Underpinning prosociality: Age related performance in theory of mind, empathic

understanding, and moral reasoning

Abstract

This paper investigates the idea that Theory of Mind (ToM), empathic understanding and moral reasoning are linked, and together contribute to prosocial behaviour. All three cognitive processes are explored in adolescents (aged 14–17 years), young-adults (aged 18–24 years) and middle-adults (aged 25–55). A statistically significant age-related difference was found on all measures between the adolescent group and the middle-adult group. Except for verbal ToM, all measures detected a statistically significant age-related difference between the adolescent group and the young adult group. However, except for verbal and visual ToM, no statistically significant age-related difference was found between the young-adult and middle-adult groups. A small to medium positive association was found between each of the five measures. These findings suggest that beyond adolescence ToM, empathic understanding, and moral reasoning might be improved which could be useful to researchers and practitioners interested in the later enhancement of prosociality in older individuals.

Keywords: Prosocial behaviour, Theory of Mind (ToM), Empathy, Moral reasoning

1. Introduction

Prosociality has been defined as any action that benefits someone else (Eisenberg, 1982). This includes helping, cooperating, comforting, sharing, and donating behaviours (Eisenberg & Fabes, 1998). Nevertheless, research has reported a lack of consistency in prosocial behaviour according to task, time, and person (Schachnera, Newton, Thompson, & Goodman-Wilson, 2018). One justification for this inconsistency is the Theory of Universal Emergence and Developmental Milestones (Thompson & Newton, 2013). Indeed, the emergence and development of prosociality is well reported within the literature. Rheingold (1982), for example, suggested that one to two-year-olds first engage in prosocial behaviours (e.g., sharing, helping, and comforting) to alleviate another's distress. Eisenberg and Fabes (1998), following a meta-analysis of 125 studies relating to children and adolescents, concluded that such behaviours increased in the frequency as children grow older. This was supported by Carlo, Crockett, Randall, and Roesch (2007), who noted that whilst prosocial behaviours appeared to decline initially during early adolescence, an increase was evident around the age of 16. This upward trend was also demonstrated by Eisenberg, Cumberland, Guthrie, Murphy, and Shepard (2005) who, in measuring differences in the prosociality between a group of adolescents (aged 15–16 years) and a group of young-adults (aged 25–26 years), confirmed that instances of helping behaviours appeared to increase with age. Finally, Rosi, Nola, Lecce., and Cavallini (2019) found an increase in prosociality in older adults (*M age* = 70.19) when compared to a younger group (*M age* = 23.29). When considered together, these studies suggest that prosocial behaviours may increase as individuals move from childhood, through adolescence and into adulthood.

However, Dunfield (2014) noted a lack of clarity regarding the developmental stages associated with prosociality. To address this, she suggested that three separate stages must precede any prosocial activity: the first stage enables an observer to see things from another's

perspective and so recognise the existence of a problem; the second stage allows the observer to 'place' him or herself in another's 'mind' to identify the cause of a problem; and, the third stage requires the observer to be motivated to help the other person. These stages can be further explained by three socio-cognitive components (Conte, Grazzani, & Pepe, 2018): Theory of Mind (ToM; O'Toole, Monks, & Tsermentseli, 2017), empathic understanding (Shamay-Tsoory, Tomer, & Aharon-Peretz, 2005), and moral reasoning (Gibbs, Basinger, Fuller, & Fulkler, 1992).

ToM enables a person to recognise and assess the mental state of themselves and of others (Wellman & Woolley, 1990). These mental states include thoughts, intentions, beliefs, and feelings (Blair & Cipolotti, 2000). In addition, ToM requires a person to understand that another's mental state may be different from their own (Byom & Mutlu, 2013). In other words, ToM allows a person to consider a situation from another's perspective (Qureshi, Monk, Samson, & Apperly, 2020). Yet, despite ToM being a proposed component for appropriate and effective prosocial interaction, it does not fully explain empathic understanding. Cox et al. (2012) described empathic understanding as a multidimensional construct, comprised of two components: cognitive empathic understanding and affective empathic understanding. Cognitive empathic understanding denotes the ability to recognise what another person may be feeling, whilst affective empathic understanding is allows an individual to share in that person's emotional experiences (McDonald & Messinger, 2011). In other words, empathic understanding requires an individual to consciously put themselves into the mind of another, to imagine that person's plight, and to 'simulate' his or her mental state (Myers & Hodges, 2011). However, this does not necessarily motivate a person to act in a prosocial way (Davis & Stone, 2003). Ellemers, van der Toorn, Paunov, and van Leeuwen (2019) concurred noting that whilst the nature and intensity of empathic understanding was important, prosocial behaviours required a 'moral trigger' (e.g., embarrassment, guilt, or

