to exhibit increased proactive behaviours, and vice versa (Strauss et al., 2013).

In contrast and as hypothesised (H6), work planning can help to maintain adaptive and proactive behaviours as employees age. More specifically, steeper declines in performance were observed with age when work planning was low, and high levels of work planning mitigated the potential negative effects of calendar age, helping older employees to adapt to changes in workplace processes and identify and pursue opportunities associated with core tasks. This supports the argument that older workers value autonomy and job control more than younger workers. There are two possible explanations

for this. First, older workers have greater work experience and crystallised intelligence and so do not require as much oversight and can plan work more freely (Kanfer & Ackerman, 2004; Doerwald et al., 2016; Fraccaroli, Zaniboni, & Truxillo, 2017). Second, having more control over scheduling allows for effective resource selection and optimisation strategies to compensate for age-related losses in other domains (Bal & de Lange, 2015; Dikkers et al., 2017).

It is acknowledged that task-related adaptive and proactive behaviours require a range of interpersonal and cognitive ability during times of uncertainty (Cleveland et al., 2019). Here, one school of thought views the ageing process favourably in that the accumulation of wisdom and experiential knowledge (Kramer & DePryck, 2010) and the ability to regulate emotions (Doerwald et al., 2016) can help to deal with challenging situations (Baltes, 1987). From a physiological viewpoint, however, age is negatively associated with cognitive ability which, in turn, can hinder adaptive performance capabilities (Le Pine et al., 2000; Pulakos et al., 2002). Along the same lines, older workers are more susceptible to proactive interference as a result of established beliefs and norms in long-term working memory (Rhodes, Buchsbaum, & Hasher, 2021).

In keeping with research by Parker, Bindl, and Strauss (2010), this finding suggests that the ‘can do’ motivational path, which refers to the level of control one feels over their job role, is of utmost importance to individual proactive behaviour. Specifically, being accommodative of flexible work scheduling and prioritisation may help to offset emotional exhaustion (Ng & Feldman, 2015) and incentivise working for longer by making goals more achievable (Truxillo

et al., 2012; Rudolph et al., 2018). As a result, growth motives associated with accomplishment are more readily stimulated and employees are more likely to experience positive affect, which can promote a willingness to pursue other change-related behaviours (Dreisbach & Goschke, 2004; Dreisbach, 2006; Parker & Griffin, 2011). The opposite is true for when work planning is rigid, such that employees become increasingly reluctant to pursue change-related behaviours.

This finding would indicate that increasing flexibility in workflow and task prioritisation is essential for older employees so that they have sufficient time, space, and control to effectively respond to these challenges. Indeed, research has found that being in control over aspects of work in later life is beneficial not only to health but also to adaptive and future-oriented behaviours (Zacher & Kooij, 2017). This is because during midlife and beyond, employees begin to redirect resources to balance work responsibilities with family or caring responsibilities (Baslevent & Kirmanoglu, 2012; Huffman et al., 2013); as a result, the resources dedicated to responding to new work processes and equipment declines, resulting in a midlife dip in adaptivity (Scheibe & Zacher, 2013; Karanika-Murray et al., 2022).

Hence, increased flexibility and job control for older workers helps to counterbalance resource losses associated with ability by allowing time and flexibility to deploy resources from other domains to compensate (Van den Berg et al., 2011; Weigl et al., 2013; Bal & de Lange, 2015). This may be why

existing research shows that autonomy predicts job performance more strongly for older workers (Ng & Feldman, 2015).

Thus, it is a distinct possibility that in scenarios where work planning and scheduling is rigid (i.e., low), the already-increasing likelihood of employing secondary control strategies as we age is accelerated, resulting in fewer opportunities to utilise and recall on experiences and knowledge in order to adapt to workplace changes (Zhang & Farndale, 2021; den Boer, 2021). Examining this notion through the lens of SOC theory, it could be posited that the steeper decline in adaptive and proactive behaviours occurring with age may be a consequence of resource reallocation away from future-oriented and toward present-oriented behaviours so to maximise gains and minimise further declines (Dikkers et al., 2017). In light of this, SOC strategies may become increasingly resource-intensive resulting in further losses to individual adaptive and proactive performance to compensate for the maintenance of individual proficiency (Zacher & Rudolph, 2017).

One way of mitigating such losses is by adapting the job-demands control approach to job design (Karasak, 1979), such that it allows older workers to plan and execute work more autonomously (Truxillo et al., 2012). Doing so should help to mitigate potential cognitive losses associated with the ageing process by simplifying information-processing and decision-making processes (Pachur, Mata, & Schooler, 2009; Rydzewska et al., 2018).

This finding helps to explain the opposing roles of restrictive and autonomous work planning in relationships between calendar age with task-related adaptivity and proactivity. These findings are also in support of prior research showing the enhanced value of autonomy and control in resource selection and allocation preferences for older workers who, as a result, exhibit higher levels of adaptivity (Chen et al., 2005) and extra-role behaviours (Zhang & Farndale, 2021).

7.3.2 Supervisors tend to rate older employees more negatively on performance than their younger counterparts

An investigation of employee-supervisor dyads in hypotheses 12 and 13 revealed that age was more negatively related to supervisor ratings than self-ratings for proficiency (individual), adaptivity (individual and organisation), and proactivity (organisation).

The significant interaction between age and role-member showed that the effect of age on task proficiency turned negative for supervisor ratings but not for self-ratings. Although historical literature highlighted supervisor tendencies to score lower than employees (e.g., Waldman & Avolio, 1986), more recent studies have found no significant differences between self-rated and supervisor rated performance (e.g., Ng & Feldman, 2008). Furthermore, physical and cognitive changes associated with the ageing process are less likely to be noticeable in core tasks because they can be offset, at least in part, with age-related increases in crystallised intelligence, deductive reasoning, and experiential knowledge (Feinsod & Davenport 2006; Hunter & Thatcher, 2007). Although this finding would appear to challenge prior research, it must

be interpreted only in terms of supervisor-rated performance because no differences were found for self-ratings of task proficiency.

One reason for this is the increasing prevalence of ageist stereotyping in relation to social norms and perceptions held towards older workers. In relation to task proficiency, negative assumptions are held about the training ability (Chiu et al., 2001), technological capability (SHRM, 2022), and physical capability (Fung, Lai, & Ng, 2001) of older workers, all of which contribute towards the view that older workers are less dynamic and competent than their younger counterparts (e.g., Fiske et al., 2007; Posthuma & Campion, 2009; Krings et al., 2011). Negative relationships between age and performance have been observed in contexts where ageist stereotypes are prevalent (e.g., Zacher & Bal, 2012; Truxillo et al., 2012) and, as a result, older employees have been subjected to lower performance ratings than younger employees (e.g., Finkelstein et al., 1995; Van Dalen et al., 2010; Bal et al., 2011).

This is symptomatic of the depreciation model (Yeatts et al., 2000) because it makes the blanket assumption that the value of an employee depreciates with age and with it, the opportunities provided to them. This viewpoint has been shown to damage the self-efficacy and positive affect of older workers (Eurofound, 2021). As a result, older workers experiencing this are likely to suppress effort and normalise regressive performance, particularly with regards to adaptive behaviour (e.g., Harlos & Pinder, 2000; Kooij et al., 2010; Finkelstein & Truxillo, 2013). Operating under ageist assumptions can also reduce the efficacy of support mechanisms; for instance, Apenteng et al.

(2022) found that organisational support only buffered the negative effects of work stressors (e.g., burnout, emotional exhaustion) for employees with high levels of perceived adaptivity.

Another reason for this, which also holds relevance for the interaction effects observed between age with adaptivity and proactivity, is the increasing expectation of employees to engage in adaptive and proactive behaviours as part of their core operational duties (Hutchinson, 2013; Zhang & Wood, 2022). Because employees increasingly use compensatory SOC strategies to mitigate losses and maximise gains that accompany the ageing process, supervisors may visibly see – and therefore be influenced by – a reduced effort exerted toward growth-related and future-oriented goals (Griffin, Neal, & Parker, 2007; Parker, Bindl, & Strauss, 2010). For instance, individuals approaching retirement age are less likely to set achievement-oriented goals and therefore more likely to reduce the proportion of resources allocated to stretch goals, which are commonly associated with proactivity (Super, 1984; Dikkers et al., 2017; Zacher et al., 2018; Zhang & Farndale, 2021). Further, older worker goal orientations are often associated with generativity motives, which often conflicts with criteria for traditional performance measurements, which are determined in large parts by growth and development (Parker & Griffin, 2011; Wang et al., 2015).

An observed decline in adaptive and proactive behaviours is not a definitive answer, though, and studies have shown notable discrepancies between different ratings of adaptive (e.g., Warr, 1993; Posthuma & Campion, 2009;

Kooij et al., 2011) and proactive (e.g., Bindl & Parker, 2010; McMullin & Dryburgh, 2011) behaviours, such as learning new skills, flexibly adjusting to work processes, and training motivation. These discrepancies can be untangled through understanding rater bias. Because of the overlap in terminology, there is scant evidence on the effects of age on rater differences for performance behaviours directed toward organisational responsibilities. However, as established in section 2.3.6, organisation-level performance behaviours are closely linked to extra-role behaviours and OCBs (Rotundo & Sackett, 2002). Using OCBs as an example to illustrate this point, literature indicates that disparities between ratings may be contributed to by the inflated scoring observed in self-ratings due to social desirability bias, such that employees over-report the extent to which they engage in desirable behaviours (van der Heijden & Nijhof, 2004). Adding to this is the probability – or lack thereof – that supervisors observe and understand the range of extra-role behaviours that employees engage in (van der Heijden & Nijhof, 2004; Organ, Podsakoff, & MacKenzie, 2006). These disparities, conceptualised analogously to the differences observed between ratings of organisation-level performance in hypothesis 12, may be exacerbated by ageist assumptions.

These findings may be explained through a synergistic effect, whereby supervisor tendencies to rate lower and employee tendencies to rate higher are reinforced through a combination of actual and perceived retractions from future-oriented behaviours, such that the boundaries of future-oriented behaviours change for older employees but remain the same for supervisors. This results in the restructuring and prioritisation of goals to facilitate loss-

prevention, but the revised performance levels no longer operate within the expectations of supervisor boundaries. A comparable pool of evidence in alignment with this theory is provided in a meta-analysis conducted by Moghimi et al. (2017), which demonstrated that performance ratings (supervisor, self, objective), satisfaction, feelings of autonomy, work engagement, and perceptions of older employees improved markedly when ageing employees and employers mutually planned and implemented SOC strategies. To this end, whether declines in performance are assumed or measured will matter not if organisations and their management are unwilling to identify and anticipate age-related changes to help manage the working lifecycle and refute ageist stereotypes.

7.3.3 Being physically mobile and mentally healthy is beneficial to a range of performance behaviours

With the exception of organisational proactivity, hypothesis 1 showed that being physically mobile and generally healthy had a stable and positive effect on performance. Similarly, hypothesis 2 supported a consistent, albeit small, positive effect for mental health and wellbeing on individual and organisation performance behaviours while controlling for other constructs of age and psychological climate. Similar to physical health, mental health was positively related to subjective age such that feeling younger was associated with better mental health, but its positive association with calendar age was not significant.

The effects of physical and mental health were relatively stable in all blocks while controlling for age and psychological climate characteristics, indicating

that being healthy both in body and mind is beneficial to a range of performance behaviours in different work contexts for most employees. In work, impaired mental and physical health is generally associated with productivity loss (Cleveland et al., 2019), whereas better physical and mental health is associated with better memory recall, organisational abilities, multitasking, and fluid intelligence, which are attributes that impact the ability to complete tasks efficiently and cope with changes to work processes or uncertainty (Balota, Dolan, & Duchek, 2000; Cadar, 2017).

Despite research presenting a range of impairments associated with ageing, there existed only a small negative, albeit non-significant, relationship between calendar age and physical health. As such, the notion that we become more physically impaired with age (e.g., Jones et al., 2013; Eurofound, 2021) was not wholly supported in the data. The alternative, which posits that declines in performance are not monotonic, is a more plausible description of the findings because of the small effect size (Lachman, 2004; Baltes, Rudolph, & Bal, 2012). The findings support the likelihood that age-related changes in functioning are mitigated by organisational interventions, coping strategies, and self-regulatory capabilities and therefore have only a small effect on performance in work settings (Carstensen & Lang, 2002; Morgan & Schiebe, 2014; Doerwald et al., 2016; HSE, 2011).

One consideration for the finding that physical and mental health are beneficial in the maintenance of performance behaviours is that organisational interventions are being progressively implemented as a response to the

increasing reports of psychological and physical work-related ill-health conditions, thus helping to reduce burnout and promote wellbeing and performance (Cadar, 2017; Eurofound, 2021). Further consideration has also been made in satisfying basic psychological needs through work characteristics because failing to do so can worsen emotional exhaustion, work-related stress, cognitive weariness, and accelerate the processes associated with job disengagement and burnout (Warr, 2007; Kooij et al., 2012; Slemp, Lee, & Mossman, 2021).

The exception to this is where physiological declines are severe or if jobs are highly demanding. In this scenario, normal secondary control strategies may only be effective in the short-term because of the rapid depletion of resources (Muraven & Baumeister, 2000). Here, more extreme compensatory strategies (e.g., demotion, absenteeism, workforce exit) may be implemented in order to limit any further impairment and to preserve self-concept by not allowing for the observation of performance declines (Kanfer & Ackerman, 2004; Belbase et al., 2015; Davies et al., 2016; Akkermans et al., 2016).

7.3.3.1 The positive effects of being physically healthy on adaptive behaviour is reinforced with higher levels of role flexibility

Hypothesis 7 showed that higher levels of role flexibility can reinforce the positive effects of being physically healthy. While it was just established that individuals who experience significant declines may have already deployed compensatory strategies, research has shown that functional losses experienced with increasing age are linked to the ability to adapt or react

(Pulakos et al., 2002; Schwall, 2012). The effect of physical health on individual adaptivity was significant at both high and low levels of role flexibility. Higher levels of role flexibility accentuated the positive effects of physical health on adaptivity, while reduced flexibility attenuated these positive effects.

This finding is consistent with the social-environmental path offered by SDT (Ryan & Deci, 2000) and with contemporary theories of successful ageing (Kooij, 2015; Zacher, 2015) in that organisational contextual factors contribute to the maintenance of worker health, working capacity, and work ability. Organisational factors can either be a driver or barrier to motivation by assisting or obstructing employees in deploying effective compensatory or coping strategies (Sturman, 2003; Rudolph, 2016; Wilckens et al., 2021).

Contributing toward an interdisciplinary understanding of age at work, this finding proposes that developmental and work outcomes can be improved by allowing sufficient time to adapt and respond flexibly to workplace demands (Bos et al., 2013; Zaniboni et al., 2014, 2017). The health-performance framework of presenteeism (Karanika-Murray & Biron, 2020) would posit that flexible work resources should be made readily available to assist employees in functional presenteeism and, as a result, adapt to workplace challenges more effectively. In doing so, employees are freely able to access resources when tasks are more demanding to dynamically limit the impact on work outcomes (Davies et al., 2013).

Whereas role flexibility moderated this relationship, work planning and decision making did not. Work planning refers to leeway in work scheduling and decision making reflects independence in making decisions (Karanika-Murray & Michaelides, 2015). One possible explanation here is that the degree to which an employee can flexibly and readily adapt to the needs of the working environment very much depends on whether they have control over work schedules and decision making. Unlike decision making where, for instance, the degree of independent decision making is invariant across workplaces, the meaning of role flexibility may differ across workplaces (Karanika-Murray & Michaelides, 2015). This makes it a potentially useful characteristic for adaptive behaviour, particularly for those with physical health conditions.

Following this trail of thought, several studies have shown that role flexibility allows older workers to adapt their roles such that tasks can be completed to the same standard without depleting functional resources. For instance, Parkhouse and Gall (2004) found that older workers in manual labour roles were able to maintain performance levels when able to train younger employees by reducing the degree of physically strenuous work undertaken themselves. Zaniboni et al. (2013) found that older employees with a more limited scope of job responsibilities (i.e., task variety) and who applied their accrued skills in current roles (i.e., skill variety) exhibited reduced physical and psychological fatigue (i.e., burnout) and reported lower intentions to leave. Non-invasive workplace practices such as computerisation and automation also help to mitigate the negative impact of functional declines which may

otherwise interfere with manual labour, complex problem-solving, and memory recall (Schalk et al., 2010; McKinsey & Co., 2017; Cleveland et al., 2019).

This finding therefore supports the JD-C and JD-R models which recognise the value of control and resources as crucial characteristics of healthy work (Karasek, 1989; Virtanen et al., 2022). More specifically, this finding posits that high levels of role flexibility can act as a coping mechanism and incentive to work for longer when work demands are high.

7.3.4 Age identity has only negligible effects on performance, but feeling younger may act as a compensatory strategy when psychological climate characteristics are unfavourable

If examining the relationship between age and performance in isolation, one might assume that feeling younger is a positive predictor of performance (see Table 5.7, block 2). However, the results of hypothesis 3 and 4 indicated that feeling younger or older than ones calendar age has, except for organisational proactivity, a mostly negligible impact on proficient, adaptive, and proactive behaviours when controlling for other age constructs and psychological climate characteristics.

The relationship between subjective age and organisational proactivity has been investigated in prior research (e.g., Weiss & Weiss, 2019; Zhang & Wood, 2021). The relationship is often accompanied by the suggestion that organisation proactivity is better predicted by how positive one feels about the ageing process because, in doing so, individuals who feel younger than their calendar age are more likely to perceive a longer FTP and pursue opportunities

aligned with future-oriented goals (van Veldhoven & Dorenbosch, 2008; Zhang & Wood, 2022). For instance, Kunze et al. (2015) found that a positive subjective age was associated with pursual of individual-set goals, resulting in an increase in both individual and organisational performance.

Indeed, the current body of literature indicates that feeling younger is beneficial to developmental outcomes such as self-regulation processes, work attitudes and relationships, and job engagement (e.g., Baltes & Smith, 2003; Sneed & Whitbourne, 2005; Moor et al., 2006; Kleinspehn-Ammerlahn, Gruhn, & Smith, 2008; Barak, 2009), as well as performance outcomes such as adaptivity (Kunze, Boehm, & Bruch, 2011; Goecke & Kunze, 2018; Weiss & Weiss, 2019; Drazic & Schermuly, 2021).

As such, this finding challenges these overarching findings by suggesting that, in the presence of other age and psychological climate characteristics, feeling younger or older has a negligible effect on proficient, adaptive, and proactive behaviours. One explanation for this finding is that subjective age is a highly intraindividual and dynamically fluctuating construct that holds different meanings to different people (Weiss & Weiss, 2019). In other words, people become more heterogeneous with age and their needs and motives may change at different life stages (Staudinger & Bowen, 2011; Jonsson, Hasselgren, Dellve, Seldén, Larsson, & Stattin, 2021). This is firstly a problem because subjective age is often operationalised using one-item, which asks “how old do you feel?”. The response to this question is variable from day-to-

day, and makes it highly improbable that the operationalisation is invariant across populations (Laguerre et al., 2022).

Secondly, subjective wellbeing at work is more closely linked with aspects of intrinsic motivation. It encompasses emotional, psychosomatic, and cognitive weariness, which often present in outcomes such as job dissatisfaction, anxiety, depression, burnout, or disengagement (Van Horn et al., 2004; Warr, 2007; Kooij et al., 2012). As a result, perceptions toward how an individual feels mentally, socially, and physically compared to their calendar age could also be considered as the overall quality of an employees work experience, functioning, and affect towards their role and the wider organisation (Grant et al., 2007; Kooij et al., 2012).

The preliminary results for sample A data (see section 5.3) support the existence of a small to moderate relationship between calendar age and subjective age. This suggests that employees of the same chronological age will not necessarily hold the same views, require the same support, or be motivated by the same things (Kooij et al., 2008). This, at least in part, corroborates findings by Weiss and Weiss (2019), who observed increases in self-perceived competence and proactivity for young adults that felt older, and for older adults that felt younger. Thus, young adults who feel older may be prescribed with higher maturity and responsibility; older adults, however, are more likely to experience a decline in self-efficacy ‘can do’ behaviours (Pulakos et al., 2002; Parker & Griffin, 2011).

Another explanation that could explain the consistently positive effects of subjective age in previous research and lack thereof in this thesis, is model complexity and variable inclusion. This alternative explanation finds similarities with a less popular school of thought which posits that relationships between subjective age and work outcomes are confounded by physical and psychological health, perceived work ability, and core self-evaluations (Zacher & Rudolph, 2018). This is plausible, given that subjective age represents perceptions toward age-related changes relative to the workplace ascribed by oneself and others (Schwall, 2012).

Indeed, the cumulative effect of poor working conditions and work stressors can lead to declines in subjective ratings of age and health (Schalk et al., 2010; Eurofound, 2021). In contrast, HR policies that promote age-inclusive working conditions are positively associated with the subjective age of employees (Schalk et al., 2010). It is therefore possible that this finding can be explained by subjective perceptions which manifest as psychological and physical issues, or by low perceptions of psychological climate characteristics. For instance, the data showed those who feel substantially younger are likely to report better physical and mental health, and vice versa, and so perceptions toward the ageing process may have a negligible effect because those issues manifest in the physical and mental wellbeing of employees.

7.3.4.1 When managerial support is low, feeling young may facilitate adaptive behaviour in core tasks

Hypothesis 9b provided evidence to support a moderating effect of supportive management on the relationship between subjective age and individual adaptivity. This finding indicated that when managerial support is low, individuals who feel younger perform markedly better than those who feel older. This effect weakens at average or high levels, such that feeling older or younger has a negligible effect on individual adaptivity. This finding indicates that feeling youthful may be of minimal benefit when managerial support is at average or high levels, but can facilitate individual adaptivity in the absence of managerial support.

Indeed, the benefits of feeling younger are not assured and vary depending on measurement outcomes (Drazic & Schermuly, 2021). To illustrate, subjective age is strongly related to calendar age in some studies (e.g., Rodriguez-Cifuentes et al., 2018) but holds almost no relationship in others (e.g., Drazic & Schermuly, 2021), and some scales use calendar age as a baseline against age identity (i.e., I feel old compared to my age), resulting in variable measurement methods. As such, the benefits of subjective age on specific age cohorts are unlikely to be invariant across sample populations. The role of subjective age in specific cohorts of age and health are out of the scope of this thesis, so the following interpretations are guided by subjective age as a main predictor while controlling for other variables of interest.

The previous section presented evidence to suggest that employees of the same calendar age will not necessarily require the same support (Kooij et al., 2008), and those that feel young may be better able to adapt to situations in life (Westerhof & Barrett, 2005) and at work (Drazic & Schermuly, 2021). Similarly, feeling younger has been associated with positive psychological and physical states, including higher self-efficacy and emotional regulation (Huang, McDowell, & Vargas, 2015). On the other hand, when employees feel older at work, they experience lower psychological wellbeing (Schalk et al., 2010). This is in contrast to being chronologically older, which is associated with an increase in psychological resources including experiential knowledge, positive affect, and emotional regulation (e.g., Carstensen & Lang, 2002; Morgan & Schiebe, 2014; Doerwald et al., 2016). As such, individuals that feel older are less protected from work stressors and less able to attain goals during uncertainty (Porath & Bateman, 2006).