shame). Simply, whilst empathic understanding plays a significant (and positive) role in moral reasoning (Skoe, 2010), it is the process of moral reasoning itself that determines if another is a worthy recipient of help or support (Hamlin, 2013). Thus, together ToM, empathic understanding, and moral reasoning are said to enable prosociality (Sharp, 2008).

If ToM, empathic understanding, and moral reasoning are indeed necessary for prosocial behaviours, the question remains 'are they associated in some way?'. Indeed, past research has found associations between ToM and empathic understanding (Lawson, Baron-Cohen, & Wheelwright, 2004), ToM and moral reasoning (Astington, 2004), and empathic understanding and moral reasoning (Eisenberg & Mussen, 1989). Further, Spenser, Betts, and Das Gupta (2015), in a study with 92 young-adult male offenders and nonoffenders, found modest associations between all three components: ToM and empathic understanding ($p <$ .001), ToM and moral reasoning ($p <$ .001), empathic understanding and moral reasoning, ($p <$ .001). Support for this finding can be found in neuropsychology. Bzdok et al. (2012) for example, in a meta-analysis of 247 neuro-imaging studies, concluded that ToM, empathic understanding, and moral reasoning may be part of the same underlying cognitive capacity. Best and Miller (2010) similarly noted likenesses in the brain maturation processes of each. Therefore, from this standpoint, it is not surprising that ToM, empathic understanding, and moral reasoning are first detected at a similar time during early childhood (Wang & Wang, 2015).

A key milestone in the development of ToM is the ability to attribute false belief (Wimmer & Perner, 1983). To do this, a person must recognise that a belief can accurately represent reality (and be true) or can misrepresent reality (and be false), and that behaviours can be predicted using that knowledge (Eggum et al., 2011). Whilst, research has suggested that very young children tend to confound another person's knowledge with their own (Begeer, Malle, Nieuwland, & Keysar, 2010), this 'flaw' has generally disappeared by the age

of three or four years (Callaghan et al., 2004). In addition, A meta-analysis conducted by Wellman and Liu (2004) demonstrated that levels of ability are robust in children across different measures and cultures; thus, supporting the theory that maturation is the main factor responsible for the onset of ToM in typically developing children. Building on this, Valle, Massaro, Castelli, and Marchetti (2015) found that ToM continued to improve into young adulthood. In a study involving an adolescent group (*M* age = 14.8 years) and a young adult group (*M* age = 22.8 years), they noted that the young-adult group scored higher than the adolescent-group when using an age appropriate ToM task, which they attributed to the assumption that young-adults have more mature cognitive abilities than adolescents. Birch and Bloom (2007) similarly found improved ToM into older adults when compared to adolescents; this, they suggested, was because older adults also consider the plausibility of any given situation. However, Bernstein, Godfrey, Davidson, and Loftus (2004) proposed a more bell-shaped development for ToM which, they stated, increased throughout childhood, stabilised in adulthood, but then declined in later life. In their study of 95 adults (aged 17–59 years), they found that the older participants exhibited more ToM bias than the younger participants (ToM bias being when a person neglects another's perspective and makes judgements based only on their own beliefs, knowledge or preferences). Similarly, Reiter, Kanske, Eppinger, and Li (2017) found that older adults demonstrated reduced ToM when compared to younger adults. However, these researchers used a relatively new ToM task called EmpaToM.

Regarding empathic understanding, Zahn-Waxler, Radke-Yarrow, Wagner, and Chapman (1992) studied typically developing children's responses to the simulated distress of a parent or a stranger, both at home and in a laboratory. By measuring different manifestations of empathic responding (including concern as noted by the child's facial expression, hypothesis testing by asking the child questions such as 'what happened?', and

prosocial behaviours as observed by the child's physical reactions) they found that many prosocial behaviours increased in quantity over the second year of life. Further, they noted that the quality of the children's behaviour also improved during the same period. Other studies have noted similar improvements in empathic understanding between early and middle childhood (Hay & Cook, 2007). During this time, it is known that children begin to associate more regularly with friends and peers and less frequently with their parents (Hastings, Miller, & Troxel, 2015). As a result, by the age of 12 years, some young people may better understand the emotions of individuals outside of their family unit, as well as inside (McDonald & Messinger, 2011). Conversely, Van der Graaff et al. (2014), in a study with 497, 13- to 18-year olds, found a decline in empathic concern during adolescence; something particularly evident in boys. However, this dip seemed to be temporary and was explained by the social changes that take place for young people during that time (Grotevant, 1998). However, as with ToM, inconsistencies can be found when considering age-related development in empathic understanding (Grühn, Rebucal, Diehl, Lumley, & Labouvie-Vief, 2008). For example, Birditt and Fingerman (2005), in a study with 666 adults (aged 25- to 74-years), found that older adults were better at regulating their emotions than younger adults (i.e. they appeared less likely to engage in arguments or report tensions). Along similar lines, Reiter et al. (2017), as a response to an emotion provoking video, recorded higher levels of compassion in older adults when compared to younger adults ($p < 0.001$). In contrast, Labouvie-Vief and González (2004) suggested that older adults possess a less differentiated view of themselves and others and so empathic understanding appeared to be diminished.

The final key component to be discussed is moral reasoning. Kohlberg (1976), based on a study of 50 male participants, aged between 10 and 26 years, concluded that the development of moral reasoning comprised of three main levels, each with two stages. Firstly, the 'pre-conventional level', which included "most children under 9 [and] some

adolescents", next a 'conventional level', being "the level of most adolescents", and finally a 'post conventional level' which is reached during early adulthood (p.33). Snarey (1995) concurred, stating that, because of increasing brain maturation, moral reasoning improves over time. Decety, Michalska, and Akitsuki (2008) drew similar conclusions. In their study, 127 participants (aged 4–36 years) were shown 96 short video recordings of intentional and accidental harm whilst attached to a Functional Magnetic Resonance Imaging (fMRI) scanner. These researchers found that younger children tended to consider most wrongdoers as malicious, regardless of the circumstance, whilst older participants were more 'forgiving'. Conversely, Henry, Phillips, Ruffman, and Bailey (2013) in a systematic review and subsequent metaanalysis of 22 studies revealed a decrease in moral reasoning in older adults when compared to a younger group; something that was explained by an increasing inability to integrate mental state information into their moral judgments. Similarly, Moran, Jolly, and Mitchell (2012) identified impairments in the area of the brain associated with mental state reasoning in a group of older adults (*M age* = 71.8 years) and used this to explain why they were less able to focus on an individual's perceived intentions but rather judged individuals based on observed actions.

To summarise, past studies have considered age-related changes in ToM, empathic understanding, and/or moral reasoning in either children, adolescents, or adults. However, very few have considered all three components across a greater age range and, whilst there is general agreement regarding the initial emergence of ToM, empathic understanding, and moral reasoning, whether each continues to develop throughout the lifespan remains unclear. This lack of clarity is further exacerbated by the measures that have been used. For example, traditional ToM tasks tend to be heavily reliant on an individual's verbal capacity. Blair and Coles (2000) noted the need to include both verbal and visual cues when accessing an individual's ability to respond to another's mental state. In addition, concerns have been

raised regarding the use of self-report measures to access empathic understanding. For example, Makino (2010) suggested that such measures may not indicate how a participant feels, but rather reflect their knowledge of how other people might expect them to feel.