Leaders have considerable influence on experiences and perceptions toward work and therefore play a vital role in how the ageing process is perceived, and the extent to which these perceptions are internalised (Arnold et al., 2007; Hammond et al., 2017; Vickerstaff & van der Horst, 2019). The way that jobs are designed and tasks are built will affect the degree to which employees are able to adapt more readily to workplace changes; for instance, tasks that draw from crystallised intelligence rather than fluid intelligence may reduce the need to deploy resources and implement compensatory strategies (Hammond et al., 2017; Kooij et al., 2020). Strauss et al. (2015) notes that the first mechanism to facilitate adaptive behaviour is an organisations ability to acquire new

information and gather knowledge that will assist employees in adjusting and responding to change. When managerial support is low, this mechanism is weakened and a heightened reliance is placed on the ability of employees to have the necessary experience or the psychological resources, such as self-efficacy, to positively respond to workplace changes (Jundt, Shoss, & Huang, 2015). Furthermore, unsupportive management may contribute toward the internalisation of negative ageist beliefs which, in turn, can weaken the motivation to learn, train, and perform (Fisher et al., 2017; Delgado-Rodriguez et al., 2018; Vickerstaff & van der Horst, 2019).

To this end, those who feel older may hold fewer psychological resources which reduces the extent to which they can adapt to uncertainty or changes to workplace practices without relying on directions from supervisors (Crant, 2000; Schalk et al., 2010; Strauss et al., 2013). This is supported by Kunze et al. (2015), who found that relative [to calendar age] subjective age was negatively related to goal attainment and organisation performance. Conversely, individuals that feel younger are more likely to exhibit a readiness for change (Drazic & Schermuly, 2021), feel more capable (Barnes-Farrell et al., 2002), and are therefore better equipped to maintain performance in dynamic environments and without substantial oversight (Kunze et al., 2015). Furthermore, individuals that feel younger are more likely engage in job crafting to facilitate their capacity to cope with and respond to unpredictable situations (Nagy, Johnston, & Hirschi, 2019) and negative work events (Armenta et al., 2018).

This aligns with the notion that attitudes towards the ageing process can support or impair the ability to cope or respond to changes in workplace policies and practices (Westerhof & Barrett, 2005; Kwak et al., 2018). However, it also alters our understanding MTLD (Heckhausen, Schulz, & Wrosch, 2010). Rather than managing losses associated with the ageing process, this finding suggests that age identity serves as an important secondary control strategy in managing for losses associated with unsupportive management. Finally, this finding reinforces the need for emotionally and socially intelligent managers and the ability to comprehend the complex feelings and needs of employees to build sustainable relationships and to support positive responses to change (Salovey & Mayer, 1990; Buchanan & Huczynski, 2019).

7.3.4.2 Sense of community can provide psychological and psychosocial resources that benefit team-member performance behaviours

The findings of this thesis supported a moderating effect for sense of community on the relationship between subjective age and team-member performance. Findings in H11a indicated that in environments with a weak sense of community among colleagues, an increasing sense of youthfulness aids workers in effectively coordinating with coworkers. The differences in feeling old or young had negligible effect at average or high levels of community. In contrast, H11b indicated that in environments with a strong sense of community, an increasing sense of youthfulness hinders the extent to which workers respond to changes in the team dynamic.

To date, there have only been a handful of studies examining subjective age and work-related outcomes (e.g., Nagy et al., 2019; Laguerre, Barnes-Farrell, & Hughes, 2022), but no research has examined the moderating role of community in the relationship between subjective age and team performance. This section will therefore consider theoretically analogous dimensions to team performance (see chapter 2.3.6). Team proficiency, for example, is comparable to the OCB subdimension personal support (Podsakoff et al., 2000), while team-member adaptivity is akin to interpersonal adaptability (Kozlowski et al., 1999).

Sense of community is becoming increasingly important to work teams because of the innate need to feel a sense of belonging and group identity (Henning et al., 2023). Relatedness needs are satisfied when workers view themselves as part of a team, identify with group values, feel a sense of companionship, and perceive work to be safe and stable (Van den Broeck et al., 2016; Slemp et al., 2018).

It has been established that individuals with an older subjective age usually report poorer outcomes in physical, mental, and social wellbeing (Barrett, 2003; Westerhof & Barrett, 2005). In workplaces that foster a sense of belonging and community, employees are more likely to report better mental health and subjective wellbeing because they can cooperate with likeminded individuals and feel a sense of companionship (Stewart & Townley, 2020). As a result, the effectiveness of teamwork behavioral processes improves. This improvement fosters positive mutual interactions with individual motivation and

overall team performance. Moreover, workers are more likely to report positive psychological states when team processes and effectiveness are maintained (DeChurch & Mesmer-Magnus, 2010; Mesmer-Magnus et al., 2017). Because of this, workers that feel older are better protected from work stressors and do not have to deplete resources in order to maintain team performance (Karasak, 1989; Muraven & Baumeister, 2000; Francioli et al., 2018). Fostering a sense of community that allows for higher levels of trust and cohesion may therefore act as a resource in offsetting detrimental physiological changes that occur with age which lead to negative self-perceptions in the first instance (Barrett, 2003; Boyd & Nowell, 2017).

Hypothesis 11a also indicated that the ability to coordinate and integrate team member actions improves with increasing youthfulness. Indeed, the aforementioned positive psychological states such as self-efficacy are strong enablers of prosocial acts (Muller et al., 2013; Huang, McDowell, & Vargas, 2015). Furthermore, individuals that feel young report higher job satisfaction, which has shown to positively predict interpersonal behaviours (Kuehn & Al-Busaidi, 2002). In situations where there exists conflict or issues with interpersonal relationships, OCBs can facilitate normative social interactions and reduce group friction by enabling members to focus on tasks rather than such conflicts (Smith, Organ, & Near, 1983; Nielsen et al., 2012). Because OCBs are likely to strengthen with psychological ageing (Lang & Carstensen, 2002), individuals that feel younger may be better able to actively maintain coordination between team members.

Although this helps to explain the benefits to those feeling older, hypothesis 11b posited that individuals who feel substantially younger do not respond as constructively to changes in the team dynamic when sense of community is high. One explanation that was noted by Henning et al. (2023) is that effects can be exaggerated in situations where there is an elevated sense of community baseline. This argument is plausible because sense of community was the highest rated work characteristic in this thesis. Nonetheless, a high sense of community is generally associated with stronger cohesion, team harmony, and reduced intragroup conflict which can promote a sense of subjective wellbeing (Henning et al., 2023); and this was supported by the positive correlation between subjective age and sense of community in Table 5.6.

Employees that feel younger at any given time may previously have expended resources to foster a higher sense of community among colleagues. When new members join the group, these employees may have to expend further prosocial resources to facilitate changes to the team dynamic which, in turn, can negatively impact team performance (Bergeron, 2007; Nielsen et al., 2012). The relationship may therefore be reciprocal, such that sense of community helps workers to feel younger, and vice versa. When this is threatened, employees are more likely to engage in counterproductive behaviours and less likely to engage in prosocial or collaborative behaviours in the fear of weakening an established sense of community between colleagues (Twenge et al., 2007; Fracioli et al., 2018). This is in contrast to individuals that feel older who, as a result, are less concerned with changes to

the team dynamic because it may actually service to help, rather than hinder, their subjective age.

This particular finding could also be explained, at least in some part, by two adverse effects emerging from an increase in self-efficacy, esteem, and helping behaviours as a result of feeling young (Barrett, 2003). First, teams that are comprised of workers who feel young, confident, and competent, may also experience higher levels of conflict and reduced interpersonal adaptability as emphasis may shift from team coordination to personal growth (Sonnentag & Volmer, 2009). If a social base is considered to be secure and trustworthy, any potential threats may give rise to anxiety and uncertainty, which may then prevent the emergence of autonomous motivation (Deci & Ryan, 2000; Foss, Pederson, Fosgaard, & Stea, 2015).

7.3.5 The need for autonomy is stronger than the need for competence in organisation-member adaptivity and proactivity

Work planning and role flexibility had positive effects on all performance behaviours, and were most strongly related to organisation-member adaptivity and proactivity. This finding is in contrast to what was hypothesised and provides two insights. First, increasing autonomy in work scheduling improves the ability to adapt to organisational changes. Second, increasing role flexibility better enables workers to meet organisational needs by providing resources that allow for engagement in self-starting, future-directed behaviours that promote organisational efficiency.

Organisation-member adaptivity refers to an individual's ability to cope with and respond to broader changes that affect their organisational membership (Griffin, Neal, & Parker, 2007). Providing workers a heightened level of control over how work is planned and designed enables them to respond more effectively by allowing them to utilise strengths and offset weaknesses (Dreisbach & Goschke, 2004; Dreisbach, 2006). As a result, increased work planning can help to sustain interdependence in workflows in spite of unpredictability (Kozlowski et al., 1999).

Organisation-member proactivity refers to self-initiated behaviours that promote change within the organisation (Griffin, Parker, & Neal, 2007). Research has shown that in order to foster change-related behaviour, workplaces must be flexible in allowing employees to adapt their roles and responsibilities to meet existing and unexpected demands (Dreisbach & Goschke, 2004; Dreisbach, 2006; Parker & Griffin, 2011). Employees feel empowered when afforded with this flexibility and, as a result, are more likely to pursue actions that promote efficiencies in broader work practices, rather than individual tasks, because of the increased sense of ownership and accountability (Griffin et al., 2007; Veldhoven & Dorenbosch, 2008; Hauschildt & Konradt, 2012). For instance, those who are able to dynamically adapt their roles and responsibilities are more likely to exhibit leadership behaviours within teams, which can help to promote creative and collective performance (Konradt et al., 2009).

Findings suggest that supportive management is less important in predicting organisation adaptivity and proactivity. This may be because individuals already engaging in organisation-member behaviours have a stronger growth drives and are confident with their competencies (Parker & Griffin, 2011; Zacher & Kooij, 2017). More value is placed on autonomous working practices that allow workers to readily adapt to organisational change and actively pursue opportunities that go beyond individual task enrichment to fulfil higher growth drives. Extra-role behaviours may therefore benefit more from LAS, which posits that behaviour is internally – rather than externally – directed and therefore encourages self-initiation and autonomy, despite also offering support when needed (Deci et al., 2017; Slemp et al., 2018).

7.3.6 Employees are more proficient when experiencing a sense of belonging

As hypothesised, sense of community positively predicted the ability to effectively coordinate with team members (i.e., team proficiency). In addition to this, findings showed that sense of community positively predicted individual and organisation proficiency. One explanation for this is that work processes are interdependent, responsibilities are shared, and experiences are shaped mutually, making interpersonal relations and trust among colleagues critical to even the most basic of responsibilities (Griffin, Neal, & Parker, 2007; Baltes, Zhdanova, & Parker, 2009). In other words, the degree to which someone is proficient in core tasks (i.e., individual proficiency) may also depend on their coordination with team members (i.e., team proficiency), and both are required in order to fulfil role expectations with regards to broader organisational requirements (i.e., organisation proficiency). This interdependence is further

supported by the strong similarities between models for individual and team proficiency. Experiencing a sense of community provides a secure social base from which tasks can be coordinated and completed effectively and with minimal disruption or ambiguity (Deci & Ryan, 2000). As a result, collective cognitive processes of work groups that contribute to individual and team effectiveness are strengthened (DeChurch & Mesmer-Magnus, 2010; Mesmer-Magnus et al., 2017).

Much of the literature underpinning SST emphasises the importance of positive social and emotional experiences as individuals age (Tajfel, 1979; Singh & Singh, 2010; Truxillo et al., 2012), but this finding also postulates that experiencing a sense of belonging, companionship, and a trusting and reliable work group can be of benefit, irrespective of age. When experiencing a sense of belonging, inexperienced workers with minimal job control may be better protected from work-stressors and consequential avoidance-coping strategies (Karasek, 1989). On the other hand, highly collaborative work units have the potential to simultaneously satisfy older and younger worker needs, because older workers are able to fulfil generativity motives by mentoring younger workers who, in gaining knowledge and skills, are able to fulfil competence needs (Baumeister & Leary, 1995; Van den Broeck et al., 2016; Slemp et al., 2018).

Indeed, individuals who feel a sense of belonging in the work group benefit from positive wellbeing and mental health (Weinberg et al., 2017). Cohesive groups with shared beliefs have been shown to influence attitudes beyond

individual experiences at work, provide a sense of meaning to work, and reinforce a positive social identity (Kozlowski & Ilgen, 2006; Naegele et al., 2018). This finding therefore posits that the need to relate and affiliate is important to proficient behaviours both in core tasks and in response to organisational responsibilities.

Chapter 8: Conclusion

The aim of this thesis was to examine the role of psychological climate in relationships between age and performance. The mean age of the workforce continues to increase, and forecasters expect that this pattern will persist for the foreseeable future. As a result employees are expected and encouraged to work into later life. To do so, organisations need to construct suitable, sustainable working environments which instill feelings of competence and ableness in older workers. The primary and secondary research conducted in this thesis indicates that the ways in which employees value and experience these feelings differ across the objective and subjective lifespan based on their physical, mental, and social wellbeing. This manifests as variations in goal orientations, needs, and motives between younger and older workers, resulting in a pool of inconsistent and ambiguous research on what motivates older and younger workers to perform effectively (Akkermans et al., 2016; Henning et al., 2023).

Indeed, employee performance is viewed as the outcome of individuals capabilities, motives, and effort, and the degree to which work characteristics aids them in utilising strengths, stimulating motives, and directing effort. Thus, understanding how to enhance the performance of individuals working into later life is complex and multifaceted. How an individual feels about their age and health can influence the degree to which work characteristics satisfy their needs. Because interindividual variability increases in similarly aged

individuals over time, keeping track of these needs becomes increasingly difficult, yet more important to performance behaviour.

This thesis aimed to extend our understanding of the relationship between age and performance at work by expanding the breadth and depth of inquiry. This was achieved by measuring age chronologically and subjectively; by examining psychological climate characteristics grounded in the domain of motivation; and by measuring performance behaviours that transcended individual responsibilities by incorporating team and organisation performance.

The findings of this thesis supported the notion that the relationship between age and performance does not exist in a vacuum, and that the date from which you are born is simply a universally understood chronological timeline. The data supported differential moderating roles of psychological climate characteristics in individual relationships between age and performance. By increasing leeway in work planning and scheduling, older workers are able to perform just as effectively in responding to and initiating changes in core tasks. Moreover, optimal physical and mental health is beneficial to nearly all performance behaviours. However, individuals who perceive themselves as physically older tend to benefit more when given the flexibility to adjust roles and responsibilities, which enables them to effectively respond to unexpected changes in core processes or procedures.

The benefit of perceiving oneself as young was observed exclusively in situations where needs remained unmet. This suggests that the heightened psychological capital associated with feeling younger might serve as a protective resource in unsupportive work environments. On the other hand, in environments that support relatedness needs, individuals who perceive themselves as substantially younger may respond adversely to changes in team dynamics, as such changes could damage their age identity. In keeping with existing research, these differences may indicate that the felt component of subjective age is predicted by other characteristics that influence psychological states (Zacher & Rudolph, 2019).

Another benefit of this thesis was the simultaneous examination of relationships between age, psychological climate, and performance. By controlling for the effects of age and psychological climate characteristics, effects are much more plausible than when tested individually. Findings supported the existence of within-dimension variability for psychological climate characteristics (e.g., autonomy) in predicting performance behaviours. For instance, work planning, but not role flexibility, fosters proficient behaviours as an organisation member, possibly due the time and space needed to fulfil extra-role expectations. Further, proactive performance behaviours are more likely to emerge when the need for autonomy and competence are satisfied, but the need for relatedness is seemingly less important. Because individual proactivity refers to innovation and improvements to tasks, having control over work processes and schedules allows employees to initiate better ways of completing daily tasks. Conversely, being able to flexibly adapt roles and

responsibilities benefits change-oriented behaviours that subsequently enhance team and organisation effectiveness.

Finally, employee-supervisor dyads within sample B provided rich data that allowed for an in-depth exploration into the role of age in differences between self-ratings and supervisor ratings of performance. Initially, lower supervisor ratings were observed organisation-level performance. With increasing age, the tendency for supervisors to rate more negatively increase, such that the trajectory declined more steeply for older workers. The addition of age also introduced significant differences in ratings for individual proficiency and adaptivity. Again, increasing age was associated with a lower performance rating from supervisors. This was in contrast to the role of age in self-ratings of performance, which had a negligible effect.

8.1 Theoretical Implications

The insights garnered from this thesis carry theoretical implications concerning how age is conceptualised, the experience and perception of ageing at work, and the effects that this has on actual and perceived performance. First, there is limited knowledge on the interaction between subjective age and psychological climate in predicting performance behaviour. This is primarily because much of the existing literature centers on personal factors as markers of successful ageing (Schalk et al., 2010; Goštautaitė & Bučiūnienė, 2015; Zacher, 2015). Authors dedicated to the theoretical development of successful ageing at work have criticised the lack of contextual investigation which makes it difficult to distinguish between processes and outcomes (e.g., Kanfer &

Ackerman, 2004; Warr, 2008; Zacher, 2015; Zacher & Rudolph, 2017; Wilckens et al., 2021; Henning et al., 2023). This thesis contributes to this by measuring psychological climate characteristics that are grounded in the fundamental psychological needs of autonomy, competence, and relatedness, thus moving toward a more comprehensive understanding of the interplay between age and work characteristics.

Second, there are few studies to have investigated the role of SDT in relationships between age and performance (e.g., Burmeister, Hirschi, & Wang, 2019; Henning et al., 2019, 2023). While some research has shown preferences for certain work characteristics (e.g., den Boer, van Vuuren, & de Jong, 2021), this thesis is seemingly among the first to examine the reciprocity between subjective age constructs and the moderating role of psychological climates for motivation in predicting performance behaviours. In doing so, research ought to be better equipped at providing recommendations to fulfil needs that are grounded in practice, rather than theory.

The underlying premise here, is that an individual's experiences of workplace characteristics for motivation across the life course can provide a conceptual pathway into understanding how their needs are fulfilled more practically at work and, as a consequence, how performance behaviours are differentially predicted. For example, results showed that work planning can facilitate individual adaptive behaviour for those who are chronologically older, and role flexibility can benefit the same behaviours for those who feel physically older.

These implications support the notion that existing methodological approaches to investigating the relationship between age and performance may unknowingly advance the ageist rhetoric. This is firstly because supervisor ratings are among the most common measurement instruments for employee performance (Murphy, 2008). The results of sample B support the existing arguments that supervisor ratings are often skewed by ageist assumptions (e.g., van der Heijden, 2009; Bal et al., 2011), among other biases (Murphy, 2008).

Finally, analytical approaches aimed at understanding the age-differential effects of motives, resources, and capabilities on various work outcomes often collapse construct dimensions. In doing so, the ability to detect lower-level unique and meaningful relationships is restricted. Instead, spurious support is offered to dimensions which encapsulate a range of domains which may otherwise be distinct. As a result, the increasing heterogeneity associated with ageing at work becomes more difficult to untangle. By recognising the potential for within-domain variation in psychological climate and performance, the findings of this thesis can be drawn upon to systematically complement theories of lifespan development. For instance, these findings could extend the MTLD (Heckhausen, Schulz, & Wrosch, 2010) by illustrating the ways in which primary and secondary control strategies can strengthened through lower-level relationships.

8.2 Practical Implications

This body of research offers government bodies and organisations a practical insight into the intricacies of developing a sustainable work environment that fulfills needs dynamically. The term *old* can refer to our chronological age, or to perceptions of oneself and others social, mental, and physical wellbeing. Being able to differentiate between each of these individually allows for a deeper understanding into how needs manifest and are satisfied across the working lifespan.

Findings would advocate for the expansion of ‘age-friendly’ legislation, policies, and practices by focusing on the construction of healthy and sustainable work environments that offer readily accessible resources from which older workers can actively offset losses and maximise gains associated with ageing. Under the theoretical groundings of motivational theory, age-discrimination guidance alone is not enough to incentivise older workers that work is sustainable and meaningful. For organisations, these findings indicate that moving away from nomothetic and towards ideographic approaches as a way of understanding multi-generational workforces may be more fruitful in fostering motivational work climates. It is unlikely that employers will have the luxury of handpicking older workers with the highest expected productivity (Mulders & Henkens, 2019), and so more effort will be required to comprehend and attend to the motives and needs of older workers to help maintain performance in later life.

In light of this, two recommendations are put forth that could benefit both legal and institutional frameworks, as well as HR policies and strategies. First, age-related policy and practice should reflect a broader range of age constructs. This thesis argues that the performance behaviours of younger and older workers are not significantly different. On the contrary, an individual's perceptions toward their physical and mental wellbeing does influence performance.

The introduction of additional and varied conceptualisations of age and health decreases the likelihood that calendar age is used as a proxy for work outcomes such as performance. Doing so can also aid supervisors in recognising the psychological, physical, and social aspects of ageing that may affect performance to minimise opportunities for ageist biases and stereotypes. For instance, the benefits of good physical and mental health on a range of performance behaviours reinforces the need for more health-based programs at work, which have been found to benefit functional and work outcomes among employees of various ages (e.g., Cadar, 2017; Eurofound, 2021). This is a useful addition to existing age-inclusive training programmes that are regularly implemented across organisations, but seemingly do not go far enough in addressing ageism at work (Macleod et al., 2010; Eurofound, 2021).

Second, organisations need to differentiate between similar work characteristics in order to effectively support employee needs. These results indicate that proficient behaviours are better predicted by work attributes which

satisfy the need for autonomy and relatedness, whereas and adaptive and proactive behaviours are predicted more strongly by work characteristics which satisfy the need for autonomy and competence. Further, sense of community more strongly predicts sense of community, whereas managerial support is a stronger predictor of organisation performance. This within-domain variation could also be beneficial in the development of sector-specific performance frameworks. For instance, a relatedness-supportive psychological climate may act as a protective mechanism in job roles with low job control, such as retail (Mosley, Winters, & Wood, 2012).

A practical recommendation emerging from the findings of this thesis is that organisations should provide higher levels of work planning to facilitate adaptive and proactive behaviours in core tasks. Consistent with the body of literature, fostering autonomous working practices for older employees enables them to leverage crystallised intelligence as opposed to fluid intelligence. In doing so, older workers are able to reduce their dependency on compensatory strategies and reinforce the perception that work is sustainable which, in turn, can promote positive affect and bolster self-efficacy (Kooij et al., 2020).

This can be of great value to retirees looking to re-enter the workforce who, as a consequence of retirement, may have disengaged from work. Because of this, retirees returning to employment may experience a state of cognitive dissonance as a result of transitioning from disengagement toward the engagement of self-development, job security, and work structures in order to

maintain a stable work-life balance (Rudolph et al., 2018; Virtanen et al., 2022). These workers may have to deplete additional resources toward the implementation of compensation and loss-avoidance strategies because work continuation often relies on the maintenance of work-related abilities (Eurofound, 2021). As such, fostering autonomy-supportive work climates is not only beneficial to the performance of young and old workers, but also to retirees pondering whether to return to work.

8.3 Limitations and Directions for Future Research

While this thesis has made significant contributions to knowledge, it also presents several limitations. First, the limited sample size may have restricted the statistical power when estimating models in blocks 4 and 5, which raises concerns about the broader generalisability of findings (Clark et al., 2021). The predictive mean matching method used to impute missing values in sample A data addressed these issues, at least in part, resulting in greater statistical power and confidence in unbiased estimates (Rubin, 1987; Madley et al., 2019).

While there was a tradeoff between statistical power and model complexity, the detailed exploration of lower-level relationships addressed limitations associated with oversimplifying construct dimensions (e.g., Baltes, Zhdanova, & Parker, 2009; Wilckens et al., 2021). In doing so, this helped to increase the level of contextual investigation workplace ageing research (Zacher, 2015; Zacher & Rudolph, 2017). For instance, retaining the dimensionality of individual performance helped to address issues associated with empirical

overlap in ostensibly distinct constructs of performance (Rotundo & Sackett, 2002; Griffin, Neal, & Parker, 2007; Garcia-Chas et al., 2015; Karanika-Murray et al., 2022). As a result, this study reduced the likelihood of omitted variable bias and the potential for spurious support (Baltes Zhdanova, & Parker, 2009).

When examining lower level relationships, the available literature is limited, making it difficult to draw conclusions and comparisons. As a result, several findings emerging from this thesis (e.g., H7, H9) lack comparability since these relationships are untested. Additionally, each of the nine performance behaviours represented endogenous factors in distinct models. As such, this thesis precludes from making any inferences about model-implied interdependence between performance behaviours (Griffin, Neal, & Parker, 2007). Despite the drawbacks, these unique findings provide valuable insights into the interplay between age conceptualisations, psychological climate characteristics, and work performance.

The primary purpose of sample B data was to observe the within-dyad variation in performance ratings when accounting for age. The preclusion of psychological climate in sample B analysis may have weakened the generalisability of these findings. Moreover, lower ratings from supervisors do not necessarily imply ageism or bias. They might be rooted in the nature of the job; for example, certain industries might have heightened cognitive demands, making any declines more evident to supervisors (Zimmer et al., 2015; Muller et al., 2015). Another plausible explanation could be that unfavourable perceptions were held about managerial support.

Owing to the limited sample size, the analysis of sample B was limited in its complexity. Sample A, on the other hand, offered a series of complex models which may have reduced statistical power. The analysis of each dataset was therefore limited in some capacity. With a larger dyadic sample, future research could delve deeper into complex dyadic relationships and more rigorously assess workplace interdependence. This would allow for the continued investigation into lower-level relationships, offering renewed and practicable insights into relationships between age and performance. Similarly, this increased statistical power may permit the testing of interdependence by simultaneously estimating paths between age and performance conceptualisations.

An underlying premise of this thesis was to simultaneously examine and control for objective and subjective components of ageing. In doing so, there was no requirement to categorise individuals into certain age groups, or assign them with implicitly positive or negative stereotypes. Whilst this limits the extent to which these results can be compared, attaching an age cohort to, for example, physical impairment does not necessarily improve remediation strategies or interventions, but may serve to exacerbate the assumptions about what older workers need, rather than considering how they feel mentally, physically, and socially.

Future studies with larger and more age-diverse samples could address this by collecting longitudinal data and simultaneously modelling temporal

variables using time-series analyses such that changes to the ‘felt’ aspects can be more accurately modelled into chronological age. Another line of inquiry could be to use time-lagged panel models to assess interventions associated with workplace characteristics that satisfy a specific need. This could help to understand whether physical health improves over time when individuals are afforded high levels of role flexibility, and if this has an effect on individual adaptivity. A marked improvement in physical health could also indicate an increase in personal resources, which could then be used to engage in other performance behaviours. Another interesting line of inquiry would be whether healthy working practices aimed at improving employee health reduce the reliance on autonomy-supportive climate characteristics in predicting certain performance behaviours, such as individual adaptivity.

While each model yielded good fit indices for a range of specified linear causal paths, future studies may benefit from focusing on specific lower-level relationships to model nonlinear trajectories. While many nonlinear relationships point to job complexity as a moderating factor between age and performance (e.g., Sturman, 2003; Karanika-Murray et al., 2022), the existing literature could gain from exploring how psychological climate characteristics aid performance across the working lifespan. For instance, the midlife point is associated with a dip in adaptive behaviours (Scheibe & Zacher, 2013; Karanika-Murray et al., 2022). Therefore, social-environmental factors might play a crucial role in facilitating adaptive behaviours by providing greater flexibility in work planning, thus enabling the more optimal use of primary and secondary control strategies (Heckhausen, Schulz, & Wrosch, 2010).

Finally, chapter 2.1 outlined the economic, financial, and occupational implications emerging from the Covid-19 pandemic. These implications were significant to this thesis in three ways. First, data was collected during the pandemic, which might have resulted in a reduced sample size. This could be attributed to concerns related to job security and furloughs that arose during that period (CIPD, 2020; Fortmeyer, 2022).

Second, the sample demographic was younger than expected. To explain this, recent research showed that rising economic inactivity among individuals aged 50-64 accounted for 68.5% of the total rise in economic inactivity among individuals aged 16-64 since the beginning of the pandemic (Rankl, 2023). Two thirds of those aged 50 and above left work earlier than anticipated due to the pandemic, and half of those still out of work were not planning to return (Francis-Devine & Powell, 2023). These issues may be representative of nonresponse bias in this thesis, where there were fewer opportunities to recruit participants aged 50 and above thus resulting in the underrepresentation of older workers in both samples.

While representative of the general population at the time of data collection, the small proportion of older workers in this thesis impairs the degree to which effects can be readily compared to studies before the pandemic. In other words, the effects and interpretation thereof may be subject to increased bias because the difference between the observed effect and the true, unobserved effect for age is actually due to nonresponse bias (Clark et al., 2021). Future

research ought to retest the structural paths specified in chapter 5.5 to establish whether these effects exist in a sample demographic relevant to the current labour market.

Finally, there were no significant relationships between Covid-19 impact and other study variables, but this scale was not validated. Although the scope of this thesis precluded for an in-depth investigation into the implications of Covid-19, it is important to recognise that effects may have been felt more strongly in different occupations such as healthcare, whose workers reported significantly higher levels of burnout (Fortmeyer, 2022).

8.4 Concluding Remarks

While studies have investigated the needs and motives of older workers, there remains a gap in understanding how these factors translate into everyday work characteristics that influence performance. Numerous motivational models, frameworks for successful ageing, and workplace characteristic models exist. However, unless these are integrated to produce actionable insights for organisations, our comprehension of promoting peak performance in the later stages of life remains limited. Ageing often carries negative stereotypes, but it does not necessarily imply that older individuals are physically, mentally, or socially inferior to their younger counterparts. It is imperative for organisations and their management to recognise this when making decisions related to selection, development, and design.

Similarly, certain work characteristics, such as work planning, role flexibility, and a sense of community, are advantageous for everyone and should be more widely incorporated to cater to a diverse, multigenerational workforce. It is anticipated that forthcoming research will delve deeper into the nuances of age, work, and performance, aiming to untangle previously ambiguous relationships. Such insights will enhance our knowledge of how workplaces can be tailored to meet the needs of both chronologically and subjectively older employees, moving beyond the simplistic use of calendar age as a proxy measure.

References

Ackerman, P. L. (1992). Predicting individual differences in complex skill acquisition: Dynamics of ability determinants. *Journal of Applied Psychology*, *77*, 598–614. https://doi.org/10/ct4tf2

Aguinis, H. (1995). Statistical Power with Moderated Multiple Regression in Management Research. *Journal of Management*, *21*(6), 1141–1158. https://doi.org/10.1177/014920639502100607

Akkermans, J., de Lange, A. H., van der Heijden, B. I. J. M., Kooij, D. T. A. M., Jansen, P. G. W., & Dikkers, J. S. E. (2016). What about time? Examining chronological and subjective age and their relation to work motivation. *Career Development International*, *21*(4), 419–439. https://doi.org/10/gdrb4k

Alavi, M., Visentin, D. C., Thapa, D. K., Hunt, G. E., Watson, R., & Cleary, M. (2020). Chi-square for model fit in confirmatory factor analysis. *Journal of Advanced Nursing*, *76*(9), 2209–2211. https://doi.org/10.1111/jan.14399

Ali, H., & Davies, D. R. (2003). The effects of age, sex and tenure on the job performance of rubber tappers. *Journal of Occupational and Organizational Psychology*, *76*(3), 381–391. https://doi.org/10.1348/096317903769647238

Amarya, S., Singh, K., & Sabharwal, M. (2018). Ageing Process and Physiological Changes. In *Gerontology*. IntechOpen.

Anderson, J. C., & Gerbing, D. W. (1989). *Structural Equation Modeling in Practice: A Review and Recommended Two-Step Approach*. 13. https://doi.org/10.1037/0033-2909.103.3.411

Avolio, B. J., Gardner, W. L., Walumbwa, F. O., Luthans, F., & May, D. R. (2004). Unlocking the mask: A look at the process by which authentic leaders impact follower attitudes and behaviors. *The Leadership Quarterly*, 23. https://doi.org/10/fwqdjv

Avolio, B. J., Waldman, D. A., & McDaniel, M. A. (1990). Age and Work Performance

in Nonmanagerial Jobs: The Effects of Experience and Occupational Type. *Academy of Management Journal*, *33*(2), 407–422. https://doi.org/10/c3r4qx

Avolio, B. J., Walumbwa, F. O., & Weber, T. J. (2009). Leadership: Current Theories, Research, and Future Directions. *Annual Review of Psychology*, *60*(1), 421–449. https://doi.org/10/fm5hnr

Ayalon, L., & Tesch-Römer, C. (Eds.). (2018). *Contemporary Perspectives on Ageism* (1st ed. 2018). Springer International Publishing : Imprint: Springer. https://doi.org/10.1007/978-3-319-73820-8

Baguley, T. (2009). Standardized or simple effect size: What should be reported? *British Journal of Psychology*, *100*(3), 603–617. https://doi.org/10.1348/000712608X377117

Bal, A. C., Reiss, A. E. B., Rudolph, C. W., & Baltes, B. B. (2011). Examining Positive and Negative Perceptions of Older Workers: A Meta-Analysis. *The Journals of Gerontology: Series B*, *66B*(6), 687–698. https://doi.org/10.1093/geronb/gbr056

Bal, P. M., & De Lange, A. H. (2015). From flexibility human resource management to employee engagement and perceived job performance across the lifespan: A multisample study. *Journal of Occupational and Organizational Psychology*, *88*(1), 126–154. https://doi.org/10.1111/joop.12082

Bal, P. M., De Lange, A. H., Jansen, P. G. W., & Van Der Velde, M. E. G. (2008). Psychological contract breach and job attitudes: A meta-analysis of age as a moderator. *Journal of Vocational Behavior*, *72*(1), 143–158. https://doi.org/10.1016/j.jvb.2007.10.005

Bal, P. M., & Lange, A. H. D. (2015). *From flexibility human resource management to employee engagement and perceived job performance across the lifespan: A multisample study*. 30. https://doi.org/10/f69rhr

Balota, D. A., Dolan, P. O., & Duchek, J. M. (2000). Memory changes in healthy older adults. In *The Oxford handbook of memory* (pp. 395–409). Oxford University

Press.

Baltes, B. B., Rudolph, C. W., & Bal, A. C. (2012). A Review of Aging Theories and Modern Work Perspectives. In W. C. Borman & J. W. Hedge, *The Oxford Handbook of Work and Aging* (1st ed., pp. 117–136). Oxford University Press.

Baltes, P. B. (1997). On the incomplete architecture of human ontogeny: Selection, optimization, and compensation as foundation of developmental theory. *American Psychologist*, *52*, 366–380. https://doi.org/10.1037/0003-066X.52.4.366

Baltes, P. B., Freund, A. M., & Li, S. (2005). The Psychological Science of Human Ageing. In M. L. Johnson, V. L. Bengtson, P. G. Coleman, & T. B. L. Kirkwood (Eds.), *The Cambridge Handbook of Age and Ageing* (1st ed., pp. 47–71). Cambridge University Press. https://doi.org/10.1017/CBO9780511610714.006

Barak, B. (2009). Age identity: A cross-cultural global approach. *International Journal of Behavioral Development*, *33*(1), 2–11. https://doi.org/10.1177/0165025408099485

Barnes-Farrell, J. L., Rumery, S. M., & Swody, C. A. (2002). How Do Concepts of Age Relate to Work and Off-the-Job Stresses and Strains? A Field Study of Health Care Workers in Five Nations. *Experimental Aging Research*, *28*(1), 87–98. https://doi.org/10/dcj9nz

Bartlett, J. W., Seaman, S. R., White, I. R., Carpenter, J. R., & for the Alzheimer's Disease Neuroimaging Initiative*. (2015). Multiple imputation of covariates by fully conditional specification: Accommodating the substantive model. *Statistical Methods in Medical Research*, *24*(4), 462–487. https://doi.org/10.1177/0962280214521348

Baskett, G. D., Byrne, D., & Hodges, L. (1971). Behavioral Indicators of Interpersonal Attraction1. *Journal of Applied Social Psychology*, *1*(2), 137–149. https://doi.org/10.1111/j.1559-1816.1971.tb00358.x

Beier, M. E., Kanfer, R., Kooij, D. T. A. M., & Truxillo, D. M. (2022). What's age got to do with it? A primer and review of the workplace aging literature. *Personnel Psychology*, *75*(4), 779–804. https://doi.org/10.1111/peps.12544

Belbase, A., Khan, M., Munnell, A. H., & Webb, A. (2015). Slowed or Sidelined? The Effect of 'Normal' Cognitive Decline on Job Performance Among the Elderly. *SSRN Electronic Journal*. https://doi.org/10/gjqnqr

Bertolino, M., M. Truxillo, D., & Fraccaroli, F. (2013). Age effects on perceived personality and job performance. *Journal of Managerial Psychology*, *28*(7/8), 867–885. https://doi.org/10/gbfbz2

Bertolino, M., Zacher, H., & Kooij, D. (2015). Proactivity and Aging at Work. In N. A. Pachana (Ed.), *Encyclopedia of Geropsychology* (pp. 1–8). Springer Singapore. https://doi.org/10.1007/978-981-287-080-3_284-1

Besdine, R. W., & Wu, D. (2008). Aging of the human nervous system: What do we know? *Medicine and Health, Rhode Island*, *91*(5), 129–131.

Bindl, U. K., Parker, S. K., Sonnentag, S., & Stride, C. B. (2022). Managing your feelings at work, for a reason: The role of individual motives in affect regulation for performance-related outcomes at work. *Journal of Organizational Behavior*, *43*(7), 1251–1270. https://doi.org/10.1002/job.2628

Bodner, T. E. (2008). What improves with increased missing data imputations? *Structural Equation Modeling*, *15*(4), 651–675. https://doi.org/10.1080/10705510802339072

Boehm, S. A. (2017). Is There a Downside of Job Accommodations? An Employee Perspective on Individual Change Processes. *Frontiers in Psychology*, *8*, 17.

Borman, W. C., Brantley, L. B., & Hanson, M. A. (2014). Progress Toward Understanding the Structure and Determinants of Job Performance: A focus on task and citizenship performance. *International Journal of Selection and Assessment*, *22*(4), 422–431. https://doi.org/10.1111/ijsa.12088

Borman, W. C., Hanson, M. A., Oppler, S. H., Pulakos, E. D., & White, L. A. (1993).

Role of early supervisory experience in supervisor performance. *Journal of Applied Psychology*, *78*(3), 443–449. https://doi.org/10/bspgvq

Bos, A. E. R., Pryor, J. B., Reeder, G. D., & Stutterheim, S. E. (2013). Stigma: Advances in Theory and Research. *Basic and Applied Social Psychology*, *35*(1), 1–9. https://doi.org/10.1080/01973533.2012.746147

Bowen, C. E., Noack, M. G., & Staudinger, U. M. (2011). Aging in the work context. In *Handbook of the psychology of aging, 7th ed* (pp. 263–277). Elsevier Academic Press. https://doi.org/10.1016/B978-0-12-380882-0.00017-6

Boyle, C. J., Gonyeau, M., Flowers, S. K., Hritcko, P., Taheri, R., & Prabhu, S. (2018). Adapting Leadership Styles to Reflect Generational Differences in the Academy. *American Journal of Pharmaceutical Education*, *82*(6), 6886. https://doi.org/10/gd644n

Bryson, A., Forth, J., Gray, H., & Stokes, L. (2020). Does Employing Older Workers Affect Workplace Performance? *Industrial Relations: A Journal of Economy and Society*, *59*(4), 532–562. https://doi.org/10.1111/irel.12265

Burmeister, A., Fasbender, U., & Deller, J. (2018). Being perceived as a knowledge sender or knowledge receiver: A multistudy investigation of the effect of age on knowledge transfer. *Journal of Occupational and Organizational Psychology*, *91*(3), 518–545. https://doi.org/10/gd3ndm

Burmeister, A., Wang, M., & Hirschi, A. (2020). Understanding the motivational benefits of knowledge transfer for older and younger workers in age-diverse coworker dyads: An actor–partner interdependence model. *Journal of Applied Psychology*, *105*(7), 748–759. https://doi.org/10.1037/apl0000466

van Buuren, S., & Groothuis-Oudshoorn, K. (2011). **mice**: Multivariate Imputation by Chained Equations in *R*. *Journal of Statistical Software*, *45*(3). https://doi.org/10.18637/jss.v045.i03

Cadiz, D. M., Brady, G. M., Yaldiz, L. M., Zaniboni, S., & Truxillo, D. M. (2022). Age Stereotypes Do Matter: Looking Through the Lens of the Attraction–Selection–

Attrition Model. *Work, Aging and Retirement*. https://doi.org/10.1093/workar/waac009

Campion, M. A. (1988). *Interdisciplinary Approaches to Job Design: A Constructive Replication With Extensions*. 15. https://doi.org/10/cmw54h

Cavanagh, T. M., Kraiger, K., & L. Henry, K. (2020). Age-Related Changes on the Effects of Job Characteristics on Job Satisfaction: A Longitudinal Analysis. *The International Journal of Aging and Human Development*, *91*(1), 60–84. https://doi.org/10/gm72dd

Cerasoli, C. P., Nicklin, J. M., & Ford, M. T. (2014). Intrinsic motivation and extrinsic incentives jointly predict performance: A 40-year meta-analysis. *Psychological Bulletin*, *140*(4), 980–1008. https://doi.org/10/f58cp8

Chan, D. (1998). *Functional Relations among Constructs in the Same Content Domain at Different Levels of Analysis: A Typology of Composition Models*. 14. https://doi.org/10/c66fqs

Charles, S. T., & Carstensen, L. L. (2010). Social and Emotional Aging. *Annual Review of Psychology*, *61*(1), 383–409. https://doi.org/10.1146/annurev.psych.093008.100448

Charness, N., & Czaja, S. J. (2005). Adaptation to New Technologies. In M. L. Johnson, V. L. Bengtson, P. G. Coleman, & T. B. L. Kirkwood (Eds.), *The Cambridge Handbook of Age and Ageing* (1st ed., pp. 662–669). Cambridge University Press. https://doi.org/10.1017/CBO9780511610714.073

Chen, J.-Y. (2000). The Effect of Aging on Dual-Task Performance: A Meta-analysis of Studies between 1981 and 1997. *Brain and Cognition*, *44*(1), 94–97. https://doi.org/10/gjqntn

Chen, M. K.-L., & Gardiner, E. (2019). Supporting older workers to work: A systematic review. *Personnel Review*, *48*(5), 1318–1335. https://doi.org/10/gjqnp8

Chen, Y., Moustaki, I., & Zhang, H. (2020). A Note on Likelihood Ratio Tests for Models with Latent Variables. *Psychometrika*, *85*(4), 996–1012.

https://doi.org/10.1007/s11336-020-09735-0

Cheng, L.-T., Smith, T. J., Hong, Z.-R., & Lin, H. (2021). Gender and STEM background as predictors of college students' competencies in forming research questions and designing experiments in inquiry activities. *International Journal of Science Education*, *43*(17), 2866–2883. https://doi.org/10.1080/09500693.2021.1994167

China seeks 'bold' steps to lift birth rate. (2023, February 10). *BBC News*. https://www.bbc.com/news/world-asia-china-64594469

Chun, J. U., Choi, B. K., & Moon, H. K. (2014). Subordinates' feedback-seeking behavior in supervisory relationships: A moderated mediation model of supervisor, subordinate, and dyadic characteristics. *Journal of Management & Organization*, *20*(4), 463–484. https://doi.org/10.1017/jmo.2014.39

Claes, R., & Van Loo, K. (2011). Relationships of proactive behaviour with job-related affective well-being and anticipated retirement age: An exploration among older employees in Belgium. *European Journal of Ageing*, *8*(4), 233–241. https://doi.org/10.1007/s10433-011-0203-7

Clark, T., Foster, L., Sloan, L., and Bryman, A. (2021). *Bryman's social research methods*. 6th edition. Oxford: Oxford University Press.

Cleveland, J. N., & Hanscom, M. (2017). What Is Old at Work? Moving Past Chronological Age. In E. Parry & J. McCarthy (Eds.), *The Palgrave Handbook of Age Diversity and Work* (pp. 17–46). Palgrave Macmillan UK. https://doi.org/10.1057/978-1-137-46781-2_2

Cleveland, J. N., Huebner, L.-A., Anderson, K. J., & Agbeke, D. V. (2019). Lifespan Perspectives on Job Performance, Performance Appraisal/Management and Creative Performance. In *Work Across the Lifespan* (pp. 291–321). Elsevier. https://doi.org/10.1016/B978-0-12-812756-8.00012-8

Cleveland, J. N., Huebner, L.-A., & Hanscom, M. E. (2017). The Intersection of Age and Gender Issues in the Workplace. In S. Profili, A. Sammarra, & L. Innocenti

(Eds.), *Advanced Series in Management* (Vol. 17, pp. 119–137). Emerald Publishing Limited. https://doi.org/10.1108/S1877-636120170000017007

Cleveland, J. N., Shore, L. M., Cleveland, J. N., & Shore, L. M. (1992). Self- and supervisory perspectives on age and work attitudes and performance. *Journal of Applied Psychology*, *77*(4), 469–484. https://doi.org/10/bcvnfz

Corporate Leadership Council (2012). Driving breakthrough performance in the new work environment. *Washington, DC: CEB*.