Therefore, to address these concerns, the present study examined age related differences in ToM, empathic understanding, and moral reasoning from early adolescence, through young adulthood, and into middle adulthood. In respect of ToM, both a verbal and a visual measure was included, as well as a Faux Pas task, which Phillips et al. (2011) suggested is better suited to the measurement of adults' ToM. A self-report and a performance-based measure of empathic understanding and a performance-based test of moral reasoning were also used. It was hypothesised that significant age-related differences would be identified in (i) verbal and visual ToM, (ii) self-report and performance-based empathic understanding, and (iii) moral reasoning, as well as associations between the five measures.

2. Method

2.1. Design

A one-way, between groups, multivariate analysis of co-variance (MANCOVA) controlling for IQ was conducted to investigate possible age-related differences in (i) verbal and visual ToM, (ii) self-report and performance-based empathic understanding, and (iii) moral reasoning. Controlling for IQ was considered important as Baglio et al. (2016) found a negative association between IQ and performance in socio-cognitive components such as ToM. The independent variable in the present study was age involving three groups; (i) adolescents, (ii) young-adults, and (iii) middle-adults, and the five dependent variables were: (i) verbal theory of mind, (ii) visual theory of mind, (iii) self-reported empathic understanding, (iv) performance-based empathic understanding, and (v) moral reasoning.

Further, to examine any differences indicated by the MANCOVA between the three age groups, for each of the five dependant measures, a series of multiple analyses of variances (ANOVA) were performed. Lastly, associations between (i) verbal and visual ToM, (ii) self-report and performance-based empathic understanding, and (iii) moral reasoning using Pearson Product-Moment Correlation Coefficient were investigated.

2.2. Participants

Using an 'F-ratio in Analysis of Variance' (Clark-Carter, 2004, p. 607), a minimum of 35 participants per group is recommended to achieve a power of 0.8 and medium effect size ($\eta2 = 0.059$). In each of the three groups there were 46 participants (23 males and 23 females). The adolescents were aged 14–17 years (*male M* = 15, *SD* = 1.13; *female M* = 15.34, *SD* = 1.31), the young-adults were aged 18–24 years (*male M* = 19.52, *SD* = 1.24; *female M* = 20.18, *SD* = 1.98), and the middle-adults were aged 25–55 years (*male M* = 41, *SD* = 9.35; *female M* = 38.17, *SD* 3.13).The samples were self-selected as the participants responded to an advertisement placed in public places such as libraries and community centres. As per the recruitment criteria, all participants were English speaking. No form of compensation was given to any of participant and appropriate ethical procedures were followed.

2.3. Measures

The participants completed five measures to access ToM, empathic understanding, and moral reasoning.

2.3.1. Verbal ToM The Social Stories Questionnaire (SSQ, Lawson et al., 2004) consists of ten vignettes. Each vignette is divided into three subsections containing either a blatantly offensive utterance (e.g., an utterance that a recipient is more than likely to find

offensive, such as Kate referring to the wrinkles on Linda's face: sub-section 1, dialogue line 'b' below), a non-offensive utterance (e.g., an utterance that a recipient is less to find offensive such as Linda telling Kate she is back in town to see her mum: sub-section 2, dialogue line 'a'), or a subtly offensive utterance (e.g., an utterance that may or may not cause the recipient offense such as Faye calling James by Linda's previous boyfriends name: sub-section 3 dialogue line 'b'). The three sub-sections are shown below: Sub-section 1:

Linda was nervous. She was about to introduce her new boyfriend, James, to her friends - Kate and Faye. She was nervous because Faye had really liked her last boyfriend, Keith. She was also nervous because she had just spoken to her old best friend Kate. Kate and Linda had been best friends at school but when they left Kate had got a job in another town and they had lost touch. That was five years ago. But Kate was back and wanted to meet up tonight. At 7 pm the doorbell rang, and Linda opened the door to see Kate standing there.

a) *'Hello stranger', said Linda,' Come on in'.*

b) <u>'Crikey, there's a few more lines on that face than I remember', said Kate.</u>

c) *'Well it's been a few years. What brings you back?' replied Linda* Sub-section 2:

a) *'I just came back to see my mum', replied Kate.*

b) *'Oh,' said Linda, 'Do you want a drink?'*

The others arrived shortly afterwards and, to Linda's relief, were

getting on well. Sub-section 3:

Linda had cooked a meal of roast beef. Just after she had dished it out, she realised she had forgotten to ask James if he was vegetarian.

a) *'Great meal, Linda', said James to Linda's relief.*

Later when she was making coffee with Faye and Alex, she realised she was out of milk. Faye carried the black coffee into the living room.

b) *'Sorry Keith, you don't mind it black, do you?' said Faye*.

c) *'No', replied Linda's boyfriend*.