Cunha, F., Heckman, J. J., Lochner, L., & Masterov, D. V. (2006). Chapter 12 Interpreting the Evidence on Life Cycle Skill Formation. In *Handbook of the Economics of Education* (Vol. 1, pp. 697–812). Elsevier. https://doi.org/10.1016/S1574-0692(06)01012-9

Czaja, S. J., Sharit, J., & James, J. B. (Eds.). (2020). *Current and Emerging Trends in Aging and Work*. Springer International Publishing. https://doi.org/10.1007/978-3-030-24135-3

Dancey, C. P., & Reidy, J. (2007). *Statistics Without Maths for Psychology*. Pearson Education.

Davies, R., Jones, M., & Lloyd-Williams, H. (2016). Age and Work-Related Health: Insights from the UK Labour Force Survey: Age and Work-Related Health. *British Journal of Industrial Relations*, *54*(1), 136–159. https://doi.org/10/gjqnqh

de Lange, A. H., Taris, T. W., Jansen, P., Kompier, M. A. J., Houtman, I. L. D., & Bongers, P. M. (2010). On the relationships among work characteristics and learning-related behavior: Does age matter? *Journal of Organizational Behavior*, *31*(7), 925–950. https://doi.org/10.1002/job.649

De Lange, A. H., van der Heijden, B., Van Vuuren, T., Furunes, T., De Lange, C., & Dikkers, J. (2021). Employable as We Age? A Systematic Review of Relationships Between Age Conceptualizations and Employability. *Frontiers in Psychology*, *11*, 605684. https://doi.org/10/gmv58p

de Lange, A., Taris, T., Jansen, P., Smulders, P., Houtman, I., & Kompier, M. (2006). *Age as factor in the relation between work and mental health: Results of the longitudinal TAS survey*.

De Vos, A., van der Heijden, B. I. J. M., & Akkermans, J. (2020). Sustainable careers: Towards a conceptual model. *Journal of Vocational Behavior*, *117*, 103196. https://doi.org/10/gf4wtr

DeChurch, L. A., & Mesmer-Magnus, J. R. (2010). The cognitive underpinnings of effective teamwork: A meta-analysis. *Journal of Applied Psychology*, *95*, 32–53. https://doi.org/10.1037/a0017328

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic Motivation and Self-Determination in Human Behavior*. Springer US. https://doi.org/10.1007/978-1-4899-2271-7

Deci, E. L., & Ryan, R. M. (2012). Self-determination theory. In *Handbook of theories of social psychology, Vol. 1* (pp. 416–436). Sage Publications Ltd. https://doi.org/10.4135/9781446249215.n21

Delgado-Rodríguez, N., Hernández-Fernaud, E., Rosales, C., Díaz-Vilela, L., Isla-Díaz, R., & Díaz-Cabrera, D. (2018). Contextual Performance in Academic Settings: The Role of Personality, Self-efficacy, and Impression Management. *Revista de Psicología Del Trabajo y de Las Organizaciones*, 1–6. https://doi.org/10/gjqnnc

Dello Russo, S., Miraglia, M., & Borgogni, L. (2017). Reducing Organizational Politics in Performance Appraisal: The Role of Coaching Leaders for Age-Diverse Employees: OPPA and coaching leadership. *Human Resource Management*, *56*(5), 769–783. https://doi.org/10.1002/hrm.21799

den Boer, H., van Vuuren, T., & de Jong, J. (2021). Job Design to Extend Working Time: Work Characteristics to Enable Sustainable Employment of Older Employees in Different Job Types. *Sustainability*, *13*(9), 4719. https://doi.org/10/gmw84p

Deng, L., Yang, M., & Marcoulides, K. M. (2018). Structural Equation Modeling With

Many Variables: A Systematic Review of Issues and Developments. *Frontiers in Psychology*, *9*, 580. https://doi.org/10.3389/fpsyg.2018.00580

Department for Work and Pensions. (2023). *State Pension age Review 2023*. Retrieved from https://www.gov.uk/government/publications/state-pension-age-review-2023-government-report/state-pension-age-review-2023

Devins, D., Bickerstaffe, T., Mitchell, B., & Halliday, S. (2014). *Improving progression in low-paid, low-skilled retail, catering and care jobs*. 5.

Dikkers, J., & Lange, A. D. (2017). An Integrative Psychological Perspective on (Successful) Ageing at Work. In E. Parry, J. McCarthy (eds.), *The Palgrave Handbook of Age Diversity and Work*, https://doi.org/10.1057/978-1-137-46781-2_4 22.

Dong, Y., & Peng, C.-Y. J. (2013). Principled missing data methods for researchers. *SpringerPlus*, *2*, 222. https://doi.org/10.1186/2193-1801-2-222

Drazic, I., & Schermuly, C. C. (2021). Too Old for Agility? Employee Age and Readiness for Change Toward Scrum—The Moderating Roles of Age Climate and Subjective Age. *Work, Aging and Retirement*, *7*(3), 174–196. https://doi.org/10.1093/workar/waab005

Dreisbach, G. (2006). How positive affect modulates cognitive control: The costs and benefits of reduced maintenance capability. *Brain and Cognition*, *60*(1), 11–19. https://doi.org/10.1016/j.bandc.2005.08.003

Dreisbach, G., & Goschke, T. (2004). How Positive Affect Modulates Cognitive Control: Reduced Perseveration at the Cost of Increased Distractibility. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *30*(2), 343–353. https://doi.org/10.1037/0278-7393.30.2.343

Enders, C. K. (2008). A Note on the Use of Missing Auxiliary Variables in Full Information Maximum Likelihood-Based Structural Equation Models. *Structural Equation Modeling: A Multidisciplinary Journal*, *15*(3), 434–448. https://doi.org/10.1080/10705510802154307

Enders, C. K. (2010). *Applied missing data analysis*. Guilford Press.

Enders, C. K., & Mansolf, M. (2018). Assessing the fit of structural equation models with multiply imputed data. *Psychological Methods*, *23*(1), 76–93. https://doi.org/10.1037/met0000102

Eriksson, T., & Ortega, J. (2006). The Adoption of Job Rotation: Testing the Theories. *ILR Review*, *59*(4), 653–666. https://doi.org/10/gjqnsm

Eurofound (2021), *Working conditions and sustainable work: An analysis using the job quality framework*, Challenges and prospects in the EU series, Publications Office of the European Union, Luxembourg.

European Centre for the Development of Vocational Training (Ed.). (2010a). *Working and ageing: Emerging theories and empirical perspectives*. Publ. Off. of the Europ. Union. https://doi.org/10.2801/22277

European Centre for the Development of Vocational Training (Ed.). (2010b). *Working and ageing: Emerging theories and empirical perspectives*. Publications Office of the European Union.

Fasbender, U., Baltes, B., & Rudolph, C. W. (2022). New Directions for Measurement in the Field of Work, Aging and Retirement. *Work, Aging and Retirement*, waac028. https://doi.org/10.1093/workar/waac028

Ferris, G. R., Yates, V. L., Gilmore, D. C., & Rowland, K. M. (1985). THE INFLUENCE OF SUBORDINATE AGE ON PERFORMANCE RATINGS AND CAUSAL ATTRIBUTIONS. *Personnel Psychology*, *38*(3), 545–557. https://doi.org/10/d9snsw

Fischer, C., Malycha, C. P., & Schafmann, E. (2019). The Influence of Intrinsic Motivation and Synergistic Extrinsic Motivators on Creativity and Innovation. *Frontiers in Psychology*, *10*, 137. https://doi.org/10/f247

Fisher, G. G., Chaffee, D. S., Tetrick, L. E., Davalos, D. B., & Potter, G. G. (2017). Cognitive functioning, aging, and work: A review and recommendations for research and practice. *Journal of Occupational Health Psychology*, *22*, 314–

336. https://doi.org/10.1037/ocp0000086

Fortmeyer, K. (2022). *2022 Workplace Report: From Great Resignation to Workplace Revolution*. Kazoo. Retrieved 7 July 2022, from https://www.kazoohr.com/resources/library/2022-workplace-report

Foss, N. J., Pedersen, T., Reinholt Fosgaard, M., & Stea, D. (2015). Why Complementary HRM Practices Impact Performance: The Case of Rewards, Job Design, and Work Climate in a Knowledge-Sharing Context. *Human Resource Management*, *54*(6), 955–976. https://doi.org/10/gf83nz

Fraccaroli, F., Zaniboni, S., & Truxillo, D. (2017). Job Design and Older Workers. In S. Profili, A. Sammarra, & L. Innocenti (Eds.), *Advanced Series in Management* (Vol. 17, pp. 139–159). Emerald Publishing Limited. https://doi.org/10.1108/S1877-636120170000017008

Francioli, L., Conway, P. M., Hansen, Å. M., Holten, A.-L., Grynderup, M. B., Persson, R., Mikkelsen, E. G., Costa, G., & Høgh, A. (2018). Quality of Leadership and Workplace Bullying: The Mediating Role of Social Community at Work in a Two-Year Follow-Up Study. *Journal of Business Ethics*, *147*(4), 889–899. https://doi.org/10.1007/s10551-015-2996-3

Francis-Devine, B. & Powell, A. (2023). *UK Labour Market Statistics*. House of Commons Library.

Friborg, O., Martinussen, M., & Rosenvinge, J. H. (2006). Likert-based vs. semantic differential-based scorings of positive psychological constructs: A psychometric comparison of two versions of a scale measuring resilience. *Personality and Individual Differences*, *40*(5), 873–884. https://doi.org/10.1016/j.paid.2005.08.015

Fritzsche, L., Wegge, J., Schmauder, M., Kliegel, M., & Schmidt, K.-H. (2014). Good ergonomics and team diversity reduce absenteeism and errors in car manufacturing. *Ergonomics*, *57*(2), 148–161. https://doi.org/10/gjqnrf

Fuller Working Lives: Evidence Base 2017. (2017).

Furunes, T., & Mykletun, R. J. (2010). Age discrimination in the workplace: Validation of the Nordic Age Discrimination Scale (NADS). *Scandinavian Journal of Psychology*, *51*(1), 23–30. https://doi.org/10.1111/j.1467-9450.2009.00738.x

Garcia, S. G. (2021). *Adapting research methodologies in the COVID-19 pandemic*. 24.

Gemmano, C. G., Manuti, A., & Giancaspro, M. L. (2022). "It's just a matter of culture": An explorative study on the relationship between training transfer and work performance. *Journal of Workplace Learning*, *34*(6), 532–548. https://doi.org/10.1108/JWL-10-2021-0133

Giorgi, G., Lecca, L. I., Alessio, F., Finstad, G. L., Bondanini, G., Lulli, L. G., Arcangeli, G., & Mucci, N. (2020). COVID-19-Related Mental Health Effects in the Workplace: A Narrative Review. *International Journal of Environmental Research and Public Health*, *17*(21), Article 21. https://doi.org/10.3390/ijerph17217857

Gonzalez, R., & Griffin, D. (2001). Testing parameters in structural equation modeling: Every 'one' matters. *Psychological Methods*, *6*(3), 258–269. https://doi.org/10.1037/1082-989X.6.3.258

Gordon, R. A., & Arvey, R. D. (2004). Age Bias in Laboratory and Field Settings: A Meta-Analytic Investigation1. *Journal of Applied Social Psychology*, *34*(3), 468–492. https://doi.org/10.1111/j.1559-1816.2004.tb02557.x

Goštautaitė, B., & Bučiūnienė, I. (2015). The role of work characteristics in enhancing older employees' performance: Evidence from a post-Soviet country. *The International Journal of Human Resource Management*, *26*(6), 757–782. https://doi.org/10.1080/09585192.2014.949820

Office for National Statistics. (2010). *Standard occupational classification 2010. Vol. 2, Vol. 2,*. Palgrave Macmillan.

Griffin, M. A., Neal, A., & Parker, S. K. (2007). A New Model of Work Role Performance: Positive Behavior in Uncertain and Interdependent Contexts.

Academy of Management Journal, *50*(2), 327–347. https://doi.org/10/d8jrf6

Grote, G., & Pfrombeck, J. (2020). Uncertainty in Aging and Lifespan Research: Covid-19 as Catalyst for Addressing the Elephant in the Room. *Work, Aging and Retirement*, waaa020. https://doi.org/10.1093/workar/waaa020

Grund, S., Lüdtke, O., & Robitzsch, A. (2021). *Pooling methods for likelihood ratio tests in multiply imputed data sets* [Preprint]. PsyArXiv. https://doi.org/10.31234/osf.io/d459g

Gutenberg, R. L., Arvey, R. D., Osburn, H. G., & Jeanneret, P. R. (1983). Moderating effects of decision-making/information-processing job dimensions on test validities. *Journal of Applied Psychology*, *68*(4), 602–608. https://doi.org/10/fvgfh5

Hackman, J. R., & Oldham, G. R. (1975). Development of the job diagnostic survey. *Journal of Applied Psychology*, *60*, 159–170. https://doi.org/10/chz

Hammond, M. M., Lester, G., Clapp-Smith, R., & Palanski, M. (2017). Age Diversity and Leadership: Enacting and Developing Leadership for All Ages. In E. Parry & J. McCarthy (Eds.), *The Palgrave Handbook of Age Diversity and Work* (pp. 737–759). Palgrave Macmillan UK. https://doi.org/10.1057/978-1-137-46781-2_29

Hanrahan, E. A., Thomas, C. L., & Finkelstein, L. M. (2022). You're Too Old for That! Ageism and Prescriptive Stereotypes in the Workplace. *Work, Aging and Retirement*, waab037. https://doi.org/10.1093/workar/waab037

Hanscom, M. E., & Cleveland, J. N. (2018). The Influence of Successful Aging at Work Upon Simulated Performance Decisions. *Work, Aging and Retirement*, *4*(2), 129–144. https://doi.org/10.1093/workar/wax021

Harter, J. K., Schmidt, F. L., Agrawal, S., & Plowman, S. K. (2006). *THE RELATIONSHIP BETWEEN ENGAGEMENT AT WORK AND ORGANIZATIONAL OUTCOMES*. 32.

Hauschildt, K., & Konradt, U. (2012). Self-leadership and team members' work role

performance. *Journal of Managerial Psychology*, *27*(5), 497–517. https://doi.org/10/gc82pr

Heckhausen, J., Wrosch, C., & Schulz, R. (2010). A motivational theory of life-span development. *Psychological Review*, *117*(1), 32–60. https://doi.org/10/drx9fs

Hedge, J. W., & Borman, W. C. (2012). *Work and Aging: Introduction*. 9.

Henning, G., Stenling, A., Tafvelin, S., Ebener, M., & Lindwall, M. (2023). Levels and change in autonomous and controlled work motivation in older workers—The role of proximity to retirement and sense of community at work. *Journal of Occupational and Organizational Psychology*, *96*(1), 33–55. https://doi.org/10.1111/joop.12406

Hoch, J. E., Pearce, C. L., & Welzel, L. (2010). Is the Most Effective Team Leadership Shared? *Journal of Personnel Psychology*, *9*, 12. https://doi.org/10/df7t6n

Hochwarter, W. A., Witt, L. A., & Kacmar, K. M. (2000). Perceptions of organizational politics as a moderator of the relationship between consciousness and job performance. *Journal of Applied Psychology*, *85*(3), 472–478. https://doi.org/10/c83rd4

Hofmann, D. A., Jacobs, R., & Gerras, S. J. (1992). Mapping individual performance over time. *Journal of Applied Psychology*, *77*, 185–195. https://doi.org/10/ddgx4f

Huang, Y.-K., McDowell, J., & Vargas, P. (2015). *How Old I Feel Matters: Examining Age-Related Differences in Motives and Organizational Citizenship Behavior*. 20.

Hubley, A. M. (2014). Subjective Age Identity Scale (SAIS). In A. C. Michalos (Ed.), *Encyclopedia of Quality of Life and Well-Being Research* (pp. 6414–6419). Springer Netherlands. https://doi.org/10.1007/978-94-007-0753-5_2895

Hubley, A. M., & Russell, L. B. (2009). Prediction of subjective age, desired age, and age satisfaction in older adults: Do some health dimensions contribute more than others? *International Journal of Behavioral Development*, *33*(1), 12–21.

https://doi.org/10/bg3zk6

Hunter, L. W., & Thatcher, S. M. B. (2007). Feeling the Heat: Effects of Stress, Commitment, and Job Experience on Job Performance. *The Academy of Management Journal*, *50*(4), 953–968. https://doi.org/10/d37g5k

Hunter, S. T., Bedell-Avers, K. E., & Mumford, M. D. (2007). The typical leadership study: Assumptions, implications, and potential remedies. *The Leadership Quarterly*, 12. https://doi.org/10/ffmf33

Iacobucci, D., Schneider, M. J., Popovich, D. L., & Bakamitsos, G. A. (2016). Mean centering helps alleviate “micro” but not “macro” multicollinearity. *Behavior Research Methods*, *48*(4), 1308–1317. https://doi.org/10.3758/s13428-015-0624-x

Ilgen, D. R., Peterson, R. B., Martin, B. A., & Boeschen, D. A. (1981). Supervisor and subordinate reactions to performance appraisal sessions. *Organizational Behavior and Human Performance*, *28*(3), 311–330. https://doi.org/10/dmf3bs

Impact of COVID-19 on working lives | Survey reports. (2022). CIPD. Retrieved 2 March 2023, from https://www.cipd.co.uk/knowledge/work/trends/goodwork/covid-impact

James, L. R., Choi, C. C., Ko, C.-H. E., McNeil, P. K., Minton, M. K., Wright, M. A., & Kim, K. (2008). Organizational and psychological climate: A review of theory and research. *European Journal of Work and Organizational Psychology*, *17*(1), 5–32. https://doi.org/10/fjw367

Jonsson, R., Hasselgren, C., Dellve, L., Seldén, D., Larsson, D., & Stattin, M. (2021). Matching the Pieces: The Presence of Idiosyncratic Deals and Their Impact on Retirement Preferences Among Older Workers. *Work, Aging and Retirement*, *7*(3), 240–255. https://doi.org/10/gjq98c

Jorgensen, T. D., Pornprasertmanit, S., Schoemann, A. M., & Rosseel, Y. (2022). semTools: Useful tools for structural equation modeling. R package version 0.5-6. Retrieved from https://CRAN.R-project.org/package=semTools

Judge, T. A., Fluegge Woolf, E., Hurst, C., & Livingston, B. (2006). Charismatic and Transformational Leadership: A Review and an Agenda for Future Research. *Zeitschrift Für Arbeits- Und Organisationspsychologie A&O*, *50*(4), 203–214. https://doi.org/10/dzvwdj

Judge, T. A., & Locke, E. A. (1993). Effect of dysfunctional thought processes on subjective well-being and job satisfaction. *Journal of Applied Psychology*, *78*, 475–490. https://doi.org/10/cmd48p

Judge, T. A., Thoresen, C. J., Bono, J. E., & Patton, G. K. (2001). The job satisfaction–job performance relationship: A qualitative and quantitative review. *Psychological Bulletin*, *127*(3), 376–407. https://doi.org/10.1037/0033-2909.127.3.376

Kanfer, R., & Ackerman, P. L. (2004). AGING, ADULT DEVELOPMENT, AND WORK MOTIVATION. *Academy of Management Review*, 20.

Kang, H., & Ahn, J.-W. (2021). Model Setting and Interpretation of Results in Research Using Structural Equation Modeling: A Checklist with Guiding Questions for Reporting. *Asian Nursing Research*, *15*(3), 157–162. https://doi.org/10.1016/j.anr.2021.06.001

Karanika-Murray, M., Bartholomew, K. J., Williams, G. A., & Cox, T. (2015). Leader-Member Exchange across two hierarchical levels of leadership: Concurrent influences on work characteristics and employee psychological health. *Work & Stress*, *29*(1), 57–74. https://doi.org/10/gjqnst

Karanika-Murray, M., & Biron, C. (2020). The health-performance framework of presenteeism: Towards understanding an adaptive behaviour. *Human Relations*, *73*(2), 242–261. https://doi.org/10/ggh5wd

Karanika-Murray, M., & Michaelides, G. (2015). Workplace design: Conceptualizing and measuring workplace characteristics for motivation. *Journal of Organizational Effectiveness: People and Performance*, *2*(3), 224–243. https://doi.org/10/gjqnsb

Karanika-Murray, M., Pontes, H. M., Griffiths, M. D., & Biron, C. (2015). Sickness presenteeism determines job satisfaction via affective-motivational states. *Social Science & Medicine*, *139*, 100–106. https://doi.org/10/gjqnsc

Karanika-Murray, M., Van Veldhoven, M., Michaelides, G., Baguley, T., Gkiontsi, D., & Harrison, N. (2022). Curvilinear Relationships Between Age and Job Performance and the Role of Job Complexity. *Work, Aging and Retirement*, waac006. https://doi.org/10.1093/workar/waac006

Kashy, D. A., & Donnellan, M. B. (2018). Conceptual and Methodological Issues in the Analysis of Cross-Sectional and Longitudinal Dyadic Data. In K. Deaux & M. Snyder (Eds.), *The Oxford Handbook of Personality and Social Psychology* (pp. 208–238). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780190224837.013.9

Katz, R. (1978). The Influence of Job Longevity on Employee Reactions to Task Characteristics. *Human Relations*, *31*(8), 703–725. https://doi.org/10/fstjjn

Kennedy, P. E. (2005). Oh No! I Got the Wrong Sign! What Should I Do? *The Journal of Economic Education*, *36*(1), 77–92. https://doi.org/10.3200/JECE.36.1.77-92

Kenny, D. A., & Kashy, D. A. (2014a). The Design and Analysis of Data from Dyads and Groups. In H. T. Reis & C. M. Judd (Eds.), *Handbook of Research Methods in Social and Personality Psychology* (2nd ed., pp. 589–607). Cambridge University Press. https://doi.org/10.1017/CBO9780511996481.027

Kenny, D. A., & Kashy, D. A. (2014b). Dyadic Data Analysis Using Multilevel Modeling. In *Handbook of Advanced Multilevel Analysis*. Routledge. https://doi.org/10.4324/9780203848852.ch17

Kenny, G. P., Groeller, H., McGinn, R., & Flouris, A. D. (2016). Age, human performance, and physical employment standards1. *Applied Physiology, Nutrition, and Metabolism*. https://doi.org/10/gn9th4

Kite, M. E., Stockdale, G. D., Whitley, B. E., & Johnson, B. T. (2005). Attitudes Toward Younger and Older Adults: An Updated Meta-Analytic Review. *Journal of Social Issues*, *61*(2), 241–266. https://doi.org/10.1111/j.1540-4560.2005.00404.x

Kleinspehn-Ammerlahn, A., Kotter-Grühn, D., & Smith, J. (2008). Self-Perceptions of Aging: Do Subjective Age and Satisfaction With Aging Change During Old Age? *The Journals of Gerontology: Series B*, *63*(6), P377–P385. https://doi.org/10/d94hdn

Klopp, E., & Klößner, S. (2021). The Impact of Scaling Methods on the Properties and Interpretation of Parameter Estimates in Structural Equation Models with Latent Variables. *Structural Equation Modeling: A Multidisciplinary Journal*, *28*(2), 182–206. https://doi.org/10.1080/10705511.2020.1796673

Kluger, A. N., & DeNisi, A. (1996). The effects of feedback interventions on performance: A historical review, a meta-analysis, and a preliminary feedback intervention theory. *Psychological Bulletin*, *119*(2), 254–284. https://doi.org/10/gtw

Kolbe, L., Jorgensen, T. D., & Molenaar, D. (2021). The impact of unmodeled heteroskedasticity on assessing measurement invariance in single-group models. *Structural Equation Modeling*, *28*(1), 82–98. https://doi.org/10.1080/10705511.2020.1766357

Kooij, D., de Lange, A., Jansen, P., & Dikkers, J. (2008). Older workers' motivation to continue to work: Five meanings of age: A conceptual review. *Journal of Managerial Psychology*, *23*(4), 364–394. https://doi.org/10/d3rskf

Kooij, D. T. A. M., de Lange, A. H., Jansen, P. G. W., & Dikkers, J. S. E. (2013). Beyond chronological age. Examining perceived future time and subjective health as age-related mediators in relation to work-related motivations and well-being. *Work & Stress*, *27*(1), 88–105. https://doi.org/10/gfgvxz

Kooij, D. T. A. M., De Lange, A. H., Jansen, P. G. W., Kanfer, R., & Dikkers, J. S. E.

(2011a). Age and work-related motives: Results of a meta-analysis. *Journal of Organizational Behavior*, *32*(2), 197–225. https://doi.org/10/cv4h5x

Kooij, D. T. A. M., De Lange, A. H., Jansen, P. G. W., Kanfer, R., & Dikkers, J. S. E. (2011b). Age and work-related motives: Results of a meta-analysis: AGE AND WORK-RELATED MOTIVES. *Journal of Organizational Behavior*, *32*(2), 197–225. https://doi.org/10/cv4h5x

Kooij, D. T. A. M., Guest, D. E., Clinton, M., Knight, T., Jansen, P. G. W., & Dikkers, J. S. E. (2013). How the impact of HR practices on employee well-being and performance changes with age: How the impact of HR practices changes with age. *Human Resource Management Journal*, *23*(1), 18–35. https://doi.org/10/bd4c

Kooij, D. T. A. M., Nijssen, H., Bal, P. M., & van der Kruijssen, D. T. F. (2020). Crafting an Interesting Job: Stimulating an Active Role of Older Workers in Enhancing Their Daily Work Engagement and Job Performance. *Work, Aging and Retirement*, *6*(3), 165–174. https://doi.org/10.1093/workar/waaa001

Kooij, D. T. A. M., van Woerkom, M., Wilkenloh, J., Dorenbosch, L., & Denissen, J. J. A. (2017). Job crafting towards strengths and interests: The effects of a job crafting intervention on person–job fit and the role of age. *Journal of Applied Psychology*, *102*(6), 971–981. https://doi.org/10/gbhzzt

Kooij, D. T. A. M., Zacher, H., Wang, M., & Heckhausen, J. (2020). Successful aging at work: A process model to guide future research and practice. *Industrial and Organizational Psychology*, *13*(3), 345–365. https://doi.org/10.1017/iop.2020.1

Koopmans, L. (2014). *Measuring Individual Work Performance*. 261.

Koopmans, L., Bernaards, C. M., Hildebrandt, V. H., Schaufeli, W. B., de Vet Henrica, C. W., & van der Beek, A. J. (2011). Conceptual Frameworks of Individual Work Performance: A Systematic Review. *Journal of Occupational & Environmental Medicine*, *53*(8), 856–866. https://doi.org/10/cxprmr

Kornadt, A. E., Weiss, D., Gerstorf, D., Kunzmann, U., Lücke, A. J., Schilling, O. K., Katzorreck, M., Siebert, J. S., & Wahl, H.-W. (2021). “I felt so old this morning.” Short-term variations in subjective age and the role of trait subjective age: Evidence from the ILSE/EMIL ecological momentary assessment data. *Psychology and Aging*, *36*(3), 373–382. https://doi.org/10/gmvmm3

Kozlowski, S. W. J., & Ilgen, D. R. (2006). Enhancing the Effectiveness of Work Groups and Teams. *Psychological Science in the Public Interest*, *7*(3), 77–124. https://doi.org/10/fttj3p

Krishnan, V. R. (2005). *Leader-Member Exchange, Transformational Leadership, and Value System*. *10*(1), 8.

Kroon, A. C., van Selm, M., ter Hoeven, C., & Vliegenthart, R. (2017). Age at Work: Explaining variation in frames of older employees in corporate and news media. *Journalism Studies*, *18*(9), 1167–1186. https://doi.org/10/gjqnqj

Kunze, F., Boehm, S. A., & Bruch, H. (2011). Age diversity, age discrimination climate and performance consequences-a cross organizational study: AGE DIVERSITY, AGE DISCRIMINATION CLIMATE. *Journal of Organizational Behavior*, *32*(2), 264–290. https://doi.org/10/cdrk2n

Kunze, F., Boehm, S. A., & Bruch, H. (2021). It matters how old we feel in organizations: Testing a multilevel model of organizational subjective-age diversity on employee outcomes. *Journal of Organizational Behavior*, *42*(4), 448–463. https://doi.org/10.1002/job.2505

Kunze, F., Boehm, S., & Bruch, H. (2013a). Organizational Performance Consequences of Age Diversity: Inspecting the Role of Diversity-Friendly HR Policies and Top Managers’ Negative Age Stereotypes: Age Diversity and Company Performance. *Journal of Management Studies*, *50*(3), 413–442. https://doi.org/10/gc4m7g

Kunze, F., Boehm, S., & Bruch, H. (2013b). Age, resistance to change, and job performance. *Journal of Managerial Psychology*, *28*(7/8), 741–760.

https://doi.org/10/gbfbw9

Kunze, F., & Menges, J. I. (2017). Younger supervisors, older subordinates: An organizational-level study of age differences, emotions, and performance: Age Differences, Emotions, and Performance. *Journal of Organizational Behavior*, *38*(4), 461–486. https://doi.org/10/f96xtr

Kunze, F., Raes, A. M. L., & Bruch, H. (2015). It matters how old you feel: Antecedents and performance consequences of average relative subjective age in organizations. *Journal of Applied Psychology*, *100*(5), 1511–1526. https://doi.org/10.1037/a0038909

Kwak, S., Kim, H., Chey, J., & Youm, Y. (2018). Feeling how old I am: Subjective age is associated with estimated brain age. *Frontiers in Aging Neuroscience*, *10*. https://doi.org/10.3389/fnagi.2018.00168

Laguerre, R. A., Barnes-Farrell, J. L., & Hughes, J. M. (2022). An Examination of the Predictive Validity of Subjective Age and Core Self-evaluations on Performance-Related Outcomes. *Work, Aging and Retirement*, waab038. https://doi.org/10.1093/workar/waab038

Lambert, T. (2015). *A Structural Equation Model of the Influence of Personal, Behavioral, and Environmental Factors on the Writing Performance of First-year Students at a Selected Michigan Community College* [Doctor of Philosophy, Andrews University]. https://doi.org/10.32597/dissertations/1580

Lamont, R. A., Swift, H. J., & Abrams, D. (20150126). A review and meta-analysis of age-based stereotype threat: Negative stereotypes, not facts, do the damage. *Psychology and Aging*, *30*(1), 180. https://doi.org/10/gf896q

Lang, F. R., & Carstensen, L. L. (2002). Time counts: Future time perspective, goals, and social relationships. *Psychology and Aging*, *17*(1), 125–139. https://doi.org/10.1037/0882-7974.17.1.125

Larsson, M., & Lundholm, S. E. (2010). *Leadership as Work-embedded Influence: A Micro-discursive Analysis of an Everyday Interaction in a Bank*. 26.

https://doi.org/10/bwxpwz

Latham, G. P., & Pinder, C. C. (2005). Work Motivation Theory and Research at the Dawn of the Twenty-First Century. *Annual Review of Psychology*, *56*(1), 485–516. https://doi.org/10/c482dm

Levy, B. R., Pilver, C., Chung, P. H., & Slade, M. D. (2014). Subliminal Strengthening: Improving Older Individuals' Physical Function Over Time With an Implicit-Age-Stereotype Intervention. *Psychological Science*, *25*(12), 2127–2135. https://doi.org/10.1177/0956797614551970

Levy, B. R., Slade, M. D., Chang, E.-S., Kannoth, S., & Wang, S.-Y. (2020). Ageism Amplifies Cost and Prevalence of Health Conditions. *The Gerontologist*, *60*(1), 174–181. https://doi.org/10/ghvtnw

Li, F., Liu, S., Zhang, F., & Huang, H. (2022). Moderating Effects of Self-Efficacy and Time Pressure on the Relationship Between Employee Aging and Work Performance. *Psychology Research and Behavior Management*, *Volume 15*, 1043–1054. https://doi.org/10.2147/PRBM.S359624

Lin, G.-C., Wen, Z., Marsh, H. W., & Lin, H.-S. (2010). Structural Equation Models of Latent Interactions: Clarification of Orthogonalizing and Double-Mean-Centering Strategies. *Structural Equation Modeling: A Multidisciplinary Journal*, *17*(3), 374–391. https://doi.org/10.1080/10705511.2010.488999

Linderbaum, B. A., & Levy, P. E. (2010). The Development and Validation of the Feedback Orientation Scale (FOS). *Journal of Management*, *36*(6), 1372–1405. https://doi.org/10.1177/0149206310373145

Little, T. D., Bovaird, J. A., & Widaman, K. F. (2006). On the Merits of Orthogonalizing Powered and Product Terms: Implications for Modeling Interactions Among Latent Variables. *Structural Equation Modeling: A Multidisciplinary Journal*, *13*(4), 497–519. https://doi.org/10.1207/s15328007sem1304_1

Little, R. J. A., & Schenker, N. (1995). Missing Data. In G. Arminger, C. C. Clogg, & M. E. Sobel (Eds.), *Handbook of Statistical Modeling for the Social and*

Behavioral Sciences (pp. 39–75). Springer US. https://doi.org/10.1007/978-1-4899-1292-3_2

LoBiondo-Wood, G., & Haber, J. (2017). *Nursing Research - E-Book: Methods and Critical Appraisal for Evidence-Based Practice*. Mosby. http://ebookcentral.proquest.com/lib/ntuuk/detail.action?docID=6359551

MacLeod, A. (2010). *Managing an ageing workforce how employers are adapting to an older labour market*. Chartered Management Institute (CMI).

Mad About Skills: A Top Reason People Are Quitting. (2022). Visier Inc. Retrieved 7 July 2022, from https://hello.visier.com/mad-about-skills-top-reasons-people-are-quitting-report.html

Madley-Dowd, P., Hughes, R., Tilling, K., & Heron, J. (2019). The proportion of missing data should not be used to guide decisions on multiple imputation. *Journal of Clinical Epidemiology*, *110*, 63–73. https://doi.org/10.1016/j.jclinepi.2019.02.016

Martens, A., Greenberg, J., Schimel, J., & Landau, M. J. (2004). Ageism and Death: Effects of Mortality Salience and Perceived Similarity to Elders on Reactions to Elderly People. *Personality and Social Psychology Bulletin*, *30*(12), 1524–1536. https://doi.org/10.1177/0146167204271185

Marvell, R., & Cox, A. (2017). *What do older workers value about work and why?* Centre for Ageing Better.

Maslowsky, J., Jager, J., & Hemken, D. (2015). Estimating and interpreting latent variable interactions: A tutorial for applying the latent moderated structural equations method. *International Journal of Behavioral Development*, *39*(1), 87–96. https://doi.org/10.1177/0165025414552301

Matta, F. K., Scott, B. A., Koopman, J., & Conlon, D. E. (2015). Does Seeing “Eye To Eye” Affect Work Engagement and Organizational Citizenship Behavior? A Role Theory Perspective on LMX Agreement. *Academy of Management Journal*, *58*(6), 1686–1708. https://doi.org/10/b2b7

McCurdy, C. (2022). *The Resolution Foundation Labour Market Outlook*.

McEvoy, G. M., & Cascio, W. F. (1989). Cumulative evidence of the relationship between employee age and job performance. *Journal of Applied Psychology*, *74*, 11–17. https://doi.org/10/ffnjkc

Meisner, B. A. (2012). *A Meta-Analysis of Positive and Negative Age Stereotype Priming Effects on Behavior Among Older Adults*. 5. https://doi.org/10/bvcpst

Mesmer-Magnus, J., Niler, A. A., Plummer, G., Larson, L. E., & DeChurch, L. A. (2017). The cognitive underpinnings of effective teamwork: A continuation. *Career Development International*, *22*(5), 507–519. https://doi.org/10.1108/CDI-08-2017-0140

Meyers, L. S., Gamst, G., & Guarino, A. J. (2013). *Applied multivariate research: Design and interpretation, 2nd ed*. Sage Publications, Inc.

Meyers, M. C., Kooij, D., Kroon, B., de Reuver, R., & van Woerkom, M. (2020). Organizational Support for Strengths Use, Work Engagement, and Contextual Performance: The Moderating Role of Age. *Applied Research in Quality of Life*, *15*(2), 485–502. https://doi.org/10/gj3vwq

Moghimi, D., Zacher, H., Scheibe, S., & Van Yperen, N. W. (2017). The selection, optimization, and compensation model in the work context: A systematic review and meta-analysis of two decades of research. *Journal of Organizational Behavior*, *38*(2), 247–275. https://doi.org/10/gfgvx3

Mosley, P., Winters, G., & Wood, S. (2012). *Wholesale and Retail Sector Skills Assessment 2012*. 174.

Motowidlo, S. J., & Van Scotter, J. R. (1994). Evidence that task performance should be distinguished from contextual performance. *Journal of Applied Psychology*, *79*, 475–480. https://doi.org/10/csff8z

Mueller-Hanson, R. A., & Pulakos, E. D. (2015). *Putting the Performance Back in Performance Management*. 27.

Müller, A., Weigl, M., Heiden, B., Herbig, B., Glaser, J., & Angerer, P. (2013).

Selection, optimization, and compensation in nursing: Exploration of job-specific strategies, scale development, and age-specific associations to work ability. *Journal of Advanced Nursing*, *69*(7), 1630–1642. https://doi.org/10/ghbrpz

Muraven, M., & Baumeister, R. F. (2000). Self-regulation and depletion of limited resources: Does self-control resemble a muscle? *Psychological Bulletin*, *126*(2), 247–259. https://doi.org/10.1037/0033-2909.126.2.247

Murphy, K. R. (2008). Explaining the weak relationship between job performance and ratings of job performance. *Industrial and Organizational Psychology: Perspectives on Science and Practice*, *1*, 148–160. https://doi.org/10.1111/j.1754-9434.2008.00030.x

Murphy, K. R., & DeNisi, A. S. (2021). Do Age Stereotypes Predict Personnel Decisions? The State of the Evidence. *Work, Aging and Retirement*, waab019. https://doi.org/10.1093/workar/waab019

Nagarajan, N. R., Wada, M., Fang, M. L., & Sixsmith, A. (2019). Defining organizational contributions to sustaining an ageing workforce: A bibliometric review. *European Journal of Ageing*, *16*(3), 337–361. https://doi.org/10/gjqnp6

Nagarajan, R., Swamy, R. A., Reio, T. G., Elangovan, R., & Parayitam, S. (2022). The COVID-19 impact on employee performance and satisfaction: A moderated moderated-mediation conditional model of job crafting and employee engagement. *Human Resource Development International*, *0*(0), 1–31. https://doi.org/10.1080/13678868.2022.2103786

Nagele, L. (2017). 5 Age Stereotypes Workplaces Need to Eradicate. *HRNews*. http://www.proquest.com/docview/1996890385/abstract/91DA267E77BC4318PQ/1

Nagy, N., Fasbender, U., & North, M. S. (2019). Youthfuls, Matures, and Veterans: Subtyping Subjective Age in Late-Career Employees. *Work, Aging and Retirement*, *5*(4), 307–322. https://doi.org/10.1093/workar/waz015

Nagy, N., Johnston, C. S., & Hirschi, A. (2019). Do we act as old as we feel? An examination of subjective age and job crafting behaviour of late career employees. *European Journal of Work and Organizational Psychology*, *28*(3), 373–383. https://doi.org/10.1080/1359432X.2019.1584183

Nakai, M., & Ke, W. (2011). *Review of the Methods for Handling Missing Data in Longitudinal Data Analysis*.

Nelson, E. A., & Dannefer, D. (1992). Aged Heterogeneity: Fact or Fiction? The Fate of Diversity in Gerontological Research1. *The Gerontologist*, *32*(1), 17–23. https://doi.org/10.1093/geront/32.1.17

Nerstad, C. G. L., Richardsen, A. M., & Roberts, G. C. (2018). Who are the high achievers at work? Perceived motivational climate, goal orientation profiles, and work performance. *Scand J Psychol*, 18. https://doi.org/10/gjqnsh

Nestler, S. (2021). Dyadic data analysis. In *The Handbook of Personality Dynamics and Processes* (pp. 935–948). Elsevier. https://doi.org/10.1016/B978-0-12-813995-0.00036-4

Ng, E. S., Lyons, S. T., & Schweitzer, L. (2017). Millennials in Canada: Young Workers in a Challenging Labour Market. In E. Parry & J. McCarthy (Eds.), *The Palgrave Handbook of Age Diversity and Work* (pp. 325–344). Palgrave Macmillan UK. https://doi.org/10.1057/978-1-137-46781-2_13

Ng, R., Allore, H. G., Trentalange, M., Monin, J. K., & Levy, B. R. (2015). Increasing Negativity of Age Stereotypes across 200 Years: Evidence from a Database of 400 Million Words. *PLOS ONE*, 6. https://doi.org/10/f66jkg

Ng, T. W. H., & Feldman, D. C. (2008). *The Relationship of Age to Ten Dimensions of Job Performance*. 32. https://doi.org/10/fqkgf7

Ng, T. W. H., & Feldman, D. C. (2010). THE RELATIONSHIPS OF AGE WITH JOB ATTITUDES: A META-ANALYSIS. *Personnel Psychology*, *63*(3), 677–718. https://doi.org/10/c6r67q

Ng, T. W. H., & Feldman, D. C. (2012). *Aging and Participation in Career Development*

Activities. Oxford University Press. https://doi.org/10.1093/oxfordhb/9780195385052.013.0074

Ng, T. W. H., & Feldman, D. C. (2013a). A meta-analysis of the relationships of age and tenure with innovation-related behaviour. *Journal of Occupational and Organizational Psychology*, *86*(4), 585–616. https://doi.org/10/gbdwjt

Ng, T. W. H., & Feldman, D. C. (2013b). Does longer job tenure help or hinder job performance? *Journal of Vocational Behavior*, *83*(3), 305–314. https://doi.org/10/gf84p3

Ng, T. W. H., & Feldman, D. C. (2013c). How do within-person changes due to aging affect job performance? *Journal of Vocational Behavior*, *83*(3), 500–513. https://doi.org/10/ghbrkm

Ng, T. W. H., Koopmann, J., & Lucianetti, L. (2022). Supervisor Age and Embeddedness, Employee Embeddedness, and Job Performance. *Work, Aging and Retirement*, waac003. https://doi.org/10.1093/workar/waac003

Ng, T. W. H., Lam, S. S. K., & Feldman, D. C. (2016). Organizational citizenship behavior and counterproductive work behavior: Do males and females differ? *Journal of Vocational Behavior*, *93*, 11–32. https://doi.org/10/brzr

Nguyen, C. D., Carlin, J. B., & Lee, K. J. (2017). Model checking in multiple imputation: An overview and case study. *Emerging Themes in Epidemiology*, *14*(1), 8. https://doi.org/10.1186/s12982-017-0062-6

Nielsen, T. M., Bachrach, D. G., Sundstrom, E., & Halfhill, T. R. (2012). Utility of OCB: Organizational Citizenship Behavior and Group Performance in a Resource Allocation Framework. *Journal of Management*, *38*(2), 668–694. https://doi.org/10.1177/0149206309356326

Nilsen, C., Agahi, N., & Kåreholt, I. (2017). Work Stressors in Late Midlife and Physical Functioning in Old Age. *Journal of Aging and Health*, *29*(5), 893–911. https://doi.org/10/f3t2d8

Nord, J., Bovaird, J. A., & Fritz, M. S. (2020). Latent Interaction Modeling with Planned

Missing Data Designs. *Structural Equation Modeling: A Multidisciplinary Journal*, *27*(4), 602–612. https://doi.org/10.1080/10705511.2019.1692306

OECD. (2020). *OECD Employment Outlook 2020: Worker Security and the COVID-19 Crisis*. OECD. https://doi.org/10.1787/1686c758-en

Oude Mulders, J., & Henkens, K. (2019). Employers' Adjustment to Longer Working Lives. *Innovation in Aging*, *3*(1). https://doi.org/10/gjqnrh

Pahos, N., Galanaki, E., van der Heijden, B. I. J. M., & de Jong, J. (2021). The Moderating Effect of Age on the Association Between High-Performance Work Systems and Employee Performance in Different Work Roles. *Work, Aging and Retirement*, *7*(3), 214–228. https://doi.org/10.1093/workar/waaa032

Pak, K., Kooij, D. T. A. M., De Lange, A. H., van den Heuvel, S., & Van Veldhoven, M. J. P. M. (2021). The influence of human resource practices on perceived work ability and the preferred retirement age: A latent growth modelling approach. *Human Resource Management Journal*, *31*(1), 311–325. https://doi.org/10/gg3hq9

Park, J. H., Huang, S., Rozenkrants, B., & Kupor, D. (2020). Subjective Age and the Greater Good. *Journal of Consumer Psychology*, jcpy.1177. https://doi.org/10/gjqnqn

Park, S., Kang, H.-S. (Theresa), & Kim, E.-J. (2018). The role of supervisor support on employees' training and job performance: An empirical study. *European Journal of Training and Development*, *42*(1/2), 57–74. https://doi.org/10.1108/EJTD-06-2017-0054

Park, S., Sturman, M. C., Vanderpool, C., & Chan, E. (2015). *Only time will tell: the changing relationships between LMX, job performance, and justice*. 61. https://doi.org/10/f7cbd8

Parker, C., Baltes, B., Young, S., Huff, J., Altmann, R., LaCost, H., & Roberts, J. (2003). Relationships between Psychological Climate Perceptions and Work Outcomes: A Meta-Analytic Review. *Journal of Organizational Behavior*, *24*,

389–416. https://doi.org/10.1002/job.198

Parker, S. K., & Griffin, M. A. (2011). Understanding active psychological states: Embedding engagement in a wider nomological net and closer attention to performance. *European Journal of Work and Organizational Psychology*, *20*(1), 60–67. https://doi.org/10/dpq24q

Peeters, M. C. W., & van Emmerik, H. (2008). An introduction to the work and well-being of older workers: From managing threats to creating opportunities. *Journal of Managerial Psychology*, *23*(4), 353–363. https://doi.org/10.1108/02683940810869006

Pieters, C., Pieters, R., & Lemmens, A. (2022). Six Methods for Latent Moderation Analysis in Marketing Research: A Comparison and Guidelines. *Journal of Marketing Research*, *59*(5), 941–962. https://doi.org/10.1177/00222437221077266

Pinheiro J, Bates D, R Core Team (2023). *nlme: Linear and Nonlinear Mixed Effects Models*. R package version 3.1-163, https://CRAN.R-project.org/package=nlme.

Plumpton, C. O., Morris, T., Hughes, D. A., & White, I. R. (2016). Multiple imputation of multiple multi-item scales when a full imputation model is infeasible. *BMC Research Notes*, *9*, 45. https://doi.org/10.1186/s13104-016-1853-5

Posthuma, R. A., & Campion, M. A. (2009). Age Stereotypes in the Workplace: Common Stereotypes, Moderators, and Future Research Directions†. *Journal of Management*, *35*(1), 158–188. https://doi.org/10/dqjjc8

Posthuma, R. A., Wagstaff, M. F., & Campion, M. A. (2012). *Age Stereotypes and Workplace Age Discrimination: A Framework for Future Research*. 27.

Rankl, F. (2023). *Why have older workers left the labour market?* House of Commons Library.

Redman, T., & Snape, E. (2006). The Consequences of Perceived Age Discrimination Amongst Older Police Officers: Is Social Support a Buffer? *British Journal of*

Management, *17*, 167–175. https://doi.org/10.1111/j.1467-8551.2006.00492.x

Rhemtulla, M., & Little, T. (2012). Tools of the Trade: Planned Missing Data Designs for Research in Cognitive Development. *Journal of Cognition and Development : Official Journal of the Cognitive Development Society*, *13*(4), 10.1080/15248372.2012.717340. https://doi.org/10.1080/15248372.2012.717340

Rhodes, S., Buchsbaum, B. R., & Hasher, L. (2022). The influence of long-term memory on working memory: Age-differences in proactive facilitation and interference. *Psychonomic Bulletin & Review*, *29*(1), 191–202. https://doi.org/10.3758/s13423-021-01981-2

Robitzsch A,. & Grund, S. (2023). *miceadds: Some Additional Multiple Imputation Functions, Especially for 'mice'*. R package version 3.16-18, https://CRAN.R-project.org/package=miceadds.

Rodríguez-Cifuentes, F., Farfán, J., & Topa, G. (2018). Older Worker Identity and Job Performance: The Moderator Role of Subjective Age and Self-Efficacy. *International Journal of Environmental Research and Public Health*, *15*(12), 2731. https://doi.org/10.3390/ijerph15122731

Rollinson, D. (2008). *Organisational Behaviour and Analysis: An Integrated Approach*. Pearson Education.

Rosseel, Y. (2012). lavaan: An *R* Package for Structural Equation Modeling. *Journal of Statistical Software*, *48*(2). https://doi.org/10.18637/jss.v048.i02

Rothenberg, J. Z., & Gardner, D. S. (2011). Protecting older workers: The failure of the age discrimination in Employment Act of 1967. *Journal of Sociology and Social Welfare*, *38*, 9–30.

Rotundo, M., & Sackett, P. R. (2002). The relative importance of task, citizenship, and counterproductive performance to global ratings of job performance: A policy-capturing approach. *Journal of Applied Psychology*, *87*, 66–80.

https://doi.org/10/frn447

Rudolph, C. W. (2016). Lifespan Developmental Perspectives on Working: A Literature Review of Motivational Theories. *Work, Aging and Retirement*, *2*(2), 130–158. https://doi.org/10/gdrbnb

Rudolph, C. W., Katz, I. M., Lavigne, K. N., & Zacher, H. (2017). Job crafting: A meta-analysis of relationships with individual differences, job characteristics, and work outcomes. *Journal of Vocational Behavior*, *102*, 112–138. https://doi.org/10/gctpg2

Rudolph, C. W., Rauvola, R. S., & Zacher, H. (2018). Leadership and generations at work: A critical review. *The Leadership Quarterly*, *29*(1), 44–57. https://doi.org/10/gdm9q9

Rudolph, C. W., & Zacher, H. (2021). Age Inclusive Human Resource Practices, Age Diversity Climate, and Work Ability: Exploring Between- and Within-Person Indirect Effects. *Work, Aging and Retirement*, *7*(4), 387–403. https://doi.org/10.1093/workar/waaa008

Ryan, R. M., & Deci, E. L. (2000). Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development, and Well-Being. *American Psychologist*. https://doi.org/10.1037/0003-066X.55.1.68

Rydzewska, K., von Helversen, B., Kossowska, M., Magnuski, M., Sedek, G. (2018). Age-related within-task adaptations in sequential decision making: Considering cognitive and motivational factors. *Psychology and Aging*, *33*(2), 297–314. https://doi.org/10/gmbt6t

Saleem, F., Malik, M. I., & Qureshi, S. S. (2021). Work Stress Hampering Employee Performance During COVID-19: Is Safety Culture Needed? *Frontiers in Psychology*, *12*. https://doi.org/10.3389/fpsyg.2021.655839

Salthouse, T. (1991). *Theoretical perspectives of cognitive aging*. Erlbaum.

Schafer, M. H., & Shippee, T. P. (2010). Age Identity in Context: Stress and the Subjective Side of Aging. *Social Psychology Quarterly*, *73*(3), 245–264.

https://doi.org/10.1177/0190272510379751

Schalk, R., van Veldhoven, M., de Lange, A. H., De Witte, H., Kraus, K., Stamov-Roßnagel, C., Tordera, N., van der Heijden, B., Zappalà, S., Bal, M., Bertrand, F., Claes, R., Crego, A., Dorenbosch, L., de Jonge, J., Desmette, D., Gellert, F. J., Hansez, I., Iller, C., … Zacher, H. (2010). Moving European research on work and ageing forward: Overview and agenda. *European Journal of Work and Organizational Psychology*, *19*(1), 76–101. https://doi.org/10/ffwv2z

Schaufeli, W. B., Taris, T. W., & van Rhenen, W. (2008). Workaholism, Burnout, and Work Engagement: Three of a Kind or Three Different Kinds of Employee Well-being? *Applied Psychology*, *57*(2), 173–203. https://doi.org/10/dmfc32

Scheibe, S. (2019). Predicting real-world behaviour: Cognition-emotion links across adulthood and everyday functioning at work. *Cognition and Emotion*, *33*(1), 126–132. https://doi.org/10/gmbvkm

Scheibe, S., Yeung, D. Y., & Doerwald, F., (2019). Age-related differences in levels and dynamics of workplace affect. *Psychology and Aging*, *34*(1), 106–123. https://doi.org/10/ghbp2f

Schermuly, C. C., Deller, J., & Büsch, V. (2014). A Research Note on Age Discrimination and the Desire to Retire: The Mediating Effect of Psychological Empowerment. *Research on Aging*, *36*(3), 382–393. https://doi.org/10/gc4m9n

Schippers, M. C., West, M. A., & Dawson, J. F. (2015). Team Reflexivity and Innovation: The Moderating Role of Team Context. *Journal of Management*, *41*(3), 769–788. https://doi.org/10/gdtht9

Schmitt, A., & Unger, D. (2019). Lifespan Perspectives on Occupational Health. In *Work Across the Lifespan* (pp. 369–393). Elsevier. https://doi.org/10.1016/B978-0-12-812756-8.00015-3

Schneider, B., & Barbera, K. M. (Eds.). (2014). *The Oxford Handbook of Organizational Climate and Culture*. Oxford University Press.

https://doi.org/10.1093/oxfordhb/9780199860715.001.0001

Schoemann, A. M., & Jorgensen, T. D. (2021). Testing and Interpreting Latent Variable Interactions Using the semTools Package. *Psych*, *3*(3), 322–335. https://doi.org/10.3390/psych3030024

Schwall, A. R. (2012). *Defining Age and Using Age-Relevant Constructs*. 29.

Sen, D. Y., & Elmas, S. (2015). Effects of Supportive Organizational Climate and Positive Psychological Capital on Organizational Citizenship Behavior. *European Journal of Business and Management*, 7.

Seong, J. Y., & Hong, D.-S. (2018). Age diversity, group organisational citizenship behaviour, and group performance: Exploring the moderating role of charismatic leadership and participation in decision-making. *Human Resource Management Journal*, *28*(4), 621–640. https://doi.org/10.1111/1748-8583.12197

Sharit, J., & Czaja, S. J. (2012). *Job Design and Redesign for Older Workers*. 49.

Singh, J., Karanika-Murray, M., Baguley, T., & Hudson, J. (2020). A Systematic Review of Job Demands and Resources Associated with Compassion Fatigue in Mental Health Professionals. *International Journal of Environmental Research and Public Health*, *17*(19), 6987. https://doi.org/10/gjqnt2

Skirbekk, V., Loichinger, E., & Barakat, B. F. (2012). *The Aging of the Workforce in European Countries: De- mographic Trends, Retirement Projections, and Retire-*. 36.

Slemp, G. R., Kern, M. L., Patrick, K. J., & Ryan, R. M. (2018). Leader autonomy support in the workplace: A meta-analytic review. *Motivation and Emotion*, *42*(5), 706–724. https://doi.org/10.1007/s11031-018-9698-y

Slemp, G. R., Lee, M. A., & Mossman, L. H. (2021). Interventions to support autonomy, competence, and relatedness needs in organizations: A systematic review with recommendations for research and practice. *Journal of Occupational and Organizational Psychology*, *94*(2), 427–457.

https://doi.org/10.1111/joop.12338

Sparrow, P. R., & Davies, D. R. (1988). Effects of age, tenure, training, and job complexity on technical performance. *Psychology and Aging*, *3*, 307–314. https://doi.org/10.1037/0882-7974.3.3.307

Steinmetz, H., Davidov, E., & Schmidt, P. (2011). Three Approaches to Estimate Latent Interaction Effects: Intention and Perceived Behavioral Control in the Theory of Planned Behavior. *Methodological Innovations Online*, *6*(1), 95–110. https://doi.org/10.4256/mio.2010.0030

Stewart, K., & Townley, G. (2020). How Far Have we Come? An Integrative Review of the Current Literature on Sense of Community and Well-being. *American Journal of Community Psychology*, *66*(1–2), 166–189. https://doi.org/10.1002/ajcp.12456

Strauss, K., Griffin, M. A., Parker, S. K., & Mason, C. M. (2015). Building and Sustaining Proactive Behaviors: The Role of Adaptivity and Job Satisfaction. *Journal of Business and Psychology*, *30*(1), 63–72. https://doi.org/10/gckf97

Strengthening Workplace Culture. (2022, October 6). SHRM. https://www.shrm.org/hr-today/trends-and-forecasting/research-and-surveys/pages/2022-global-culture-report.aspx

Sturman, M. C. (2003). *Searching for the Inverted U-Shaped Relationship Between Time and Performance: Meta-Analyses of the Experience/Performance, Tenure/Performance, and Age/Performance Relationships*. 41.

Taneva, S. K., Arnold, J., & Nicolson, R. (2016). The Experience of Being an Older Worker in an Organization: A Qualitative Analysis. *Work, Aging and Retirement*, *2*(4), 396–414. https://doi.org/10.1093/workar/waw011

Thakkar, J. J. (2020). *Structural Equation Modelling: Application for Research and Practice (with AMOS and R)* (Vol. 285). Springer Singapore. https://doi.org/10.1007/978-981-15-3793-6

The Age of People Analytics 2021—Thanks | Visier. (2022). Retrieved 7 July 2022,

from https://www.visier.com/lp/people-analytics-maturity-value-report-thanks/

The Employment Situation—January 2023. (2023). BLS.GOV. Retrieved 1 March 2023, from https://www.bls.gov/news.release/pdf/empsit.pdf

Tribunal Statistics Quarterly: April to June 2021. (2021). GOV.UK. Retrieved 1 March 2023, from https://www.gov.uk/government/statistics/tribunal-statistics-quarterly-april-to-june-2021

Truxillo, D. M., Cadiz, D. M., Rineer, J. R., Zaniboni, S., & Fraccaroli, F. (2012). A lifespan perspective on job design: Fitting the job and the worker to promote job satisfaction, engagement, and performance. *Organizational Psychology Review*, *2*(4), 340–360. https://doi.org/10/gckgcd

Truxillo, D. M., Fraccaroli, F., Yaldiz, L. M., & Zaniboni, S. (2017). Age Discrimination at Work. In E. Parry & J. McCarthy (Eds.), *The Palgrave Handbook of Age Diversity and Work* (pp. 47–65). Palgrave Macmillan UK. https://doi.org/10.1057/978-1-137-46781-2_3

Truxillo, D. M., McCune, E. A., Bertolino, M., & Fraccaroli, F. (2012). Perceptions of Older Versus Younger Workers in Terms of Big Five Facets, Proactive Personality, Cognitive Ability, and Job Performance: Perceptions of Older versus Younger Workers. *Journal of Applied Social Psychology*, *42*(11), 2607–2639. https://doi.org/10/f4fdzp

Turpin, J. R. (2022). Where Did the Workers Go? *Air Conditioning, Heating & Refrigeration News*, *277*(3), 4.

Tziner, A., & Shkoler, O. (2018). *Leadership Styles and Work Attitudes: Does Age Moderate their Relationship?* 7. https://doi.org/10/gfrcs8

Uppal, N. (2017). Uncovering curvilinearity in the organizational tenure-job performance relationship: A moderated mediation model of continuance commitment and motivational job characteristics. *Personnel Review*, *46*(8), 1552–1570. https://doi.org/10/gjqnqw

Urick, M. J. (2017). Towards an Identity-Based Approach for Examining Age in the

Workplace: Perspectives and Implications. In E. Parry & J. McCarthy (Eds.), *The Palgrave Handbook of Age Diversity and Work* (pp. 47–65). Palgrave Macmillan UK. https://doi.org/10.1057/978-1-137-46781-2_3

Van Dalen, H. P., Henkens, K., & Schippers, J. (2010). Productivity of Older Workers: Perceptions of Employers and Employees. *Population and Development Review*, *36*(2), 309–330. https://doi.org/10.1111/j.1728-4457.2010.00331.x

van den Berg, T. I., Robroek, S. J., Plat, J. F., Koopmanschap, M. A., & Burdorf, A. (2011). The importance of job control for workers with decreased work ability to remain productive at work. *International Archives of Occupational and Environmental Health*, *84*(6), 705–712. https://doi.org/10.1007/s00420-010-0588-1

van der Heijden, B. I. J. M., & Nijhof, A. H. J. (2004). The value of subjectivity: Problems and prospects for 360-degree appraisal systems. *The International Journal of Human Resource Management*, *15*, 493–511. https://doi.org/10.1080/0958519042000181223

van Vuuren, T., & Marcelissen, F. (2017). Sturen op eigen regie voor duurzame inzetbaarheid: Een gezamenlijke verantwoordelijkheid van werkgevers én werknemers. *TBV – Tijdschrift voor Bedrijfs- en Verzekeringsgeneeskunde*, *25*(8), 364–367. https://doi.org/10.1007/s12498-017-0138-9

Veldhoven, M. van, & Dorenbosch, L. (2008). Age, proactivity and career development. *Career Development International*, *13*(2), 112–131. https://doi.org/10.1108/13620430810860530

Vickerstaff, S. A., & van der Horst, M. F. (2019). TRAINING AT WORK: THE IMPACT OF INTERNALIZED AGEISM. *Innovation in Aging*, *3*(Supplement_1), S4–S4. https://doi.org/10/gmbsjz

Vindegaard, N., & Benros, M. E. (2020). COVID-19 pandemic and mental health consequences: Systematic review of the current evidence. *Brain, Behavior, and Immunity*, *89*, 531–542. https://doi.org/10/ggzk5r

Virtanen, M., Myllyntausta, S., Kauppi, M., Kivimäki, M., Pentti, J., Ervasti, J., Prakash, K. C., Vahtera, J., & Stenholm, S. (2022). Trajectories of Worktime Control From Midlife to Retirement and Working Beyond Retirement Age. *Work, Aging and Retirement*, *8*(3), 273–281. https://doi.org/10.1093/workar/waab023

von Hippel, P. T. (2009). How to Impute Interactions, Squares, and Other Transformed Variables. *Sociological Methodology*, *39*, 265–291.

Voss, P., Bodner, E., & Rothermund, K. (2018). Ageism: The Relationship between Age Stereotypes and Age Discrimination. *Contemporary Perspectives on Ageism*, 11–31. https://doi.org/10/gm42xc

Waldman, A., & Avolio, B. J. (1986). *A Meta-Analysis of Age Differences in Job Performance*. 6. https://doi.org/10/cm46fm

Waldman, D. A., & Avolio, B. J. (1993). *Aging and work performance in perspective: Contextual and developmental considerations. In K. M. Rowland & G. R. Ferris (Eds.), Research in personnel and human resources management: Vol*. *11*, 133–162.

Wang, M., Burlacu, G., Truxillo, D., James, K., & Yao, X. (2015). Age differences in feedback reactions: The roles of employee feedback orientation on social awareness and utility. *Journal of Applied Psychology*, *100*(4), 1296–1308. https://doi.org/10/f7j83q

Ware, J. E., Kosinski, M., & Keller, S. D. (1996). A 12-Item Short-Form Health Survey: Construction of Scales and Preliminary Tests of Reliability and Validity. *Medical Care*, *34*(3), 220–233. https://doi.org/10.1097/00005650-199603000-00003

Ware, J., Kosinski, M., Turner-Bowker, D., & Gandek, B. (2002). How to score SF-12 items. *SF-12 v2: How to Score Version 2 of the SF-12 Health Survey*, 29–38.

Ware, J. E., & Sherbourne, C. D. (1992). The MOS 36-Item Short-Form Health Survey (SF-36): I. Conceptual Framework and Item Selection. *Medical Care*, *30*(6), 473–483.

Warr, P. (1994). Handbook of industrial and organizational psychology: Vol. 4, 485–550. In *Age and employment.* Consulting Psychologists Press.

Warr, P. (2007). *Work, happiness, and unhappiness.* Lawrence Erlbaum Associates Publishers.

Warr, P. (2008). Work values: Some demographic and cultural correlates. *Journal of Occupational and Organizational Psychology, 81*(4), 751–775. https://doi.org/10.1348/096317907X263638

Weigl, M., Müller, A., Hornung, S., Zacher, H., & Angerer, P. (2013). The moderating effects of job control and selection, optimization, and compensation strategies on the age–work ability relationship. *Journal of Organizational Behavior*, *34*, 607–628. https://doi.org/10.1002/job.1810

Weinberg, A., Doyle, N., Scott, K., Coulthard, L. M., & British Psychological Society. (2017). *Psychology at work: Improving wellbeing and productivity in the workplace*.

Weiss, D. (2020). When and Why Does Subjective Age Boost Competence and Proactive Work Behavior? *Innovation in Aging*, *4*(Supplement_1), 620. https://doi.org/10.1093/geroni/igaa057.2110

Weiss, D., & Weiss, M. (2019). Why People Feel Younger: Motivational and Social-Cognitive Mechanisms of the Subjective Age Bias and Its Implications for Work and Organizations. *Work, Aging and Retirement*, *5*(4), 273–280. https://doi.org/10.1093/workar/waz016

Weston, R., & Gore, P. A. (2006). A Brief Guide to Structural Equation Modeling. *The Counseling Psychologist*, *34*(5), 719–751. https://doi.org/10.1177/0011000006286345

White, M. S., Burns, C., & Conlon, H. A. (2018). The Impact of an Aging Population in the Workplace. *Workplace Health & Safety*, *66*(10), 493–498. https://doi.org/10/gfb96m

Wilckens, M. R., Wöhrmann, A. M., Deller, J., & Wang, M. (2021). Organizational

Practices for the Aging Workforce: Development and Validation of the Later Life Workplace Index. *Work, Aging and Retirement*, *7*(4), 352–386. https://doi.org/10.1093/workar/waaa012

Wiley, C. (1997). What motivates employees according to over 40 years of motivation surveys. *International Journal of Manpower*, *18*(3), 263–280. https://doi.org/10/b8sr2t

Wilson, R. S., Li, Y., Bienias, L., & Bennett, D. A. (2006). Cognitive decline in old age: Separating retest effects from the effects of growing older. *Psychology and Aging*, *21*(4), 774–789. https://doi.org/10.1037/0882-7974.21.4.774

World Health Organization. (2022). *World mental health report: Transforming mental health for all*. World Health Organization. https://apps.who.int/iris/handle/10665/356119

Wurm, S., Diehl, M., Kornadt, A. E., Westerhof, G. J., & Wahl, H. W. (2017). How do views on aging affect health outcomes in adulthood and late life? Explanations for an established connection. *Developmental Review*, *46*, 27–43. https://doi.org/10/gckspn

Zacher, H. (2021). Wellbeing and Age in Organizational Life. In T. Wall, C. Cooper, & P. Brough, *The SAGE Handbook of Organizational Wellbeing* (pp. 41–55). SAGE Publications Ltd. https://doi.org/10.4135/9781529757187.n4

Zacher, H., Dirkers, B. T., Korek, S., & Hughes, B. (2017). Age-Differential Effects of Job Characteristics on Job Attraction: A Policy-Capturing Study. *Frontiers in Psychology*, *8*, 1124. https://doi.org/10/gjqnsj

Zacher, H., & Griffin, B. (2015). Older Workers' Age as a Moderator of the Relationship Between Career Adaptability and Job Satisfaction. *Work, Aging and Retirement*, *1*(2), 227–236. https://doi.org/10.1093/workar/wau009

Zacher, H., Heusner, S., Schmitz, M., Zwierzanska, M. M., & Frese, M. (2010). Focus on opportunities as a mediator of the relationships between age, job complexity, and work performance. *Journal of Vocational Behavior*, 13.

https://doi.org/10/ckz6xm

Zacher, H., & Rudolph, C. W. (2017). Successful Aging at Work and Beyond: A Review and Critical Perspective. In S. Profili, A. Sammarra, & L. Innocenti (Eds.), *Advanced Series in Management* (Vol. 17, pp. 35–64). Emerald Publishing Limited. https://doi.org/10.1108/S1877-636120170000017004

Zacher, H., & Rudolph, C. W. (2019). Just a Mirage: On the Incremental Predictive Validity of Subjective Age. *Work, Aging and Retirement*, *5*(2), 141–162. https://doi.org/10.1093/workar/wax031

Zacher, H., & Yang, J. (2016). Organizational Climate for Successful Aging. *Frontiers in Psychology*, *7*. https://doi.org/10/f8s88f

Zaniboni, S., Truxillo, D. M., & Fraccaroli, F. (2013). Differential effects of task variety and skill variety on burnout and turnover intentions for older and younger workers. *European Journal of Work and Organizational Psychology*, *22*(3), 306–317. https://doi.org/10.1080/1359432X.2013.782288

Zhang, L., & Farndale, E. (2021). Workforce age profile effects on job resources, work engagement and organizational citizenship behavior. *Personnel Review*, *51*(1), 194–209. https://doi.org/10.1108/PR-02-2020-0095

Zhang, L., Jiang, H., & Jin, T. (2020). Leader-member exchange and organisational citizenship behaviour: The mediating and moderating effects of role ambiguity. *Journal of Psychology in Africa*, *30*(1), 17–22. https://doi.org/10/gjqnqc

Zhang, W., & Wood, S. (2022). Awareness of age-related change, chronological age, subjective age and proactivity: An empirical study in China. *Frontiers in Psychiatry*, *13*. https://doi.org/10.3389/fpsyt.2022.915673

Zhang, Y., Zhang, J., & Li, J. (2018). The effect of intrinsic and extrinsic goals on work performance: Prospective and empirical studies on goal content theory. *Personnel Review*, *47*(4), 900–912. https://doi.org/10/gjqnsf

Zhu, S., Zhao, J., Chen, Z., & Wang, Y. (2018). Influential factors on cognitive performance in middle-aged cohort: Third National Health and Nutrition

Examination Survey-based study. *Medicine*, *97*(37), e12033. https://doi.org/10/gjqnqs

Zwick, T. (2011). Why Training Older Employees is Less Effective. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.1886428

Zwick, T. (2015). Training older employees: What is effective? *International Journal of Manpower*, *36*(2), 136–150. https://doi.org/10/ghbrpv

Appendix 1: Employee-only Information Sheet, Consent, and Survey Link (OSF)

Note. Due to survey length, a pdf version has been uploaded to the OSF repository:

https://osf.io/kp3y7/?view_only=9063147b3e3546709bb8271dfc99a5dd

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INFORMATION SHEET & TERMS OF CONSENT

Purpose of the Study: This research project aims to examine the relationship between employee perceptions of the work climate and job performance, and whether the strength of this relationship differs between age groups. This data ought to guide HR policies and workplace initiatives that can facilitate the job performance of specific age groups.

What will the study involve? The study will examine your perceptions of the work climate and your own job performance. This will include a workplace questionnaire that asks questions about your job role and aspects of performance.

Will your participation in the study be kept anonymous? Yes. Personal information is not required. Where organisations have agreed to participate, anonymity will be achieved by applying unique codes to identify individual and organisational information. This means that neither supervisor nor employee will know the identity of those responding.

Do you have to take part? No, participation is voluntary. You can withdraw at any time before and during data collection, and up to 28 days after submitting your questionnaire. You do not need to provide any reasons for this and there will be no

repercussions as a result. Please email (ben.evans2017@my.ntu.ac.uk) within 28 days of submission if you want to withdraw.

What will happen to the information which you give? Any information provided will be treated as strictly confidential and only the research team will be able to access the data once collected. Where applicable, data will be 'coded' by applying unique identifiers after submission, making the data anonymous. This means that any data used will not link to individual or organizational identities.

What will happen to the results? After they have been anonymised, the results will be summarised and presented in aggregate form within the thesis so that there are no links to individual employee or organisational identities. They will be viewed by the supervisory team, examiners, and may also be read by other academics once published. If requested, these aggregated reports can also be sent to organisations. Again, individual identities of employees and organisations will be unidentifiable in these reports.

What are the possible advantages/disadvantages of taking part? The researcher hopes to discover workplace issues related to specific ages; in addition to facilitating current strategies that address issues in the ageing workforce. I do not foresee any negative consequences for you taking part in this study.

Who has reviewed this study? This study has been reviewed and approved by the supervisory team (see header) and Nottingham Trent University's College Research Ethics Committee to ensure that this study abides by ethical guidelines, and to ensure the safety and privacy of participants.

Any problems or further queries? If you have any problems or need any further information, you can contact the researcher (Ben Evans):

ben.evans2017@my.ntu.ac.uk, or the Director of Studies (Professor Thomas Baguley: Thomas.baguley@ntu.ac.uk).

Terms of Consent:

1. I have read and understood the information provided for this study.
2. I have been provided with contact details to ask any questions that I have regarding the study.
3. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason.
4. I understand that, none of my personal information will be included and responses will in no way link back to me or the company that I work for or be of any personal harm.
5. I understand that data will be anonymised before being used in this study and possible future publications.

Appendix 2: Supervisor-only Information Sheet, Consent, and Survey

Note. Due to survey length, a pdf version has been uploaded to the OSF repository:

https://osf.io/kp3y7/?view_only=9063147b3e3546709bb8271dfc99a5dd

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INFORMATION SHEET & TERMS OF CONSENT

Purpose of the Study: This research project aims to examine the relationship between employee perceptions of the work climate and job performance, and whether the strength of this relationship differs between age groups. This data ought to guide HR policies and workplace initiatives that can facilitate the job performance of specific age groups.

What will the study involve? The study will examine perceptions of the work climate and job performance. As a supervisor, you will complete a 2-3 minute survey on each of your team members performance. Each team member will complete a separate questionnaire.

Will your participation in the study be kept anonymous? Yes. Personal information is not required. Where organisations have agreed to participate, anonymity will be achieved by applying unique codes to identify individual and organisational information. This means that neither supervisor nor employee will know the identity of those responding.

Do you have to take part? No, participation is voluntary. You can withdraw at any time before and during data collection, and up to 28 days after submitting your

questionnaire. You do not need to provide any reasons for this and there will be no repercussions as a result. Please email (ben.evans2017@my.ntu.ac.uk) within 28 days of submission if you want to withdraw.

What will happen to the information which you give? Any information provided will be treated as strictly confidential and only the researcher and their directors of studies will be able to access the data once collected. Personal information will be 'coded' by applying unique identifiers after submission, making the data anonymous (i.e. will not link to individual or organisational identities).

What will happen to the results? Data will be summarised and presented in aggregate form so that there are no links to individual employee or organisational identities. They will be viewed by the supervisory team, examiners, and may also be read by other academics once published. If requested, these aggregated reports can also be sent to organisations. Again, individual identities of employees and organisations will be unidentifiable.

What are the possible advantages/disadvantages of taking part? The researcher hopes to discover age-related workplace issues, general perceptions of the workplace climate, and potential relationships with job performance. This will allow conclusions to be formed that shed light on the implications of certain workplace factors and the ageing workforce. I do not foresee any negative consequences for you taking part in this study.

Who has reviewed this study? This study has been reviewed and approved by the supervisory team (see header) and Nottingham Trent University's College Research Ethics Committee to ensure that this study abides by ethical guidelines, and to ensure the safety and privacy of participants.

Any problems or further queries? If you have any problems or need any further information, please contact either:

Researcher (Ben Evans: ben.evans2017@my.ntu.ac.uk).

Director of Studies (Professor Thomas Baguley: Thomas.baguley@ntu.ac.uk).

Terms of Consent:

1. I have read and understood the information provided for this study.
2. I have been provided with contact details to ask any questions that I have regarding the study.
3. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason.
4. I understand that, none of my personal information will be included and responses will in no way link back to me or the company that I work for or be of any personal harm.
5. I understand that data will be anonymised before being used in this study and possible future publications.

Appendix 3: Confirmatory Factor Analysis Results for Performance

Comparison of Alternative Factor Structures for Work-Role Performance in Sample A						
Models	*df*	χ^2	CFI	TLI	RMSEA	SRMR
*Nine Factors**	288	670.84	0.93	0.91	0.06	0.04
Three Factors						
Proficiency, Adaptivity, and Proactivity	321	1234.88	0.83	0.81	0.09	0.06
Three Factors (item parceling)						
Proficiency, Adaptivity, and Proactivity	24	164.88	0.94	0.90	0.12	0.04

		Results of Confirmatory Factor Analysis of Performance Items	
Constructs	α	Estimate	Standardised
Individual Task Proficiency	0.80		
Item 1		1.00	0.80
Item 2		0.91	0.75
Item 3		0.95	0.72
Individual Task Adaptivity	0.73		
Item 1		1.00	0.77
Item 2		0.88	0.70
Item 3		0.83	0.63
Individual Task Proactivity	0.82		
Item 1		1.00	0.82
Item 2		0.92	0.74
Item 3		0.97	0.77
Team Member Proficiency	0.78		
Item 1		1.00	0.75
Item 2		1.02	0.79
Item 3		0.85	0.69
Team Member Adaptivity	0.68		
Item 1		1.00	0.62
Item 2		1.20	0.65
Item 3		1.10	0.66
Team Member Proactivity	0.77		
Item 1		1.00	0.67
Item 2		1.11	0.75
Item 3		1.17	0.78
Organisation Member Proficiency	0.75		
Item 1		1.00	0.70
Item 2		1.06	0.72
Item 3		1.06	0.71
Organisation Member Adaptivity	0.78		
Item 1		1.00	0.75
Item 2		0.98	0.74
Item 3		1.08	0.73
Organisation Member Proactivity	0.78		
Item 1		1.00	0.73
Item 2		1.05	0.73
Item 3		1.08	0.76

Note.
α = Cronbach's Alpha

Appendix 4: Confirmatory Factor Analysis Results for Climate

Comparison of Alternative Factor Structures for Work Climate in Sample A						
Models	*df*	χ^2	CFI	TLI	RMSEA	SRMR
Nine Factors Full Model	341	826.85.72	0.93	0.92	0.06	0.04
Eight Factors Feedback dropped	271	674.61	0.93	0.92	0.06	0.04
*Seven Factors** Feedback and Trust dropped	231	536.14	0.94	0.93	0.06	0.04
Three Factors Autonomy-Supportive, Competence-Supportive, Relatedness-Supportive	374	1627.86	0.82	0.81	0.09	0.06
Three Factors (item parceling) Autonomy-Supportive, Competence-Supportive, Relatedness-Supportive	36	1949.34	0.98	0.97	0.06	0.03

		Results of Confirmatory Factor Analysis of Climate Items	
Factors and Items	α	Estimate	Standardised
Decision Making	0.79		
Item 1		1.00	0.66
Item 2		1.09	0.82
Item 3		1.04	0.78
Work Planning	0.83		
Item 1		1.00	0.77
Item 2		0.95	0.82
Item 3		0.89	0.77
Role Flexibility	0.85		
Item 1		1.00	0.83
Item 2		0.95	0.82
Item 3		0.89	0.78
Appreciation	0.84		
Item 1		1.00	0.78
Item 2		1.07	0.87
Item 3		1.07	0.79
Supportive Management	0.89		
Item 1		1.00	0.80
Item 2		0.91	0.79
Item 3		0.96	0.83
Item 4		1.11	0.88
Social Support	0.83		
Item 1		1.00	0.76
Item 2		1.19	0.91
Item 3		1.04	0.70
Sense of Community	0.84		
Item 1		1.00	0.77
Item 2		0.94	0.79
Item 3		1.08	0.78
Item 4		0.98	0.82
Item 5		0.87	0.68

Note.
α = Cronbach's Alpha

Appendix 5: Individual Structural Equation Modelling Results (Blocks 1 – 5)

		Individual Task Proficiency			
Block	**Variable**	**Unstandardised Coefficient**	X^2	*df*	R^2
1 (Control Variables)			1152.27	554	0.016
	Job Tenure	-0.01 [-0.03, 0.00]			
	Organisation Tenure	0.02 [0.00, 0.04]			
	Management Level	0.06 [-0.05, 0.16]			
	Contract Status	0.01 [-0.15, 0.17]			
CFI = 0.92; TLI = 0.91; RMSEA = 0.05; SRMR = 0.09					
2 (Age Constructs)			1341.22	644	0.225
	Calendar Age	-0.01 [-0.02, 0.00]			
	Physical Health	**0.03*** [0.02, 0.03]**			
	Mental Health	**0.01** [0.00, 0.02]**			
	Subjective Age Identity	**0.17** [0.06, 0.28]**			
CFI = 0.91; TLI = 0.89; RMSEA = 0.05; SRMR = 0.07					
3 (Individual Entry of Climate Variables)					
	Decision Making	**0.20*** [0.13, 0.28]**			0.322
	CA*Decision Making	0.001 [-0.004, 0.007]			0.322
	SA*Decision Making	0.063 [-0.057, 0.183]			0.327
	Work Planning	**0.16*** [0.10, 0.21]**			0.319
	CA*Work Planning	-0.001 [-0.01, 0.00]			0.320
	SA*Work Planning	-0.010 [-0.11, 0.09]			0.319
	PH*Work Planning	0.005 [0.00, 0.01]			0.323
	MH*Work Planning	**0.007* [0.00, 0.01]**			0.326
	Role Flexibility	**0.20*** [0.14, 0.26]**			0.360
	CA*Role Flexibility	-0.004 [-0.009, 0.001]			0.367
	SA*Role Flexibility	-0.008 [-0.102, 0.085]			0.360
	PH*Role Flexibility	**0.006* [0.00, 0.01]**			0.368
	MH*Role Flexibility	0.003 [0.00, 0.01]			0.362
	Appreciation	**0.13*** [0.07, 0.19]**			0.290
	CA*Appreciation	0.000 [-0.006, 0.005]			0.291
	SA*Appreciation	-0.058 [-0.146, 0.03]			0.295
	Supportive Management	**0.13*** [0.07, 0.18]**			0.284
	CA*Supportive Management	-0.004 [-0.009, 0.001]			0.290
	SA*Supportive Management	**-0.112* [-0.205, -0.019]**			0.300
	Social Support	**0.12*** [0.06, 0.19]**			0.274
	Sense of Community	**0.22*** [0.15, 0.29]**			0.349
4 (Simultaneous Entry of Climate Variables)			1622.00	826	0.407
Age					
	Calendar Age	0.00 [-0.01, 0.01]			
	Physical Health	**0.02*** [0.01, 0.03]**			
	Mental Health	**0.01** [0.00, 0.02]**			
	Subjective Age Identity	0.03 [-0.09, 0.15]			
Climate					
	Decision Making	0.06 [-0.18, 0.31]			
	Work Planning	-0.09 [-0.33, 0.15]			
	Role Flexibility	**0.17* [0.04, 0.31]**			
	Appreciation	-0.01 [-0.18, 0.16]			
	Supportive Management	0.06 [-0.07, 0.19]			
	Social Support	0.02 [-0.06, 0.11]			
	Sense of Community	0.10 [-0.03, 0.24]			
Interactions					
	SA*Supportive Management	-0.057 [-0.16, 0.05]			
	MH*Work Planning	0.005 [0.00, 0.01]			
	PH*Role Flexibility	0.006 [0.00, 0.01]			
CFI = 0.93; TLI = 0.91; RMSEA = 0.05; SRMR = 0.05; AIC = 48174.87					
5 (Final Model after Stepwise Selection)			168.17	91	0.382
Age					
	Physical Health	**0.02*** [0.02, 0.03]**			
	Mental Health	**0.01** [0.00, 0.02]**			
Climate					
	Role Flexibility	**0.15*** [0.06, 0.23]**			
	Sense of Community	**0.13** [0.04, 0.21]**			
CFI = 0.97; TLI = 0.95; RMSEA = 0.05; SRMR = 0.04; AIC = 22863.15					

Note. N = 393;
CA = Calendar Age;
SA = Subjective Age;
PH = Physical Health;
MH = Mental Health;
Eliminated variables are omitted from block 5.
Interaction significance threshold set at * p ≤ .10, otherwise;
* p ≤ .05,
** p ≤ .01,
*** p ≤ .001

		Team Member Proficiency			
Block	**Variable**	**Unstandardised Coefficient**	X^2	*df*	R^2
1 (Control variables)			1186.63	554	0.013
	Job Tenure	0.00 [-0.02, 0.02]			
	Organisation Tenure	0.01 [-0.01, 0.03]			
	Management Level	0.00 [-0.11, 0.10]			
	Contract Status	0.12 [-0.04, 0.28]			
CFI = 0.92; TLI = 0.90; RMSEA = 0.05; SRMR = 0.08					
2 (Age Constructs)			1352.23	644	0.129
	Calendar Age	0.00 [-0.01, 0.01]			
	Physical Health	**0.02*** [0.01, 0.03]**			
	Mental Health	0.00 [-0.01, 0.01]			
	Subjective Age Identity	**0.19** [0.07, 0.32]**			
CFI = 0.91; TLI = 0.89; RMSEA = 0.05; SRMR = 0.07					
3 (Individual Entry of Climate Variables)					
	Decision Making	**0.22*** [0.14, 0.31]**			0.256
	Work Planning	**0.16*** [0.09, 0.22]**			0.235
	Role Flexibility	**0.21*** [0.14, 0.28**			0.271
	Appreciation	**0.10** [0.03, 0.16]**			0.183
	CA*Appreciation	0.002 [-0.003, 0.007]			0.184
	SA*Appreciation	**-0.090* [-0.190, 0.010]**			0.192
	Supportive Management	**0.08* [0.02, 0.14]**			0.174
	CA*Supportive Management	-0.004 [-0.009, 0.002]			0.178
	SA*Supportive Management	**-0.110* [-0.216, -0.005]**			0.186
	Social Support	**0.15*** [0.08, 0.22]**			0.212
	CA*Social Support	0.001 [-0.005, 0.008]			0.213
	SA*Social Support	-0.055 [-0.169, 0.059]			0.214
	Sense of Community	**0.23*** [0.15, 0.31]**			0.261
	CA*Sense of Community	0.004 [-0.003, 0.011]			0.265
	SA*Sense of Community	**-0.133* [-0.255, 0.010]**			0.275
4 (Simultaneous Entry of Climate Variables)			2229.31	1140	0.341
Age					
	Calendar Age	0.00 [-0.01, 0.01]			
	Physical Health	**0.02** [0.01, 0.03]**			
	Mental Health	0.01 [0.00, 0.02]			
	Subjective Age Identity	0.04 [-0.11, 0.18]			
Climate					
	Decision Making	0.24 [-0.08, 0.56]			
	Work Planning	-0.06 [-0.15, 0.05]			
	Role Flexibility	0.13 [0.02, 0.37]			
	Appreciation	0.07 [-0.09, 0.23]			
	Supportive Management	0.01 [-0.15, 0.17]			
	Social Support	0.06 [-0.04, 0.16]			
	Sense of Community	0.13 [-0.05, 0.31]			
Interactions					
	SA*Appreciation	-0.013 [-0.24, 0.21]			
	SA*Supportive Management	-0.04 [-0.28, 0.19]			
	SA*Sense of Community	**-0.189* [-0.39, 0.01]**			
CFI = 0.90; TLI = 0.88; RMSEA = 0.05; SRMR = 0.05; AIC = 68561.78					
5 (Final Model after Stepwise Selection)			285.58	175	0.309
Age					
	Physical Health	**0.02*** [0.01, 0.03]**			
	Subjective Age Identity	0.08 [-0.05, 0.21]			
Climate					
	Role Flexibility	**0.13** [0.04, 0.22]**			
	Sense of Community	**0.15** [0.04, 0.25]**			
Interactions					
	SA*Sense of Community	**-0.114* [-0.24, 0.01]**			
CFI = 0.96; TLI = 0.95; RMSEA = 0.04; SRMR = 0.04; AIC = 24495.20					

Note. N = 393;
CA = Calendar Age;
SA = Subjective Age;
PH = Physical Health;
MH = Mental Health;
Eliminated variables are omitted from block 5.
Interaction significance threshold set at * $p \leq .10$, otherwise;
* $p \leq .05$,
** $p \leq .01$,
*** $p \leq .001$

		Organisation Member Proficiency			
Step	**Variable**	***Unstandardised Coefficient***	X^2	***df***	R^2
1 (Control variables)			1240.46	554	0.032
	Job Tenure	0.00 [-0.02, 0.01]			
	Organisation Tenure	0.00 [-0.02, 0.01]			
	Management Level	**0.11* [0.02, 0.20]**			
	Contract Status	0.06 [-0.07, 0.19]			
CFI = 0.91; TLI = 0.90; RMSEA = 0.06; SRMR = 0.11					
2 (Age Constructs)			1405.28	644	0.178
	Calendar Age	-0.01 [-0.01, 0.00]			
	Physical Health	**0.01** [0.00, 0.02]**			
	Mental Health	**0.01*** [0.01, 0.02]**			
	Subjective Age Identity	**0.22*** [0.11, 0.32]**			
CFI = 0.90; TLI = 0.88; RMSEA = 0.06; SRMR = 0.09					
3 (Individual Entry of Climate Variables)					
	Decision Making	**0.30*** [0.22, 0.38]**			0.417
	Work Planning	**0.26*** [0.20, 0.32]**			0.455
	Role Flexibility	**0.25*** [0.19, 0.31]**			0.404
	Appreciation	**0.23*** [0.17, 0.29]**			0.405
	CA*Appreciation	**0.005* [0.000, 0.009]**			0.413
	SA*Appreciation	-0.008 [-0.084, 0.069]			0.405
	Supportive Management	**0.23*** [0.17, 0.29]**			0.414
	CA*Supportive Management	0.002 [-0.002, 0.007]			0.418
	SA*Supportive Management	-0.049 [-0.128, 0.031]			0.418
	Social Support	**0.12*** [0.05, 0.18]**			0.225
	Sense of Community	**0.26*** [0.19, 0.34]**			0.384
4 (Simultaneous Entry of Climate Variables)			1076.57	573	0.504
Age					
	Calendar Age	0.00 [-0.01, 0.01]			
	Physical Health	**0.01** [0.00, 0.02]**			
	Mental Health	**0.01* [0.00, 0.01]**			
	Subjective Age Identity	0.08 [-0.03, 0.19]			
Climate					
	Decision Making	-0.03 [-0.25, 0.18]			
	Work Planning	0.16 [-0.03, 0.35]			
	Role Flexibility	0.05 [-0.07, 0.17]			
	Appreciation	0.02 [-0.09, 0.13]			
	Supportive Management	0.09 [-0.03, 0.21]			
	Social Support	0.01 [-0.07, 0.08]			
	Sense of Community	0.10 [-0.02, 0.22]			
Interactions					
	CA*Appreciation	0.003 [0.00, 0.01]			
CFI = 0.93; TLI = 0.91; RMSEA = 0.05; SRMR = 0.05; AIC = 54532.76					
5 (Final Model after Stepwise Selection)			272.38	151	0.499
Age					
	Physical Health	**0.01** [0.00, 0.02]**			
	Mental Health	**0.01** [0.00, 0.02]**			
Climate					
	Work Planning	**0.18*** [0.10, 0.26]**			
	Supportive Management	**0.10** [0.03, 0.17]**			
	Sense of Community	**0.09* [0.01, 0.18]**			
CFI = 0.96; TLI = 0.95; RMSEA = 0.05; SRMR = 0.04; AIC = 28120.49					

Note. N = 393;
CA = Calendar Age;
SA = Subjective Age;
PH = Physical Health;
MH = Mental Health;
Eliminated variables are omitted from block 5.
Interaction significance threshold set at * $p \leq .10$, otherwise;
* $p \leq .05$,
** $p \leq .01$,
*** $p \leq .001$

		Individual Task Adaptivity			
Block	**Variable**	***Unstandardised Coefficient***	X^2	*df*	R^2
1 (Control variables)			1170.44	554	0.028
	Job Tenure	-0.01 [-0.03, 0.01]			
	Organisation Tenure	-0.01 [-0.02, 0.01]			
	Management Level	0.09 [-0.02, 0.19]			
	Contract Status	-0.04 [-0.20, 0.12]			
CFI = 0.92; TLI = 0.91; RMSEA = 0.05; SRMR = 0.09					
2 (Age Constructs)			1334.89	644	0.242
	Calendar Age	**-0.02*** [-0.02, -0.01]**			
	Physical Health	**0.02*** [0.01, 0.03]**			
	Mental Health	**0.01** [0.00, 0.02]**			
	Subjective Age Identity	**0.21*** [0.10, 0.32]**			
CFI = 0.91; TLI = 0.89; RMSEA = 0.05; SRMR = 0.07					
3 (Individual Entry of Climate Variables)					
	Decision Making	**0.23*** [0.15, 0.31]**			0.365
	CA*Decision Making	0.001 [-0.005, 0.007]			0.365
	SA*Decision Making	-0.031 [-0.151, 0.088]			0.366
	Work Planning	**0.19*** [0.13, 0.25]**			0.376
	CA*Work Planning	**0.005* [0.00, 0.01]**			0.384
	SA*Work Planning	-0.008 [-0.107, 0.092]			0.376
	PH*Work Planning	0.003 [0.00, 0.01]			0.376
	MH*Work Planning	0.002 [0.00, 0.01]			0.376
	Role Flexibility	**0.21*** [0.15, 0.27]**			0.381
	CA*Role Flexibility	0.002 [-0.003, 0.008]			0.381
	SA*Role Flexibility	-0.029 [-0.126, 0.069]			0.381
	PH*Role Flexibility	**0.006* [0.00, 0.01]**			0.395
	MH*Role Flexibility	-0.004 [-0.01, 0.00]			0.381
	Appreciation	**0.15*** [0.09, 0.21]**			0.323
	CA*Appreciation	**0.007* [0.002, 0.013]**			0.340
	SA*Appreciation	-0.024 [-0.112, 0.063]			0.324
	Supportive Management	**0.15*** [0.09, 0.20]**			0.321
	CA*Supportive Management	0.000 [-0.005, 0.005]			0.321
	SA*Supportive Management	**-0.142* [-0.234, -0.050]**			0.349
	Social Support	**0.10** [0.03, 0.17]**			0.269
	Trust	**0.19*** [0.12, 0.26]**			0.324
	Sense of Community	**0.19*** [0.11, 0.26]**			0.322
4 (Simultaneous Entry of Climate Variables)			1898.35	946	0.439
Age					
	Calendar Age	-0.01 [-0.02, 0.00]			
	Physical Health	**0.02*** [0.01, 0.03]**			
	Mental Health	0.01 [0.00, 0.02]			
	Subjective Age Identity	0.07 [-0.06, 0.20]			
Climate					
	Decision Making	0.01 [-0.22, 0.24]			
	Work Planning	0.02 [-0.22, 0.25]			
	Role Flexibility	**0.14* [0.01, 0.28]**			
	Appreciation	-0.03 [-0.22, 0.17]			
	Supportive Management	0.09 [-0.03, 0.24]			
	Social Support	0.02 [-0.07, 0.10]			
	Sense of Community	0.01 [-0.13, 0.15]			
Interactions					
	CA*Work Planning	0.004 [-0.01, 0.01]			
	CA*Appreciation	0.001 [-0.01, 0.01]			
	SA*Supportive Management	**-0.118* [-0.21, -0.03]**			
	PH*Role Flexibility	**0.01** [0.00, 0.02]**			
CFI = 0.91; TLI = 0.89; RMSEA = 0.05; SRMR = 0.05; AIC = 75311.47					
5 (Final Model after Stepwise Selection)			726.37	350	0.430
Age					
	Calendar Age	-0.01 [-0.02, 0.00]			
	Physical Health	**0.02*** [0.01, 0.03]**			
	Mental Health	**0.01* [0.00, 0.02]**			
	Subjective Age Identity	0.07 [-0.05, 0.19]			
Climate					
	Work Planning	0.01 [-0.14, 0.16]			
	Role Flexibility	**0.15* [0.01, 0.29]**			
	Supportive Management	**0.07* [0.00, 0.14]**			
Interactions					
	CA*Work Planning	**0.005* [0.00, 0.01]**			
	SA*Supportive Management	**-0.115* [-0.21, -0.01]**			
	PH*Role Flexibility	**0.009** [0.00, 0.02]**			
CFI = 0.94; TLI = 0.91; RMSEA = 0.05; SRMR = 0.04; AIC = 50339.82					

Note. N = 393;
CA = Calendar Age;
SA = Subjective Age;
PH = Physical Health;
MH = Mental Health;
Eliminated variables are omitted from block 5.
Interaction significance threshold set at * $p \leq .10$, otherwise;
* $p \leq .05$,
** $p \leq .01$,
*** $p \leq .001$

		Team Member Adaptivity			
Block	**Variable**	***Unstandardised Coefficient***	X^2	***df***	R^2
1 (Control variables)			1156.23	554	0.023
	Job Tenure	-0.01 [-0.02, 0.00]			
	Organisation Tenure	0.00 [-0.01, 0.01]			
	Management Level	0.04 [-0.04, 0.12]			
	Contract Status	0.06 [-0.06, 0.18]			
CFI = 0.92; TLI = 0.91; RMSEA = 0.05; SRMR = 0.08					
2 (Age Constructs)			1331.15	644	0.141
	Calendar Age	-0.01 [-0.01, 0.00]			
	Physical Health	**0.01*** [0.01, 0.02]**			
	Mental Health	**0.01* [0.00, 0.01]**			
	Subjective Age Identity	0.07 [-0.02, 0.16]			
CFI = 0.91; TLI = 0.89; RMSEA = 0.05; SRMR = 0.07					
3 (Individual Entry of Climate Variables)					
	Decision Making	**0.19*** [0.12, 0.26]**			0.284
	Work Planning	**0.16*** [0.10, 0.21]**			0.296
	Role Flexibility	**0.16*** [0.11, 0.22]**			0.288
	Appreciation	**0.12*** [0.06, 0.17]**			0.220
	Supportive Management	**0.11*** [0.06, 0.16]**			0.218
	Social Support	**0.06* [0.01, 0.12]**			0.160
	CA*Social Support	0.001 [-0.003, 0.006]			0.166
	SA*Social Support	-0.048 [-0.135, 0.039]			0.165
	Sense of Community	**0.15*** [0.09, 0.21]**			0.235
	CA*Sense of Community	0.002 [-0.003, 0.007]			0.237
	SA*Sense of Community	**-0.098* [-0.191, -0.005]**			0.251
4 (Simultaneous Entry of Climate Variables)			1177.75	648	0.323
Age					
	Calendar Age	0.00 [-0.01, 0.00]			
	Physical Health	**0.01** [0.01, 0.02]**			
	Mental Health	0.01 [0.00, 0.01]			
	Subjective Age Identity	-0.01 [-0.11, 0.10]			
Climate					
	Decision Making	0.03 [-0.19, 0.25]			
	Work Planning	0.04 [-0.16, 0.25]			
	Role Flexibility	0.07 [-0.05, 0.19]			
	Appreciation	0.03 [-0.18, 0.24]			
	Supportive Management	0.06 [-0.06, 0.18]			
	Social Support	0.00 [-0.08, 0.07]			
	Sense of Community	0.07 [-0.12, 0.26]			
Interactions					
	SA*Sense of Community	-0.081 [-0.18, 0.02]			
CFI = 0.93; TLI = 0.91; RMSEA = 0.05; SRMR = 0.05; AIC = 48918.43					
5 (Final Model after Stepwise Selection)			351.76	195	0.308
Age					
	Physical Health	**0.01*** [0.01, 0.02]**			
	Mental Health	0.01 [0.00, 0.01]			
	Subjective Age Identity	-0.03 [-0.13, 0.07]			
Climate					
	Work Planning	**0.12*** [0.06, 0.19]**			
	Sense of Community	**0.07* [0.00, 0.14]**			
Interactions					
	SA*Sense of Community	**-0.082* [-0.17, 0.01]**			
CFI = 0.95; TLI = 0.93; RMSEA = 0.05; SRMR = 0.05; AIC = 27667.86					

Note. N = 393;
CA = Calendar Age;
SA = Subjective Age;
PH = Physical Health;
MH = Mental Health;
Eliminated variables are omitted from block 5.
Interaction significance threshold set at * $p \leq .10$, otherwise;
* $p \leq .05$,
** $p \leq .01$,
*** $p \leq .001$

		Organisation Member Adaptivity			
Block	**Variable**	***Unstandardised Coefficient***	X^2	*df*	R^2
1 (Control variables)			1194.15	554	0.014
	Job Tenure	0.00 [-0.01, 0.01]			
	Organisation Tenure	0.00 [-0.01, 0.01]			
	Management Level	0.08 [-0.02, 0.18]			
	Contract Status	0.05 [-0.11, 0.20]			
CFI = 0.92; TLI = 0.90; RMSEA = 0.05; SRMR = 0.11					
2 (Age Constructs)			1364.39	644	0.147
	Calendar Age	0.00 [-0.01, 0.01]			
	Physical Health	**0.02*** [0.01, 0.03]**			
	Mental Health	**0.01*** [0.01, 0.02]**			
	Subjective Age Identity	**0.19** [0.07, 0.31]**			
CFI = 0.91; TLI = 0.89; RMSEA = 0.05; SRMR = 0.09					
3 (Individual Entry of Climate Variables)					
	Decision Making	**0.37*** [0.28, 0.46]**			0.416
	Work Planning	**0.31*** [0.24, 0.37]**			0.455
	Role Flexibility	**0.28*** [0.22, 0.35]**			0.381
	Appreciation	**0.26*** [0.19, 0.32]**			0.352
	Supportive Management	**0.26*** [0.19, 0.32]**			0.374
	Social Support	**0.13*** [0.06, 0.20]**			0.191
	Sense of Community	**0.26*** [0.18, 0.34]**			0.296
4 (Simultaneous Entry of Climate Variables)			886.69	480	0.489
Age					
	Calendar Age	0.00 [-0.01, 0.01]			
	Physical Health	**0.02*** [0.01, 0.03]**			
	Mental Health	**0.01* [0.00, 0.02]**			
	Subjective Age Identity	0.04 [-0.08, 0.16]			
Climate					
	Decision Making	0.00 [-0.24, 0.25]			
	Work Planning	0.16 [-0.05, 0.38]			
	Role Flexibility	0.09 [-0.05, 0.22]			
	Appreciation	-0.01 [-0.18, 0.16]			
	Supportive Management	**0.19** [0.06, 0.33]**			
	Social Support	0.03 [-0.06, 0.11]			
	Sense of Community	0.03 [-0.17, 0.25]			
CFI = 0.93; TLI = 0.92; RMSEA = 0.05; SRMR = 0.05; AIC = 45226.10					
5 (Final Model after Stepwise Selection)			116.81	76	0.475
Age					
	Physical Health	**0.02*** [0.01, 0.02]**			
	Mental Health	**0.01* [0.00, 0.02]**			
Climate					
	Work Planning	**0.25*** [0.16, 0.35]**			
	Supportive Management	**0.13*** [0.06, 0.21]**			
CFI = 0.98; TLI = 0.97; RMSEA = 0.04; SRMR = 0.03; AIC = 22551.47					

Note. N = 393;
CA = Calendar Age;
SA = Subjective Age;
PH = Physical Health;
MH = Mental Health;
Eliminated variables are omitted from block 5.
Interaction significance threshold set at * $p \leq .10$, otherwise;
* $p \leq .05$,
** $p \leq .01$,
*** $p \leq .001$

		Individual Task Proactivity			
Block	**Variable**	***Unstandardised Coefficient***	X^2	*df*	R^2
1 (Control variables)			1145.21	554	0.052
	Job Tenure	-0.01 [-0.03, 0.01]			
	Organisation Tenure	0.00 [-0.02, 0.02]			
	Management Level	**0.15** [0.05, 0.25]**			
	Contract Status	0.11 [-0.05, 0.26]			
CFI = 0.92; TLI = 0.91; RMSEA = 0.05; SRMR = 0.09					
2 (Age Constructs)			1318.32	644	0.224
	Calendar Age	**-0.01** [-0.02, 0.00]**			
	Physical Health	**0.02*** [0.02, 0.04]**			
	Mental Health	**0.01*** [0.01, 0.03]**			
	Subjective Age Identity	**0.21*** [0.10, 0.33]**			
CFI = 0.92; TLI = 0.90; RMSEA = 0.05; SRMR = 0.07					
3 (Individual Entry of Climate Variables)					
	Decision Making	**0.23*** [0.15, 0.31]**			0.314
	CA*Decision Making	-0.001 [-0.007, 0.006]			0.315
	SA*Decision Making	-0.047 [-0.175, 0.082]			0.316
	Work Planning	**0.20*** [0.14, 0.27]**			0.338
	CA*Work Planning	**0.005* [0.00, 0.01]**			0.349
	SA*Work Planning	-0.007 [-0.113, 0.099]			0.338
	PH*Work Planning	-0.001 [-0.01, 0.01]			0.338
	MH*Work Planning	0.002 [-0.01, 0.01]			0.338
	Role Flexibility	**0.20*** [0.13, 0.26]**			0.321
	CA*Role Flexibility	0.001 [-0.005, 0.007]			0.321
	SA*Role Flexibility	-0.048 [-0.152, 0.055]			0.324
	PH*Role Flexibility	0.004 [0.00, 0.01]			0.326
	MH*Role Flexibility	-0.002 [-0.01, 0.01]			0.321
	Appreciation	**0.17*** [0.10, 0.23]**			0.294
	CA*Appreciation	**0.007* [0.001, 0.013]**			0.308
	SA*Appreciation	-0.003 [-0.097, 0.091]			0.294
	Supportive Management	**0.17*** [0.11, 0.23]**			0.298
	CA*Supportive Management	0.003 [-0.002, 0.008]			0.303
	SA*Supportive Management	**-0.093* [-0.192, 0.006]**			0.306
	Social Support	**0.08* [0.01, 0.15]**			0.236
	Sense of Community	**0.16*** [0.08, 0.23]**			0.272
4 (Simultaneous Entry of Climate Variables)			1523.79	826	0.370
Age					
	Calendar Age	-0.01 [-0.02, 0.01]			
	Physical Health	**0.02*** [0.01, 0.03]**			
	Mental Health	**0.01* [0.00, 0.02]**			
	Subjective Age Identity	0.11 [-0.03, 0.25]			
Climate					
	Decision Making	-0.04 [-0.29, 0.21]			
	Work Planning	0.13 [-0.10, 0.37]			
	Role Flexibility	0.11 [-0.03, 0.26]			
	Appreciation	0.02 [-0.13, 0.16]			
	Supportive Management	0.11 [-0.03, 0.25]			
	Social Support	0.03 [-0.06, 0.12]			
	Sense of Community	0.05 [-0.10, 0.20]			
Interactions					
	CA*Work Planning	0.006 [-0.01, 0.02]			
	CA*Appreciation	0.000 [-0.01, 0.01]			
	SA*Supportive Management	-0.066 [-0.17, 0.03]			
CFI = 0.93; TLI = 0.91; RMSEA = 0.05; SRMR = 0.06; AIC = 66551.54					
5 (Final Model after Stepwise Selection)			243.18	135	0.352
Age					
	Calendar Age	-0.01 [-0.01, 0.00]			
	Physical Health	**0.02*** [0.01, 0.03]**			
	Mental Health	**0.01** [0.00, 0.02]**			
Climate					
	Work Planning	**0.15*** [0.07, 0.24]**			
	Supportive Management	**0.08* [0.00, 0.15]**			
Interactions					
	CA*Work Planning	**0.006* [0.00, 0.01]**			
CFI = 0.97; TLI = 0.95; RMSEA = 0.05; SRMR = 0.06; AIC = 34420.57					

Note. N = 393;
CA = Calendar Age;
SA = Subjective Age;
PH = Physical Health;
MH = Mental Health;
Eliminated variables are omitted from block 5.
Interaction significance threshold set at * $p \leq .10$, otherwise;
* $p \leq .05$,
** $p \leq .01$,
*** $p \leq .001$

		Team Member Proactivity			
Block	**Variable**	***Unstandardised Coefficient***	X^2	***df***	R^2
1 (Control variables)			1163.10	554	0.087
	Job Tenure	-0.01 [-0.03, 0.02]			
	Organisation Tenure	0.00 [-0.02, 0.02]			
	Management Level	**0.16*** [0.07, 0.25]**			
	Contract Status	**0.16* [0.02, 0.29]**			
CFI = 0.92; TLI = 0.91; RMSEA = 0.05; SRMR = 0.09					
2 (Age Constructs)			1338.84	644	0.216
	Calendar Age	**-0.01** [-0.02, 0.00]**			
	Physical Health	**0.01*** [0.01, 0.02]**			
	Mental Health	**0.01** [0.00, 0.02]**			
	Subjective Age Identity	**0.19*** [0.08, 0.29]**			
CFI = 0.91; TLI = 0.89; RMSEA = 0.05; SRMR = 0.08					
3 (Individual Entry of Climate Variables)					
	Decision Making	**0.24*** [0.17, 0.32]**			0.355
	Work Planning	**0.20*** [0.14, 0.26]**			0.365
	Role Flexibility	**0.21*** [0.15, 0.27]**			0.366
	Appreciation	**0.17*** [0.11, 0.23]**			0.316
	Supportive Management	**0.14*** [0.09, 0.20]**			0.291
	Social Support	**0.08* [0.02, 0.14]**			0.234
	CA*Social Support	0.003 [-0.002, 0.009]			0.238
	SA*Social Support	-0.003 [-0.101, 0.095]			0.234
	Sense of Community	**0.17*** [0.10, 0.24]**			0.288
	CA*Sense of Community	**0.006* [0.000, 0.012]**			0.301
	SA*Sense of Community	-0.086 [-0.190, 0.017]			0.297
4 (Simultaneous Entry of Climate Variables)			1643.16	840	0.410
Age					
	Calendar Age	-0.01 [-0.02, 0.00]			
	Physical Health	**0.01** [0.01, 0.02]**			
	Mental Health	0.01 [0.00, 0.02]			
	Subjective Age Identity	0.08 [-0.04, 0.20]			
Climate					
	Decision Making	0.07 [-0.17, 0.31]			
	Work Planning	-0.02 [-0.24, 0.20]			
	Role Flexibility	**0.14* [0.01, 0.28]**			
	Appreciation	0.09 [-0.03, 0.21]			
	Supportive Management	0.02 [-0.11, 0.15]			
	Social Support	0.00 [-0.07, 0.08]			
	Sense of Community	0.05 [-0.19, 0.09]			
Interactions					
	CA*Sense of Community	0.003 [0.00, 0.01]			
	SA*Sense of Community	-0.067 [-0.18, 0.04]			
CFI = 0.91; TLI = 0.89; RMSEA = 0.05; SRMR = 0.05; AIC = 63168.53					
5 (Final Model after Stepwise Selection)			124.60	69	0.402
Age					
	Calendar Age	-0.01 [-0.02, 0.00]			
	Physical Health	**0.01*** [0.01, 0.02]**			
	Subjective Age Identity	0.10 [-0.01, 0.21]			
Climate					
	Role Flexibility	**0.20*** [0.12, 0.29]**			
	Appreciation	**0.09** [0.03, 0.16]**			
CFI = 0.97; TLI = 0.95; RMSEA = 0.05; SRMR = 0.04; AIC = 21976.17					

Note. N = 393;
CA = Calendar Age;
SA = Subjective Age;
PH = Physical Health;
MH = Mental Health;
Eliminated variables are omitted from block 5.
Interaction significance threshold set at * $p \leq .10$, otherwise;
* $p \leq .05$,
** $p \leq .01$,
*** $p \leq .001$

		Organisation Member Proactivity			
Block	**Variable**	***Unstandardised Coefficient***	X^2	***df***	R^2
1 (Control variables)			1161.78	554	0.060
	Job Tenure	-0.01 [-0.03, 0.00]			
	Organisation Tenure	0.01 [-0.01, 0.03]			
	Management Level	**0.15** [0.05, 0.24]**			
	Contract Status	0.11 [-0.04, 0.26]			
CFI = 0.92; TLI = 0.91; RMSEA = 0.05; SRMR = 0.10					
2 (Age Constructs)			1323.98	644	0.168
	Calendar Age	0.00 [-0.01, 0.01]			
	Physical Health	0.01 [-0.01, 0.01]			
	Mental Health	**0.01*** [0.01, 0.02]**			
	Subjective Age Identity	**0.22*** [0.11, 0.34]**			
CFI = 0.91; TLI = 0.90; RMSEA = 0.05; SRMR = 0.08					
3 (Individual Entry of Climate Variables)					
	Decision Making	**0.30*** [0.21, 0.39]**			0.353
	Work Planning	**0.26*** [0.19, 0.32]**			0.389
	Role Flexibility	**0.26*** [0.19, 0.33]**			0.375
	Appreciation	**0.21*** [0.14, 0.27]**			0.305
	Supportive Management	**0.19*** [0.13, 0.26]**			0.295
	Social Support	**0.16*** [0.09, 0.22]**			0.234
	Sense of Community	**0.24*** [0.16, 0.31]**			0.299
4 (Simultaneous Entry of Climate Variables)			873.97	480	0.419
Age					
	Calendar Age	0.00 [-0.01, 0.02]			
	Physical Health	0.01 [0.00, 0.02]			
	Mental Health	0.01 [0.00, 0.02]			
	Subjective Age Identity	0.09 [-0.03, 0.21]			
Climate					
	Decision Making	-0.05 [-0.30, 0.19]			
	Work Planning	0.16 [-0.06, 0.37]			
	Role Flexibility	**0.15* [0.01, 0.29]**			
	Appreciation	0.00 [-0.13, 0.13]			
	Supportive Management	0.07 [-0.06, 0.21]			
	Social Support	0.06 [-0.02, 0.14]			
	Sense of Community	0.00 [-0.14, 0.14]			
CFI = 0.93; TLI = 0.92; RMSEA = 0.05; SRMR = 0.05; AIC = 45448.65					
5 (Final Model after Stepwise Selection)			109.25	76	0.405
Age					
	Mental Health	**0.01* [0.00, 0.02]**			
	Subjective Age Identity	**0.13* [0.02, 0.24]**			
Climate					
	Role Flexibility	**0.25*** [0.16, 0.34]**			
	Supportive Management	**0.09** [0.03, 0.16]**			
CFI = 0.98; TLI = 0.98; RMSEA = 0.03; SRMR = 0.03; AIC = 20374.29					

Note. N = 393;
CA = Calendar Age;
SA = Subjective Age;
PH = Physical Health;
MH = Mental Health;
Eliminated variables are omitted from block 5.
Interaction significance threshold set at * $p \leq .10$, otherwise;
* $p \leq .05$,
** $p \leq .01$,
*** $p \leq .001$

Appendix 6: R Scripts and raw data (OSF Repository)

https://osf.io/kp3y7/?view_only=9063147b3e3546709bb8271dfc99a5dd