Participants are asked to indicate if they thought a story contained an utterance which might upset or offend another character by ticking a '*yes*' response and placing a dot at the beginning of the appropriate line and noting if the wording was offensive, nonoffensive, or subtly offensive. If they thought a story was void of any potentially offensive utterance, they were asked to tick the '*no*' response and move on. Participants were awarded one mark for each target utterance correctly identified, to a maximum of 30 marks. Lawson et al.'s (2004) guidelines for administering the test were followed throughout. According to Lawson et al., the probability of identifying a target by chance alone is $p = .5 \times .25 = .125$; therefore, corrections for chance were not considered necessary. This test has been reliably used in past research and Lawson et al. suggest that a low score indicated a 'less' developed ToM, whilst a higher score implied a more developed ToM. In the current study the internal consistency (Cronbach's alpha coefficient) was $\alpha = .72$.

2.3.2. Visual ToM The 'Reading of the Mind in the Eyes test' revised version (Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001) consists of 36 photographs of eyes plus one practice photograph. The 36 photographs (which were included for standard use in the measure) were split into three levels: 12 positive emotions, 12 negative emotions, and 12 neutral emotions. The levels were distributed randomly throughout the test and were given to the participants in the same order. The ages of the 'eyes' are mixed and split evenly between men and women; however, they are all of Caucasian ethnicity. The participants were asked to circle one of four words that they believed best described what the person in the photograph was thinking or feeling; only one word was deemed to be 'correct'. Participants were awarded one mark for each correct emotion identified and zero marks for each incorrect emotion identified, to a maximum of 36. A definition of each word taken from the original

test was also included to ensure all participants had an equal understanding on the meaning of each word. In the current study the internal consistency was α = .61

2.3.3. Self-reported empathic understanding The Empathy Quotient (EQ-Short, Wakabayashi et al., 2006) was used to assess participants' empathic understanding. Participants were instructed to read each of the 22 statements carefully and judge the extent to which they agreed using a four-point scale ranging from 1 (Strongly agree) to 4 (Strongly disagree). Half the items were positively worded (e.g., "I really enjoy caring for other people") and half negatively worded/reverse coded (e.g., "I find it difficult to judge is something is rude or polite"). The order of presentation was randomised to avoid response bias. Participants scored two points if they recorded a strongly empathising response and one point if they recorded a slightly empathising response. Slightly and strongly non-empathising responses scored no marks. The highest score obtainable is therefore 44. The higher the score the more empathic the participant is deemed to be. The Empathy Quotient is reported to have acceptable internal consistency, α = .76 (Wakabayashi et al., 2006). In the current study the internal consistency was α = .81.

2.3.4. Performance-based empathic understanding The Emotional Intelligence Test (MSCEIT; Mayer, Salovey, & Caruso, 2002) was chosen to measure performance-based Empathic Understanding. This measure assesses the four-branch model of emotional intelligence (perceiving emotions, using emotions, understanding emotions, and regulating emotions). The test consists of 141 questions that are divided among eight tasks (two for each branch). The test yielded four branches and a total emotional intelligence score. The first branch is 'Perceiving Emotions, the second branch is 'Use of Emotion to Facilitate Thought', the third branch is 'Understanding Emotion' and the fourth branch is 'Managing Emotions. The MSCEIT is a performance-based test. Full-scale MSCEIT scores, based on the consensus norms and expert norms, have been found to correlate highly, $r = .91$ (Mayer et al., 2002).

The test-retest reliability of the full-test MSCEIT over a three-week interval was $r_{(59)} = .86$ in a college student sample (Brackett & Mayer, 2003). The MSCEIT's overall reliability is reported as $\alpha = .75$. In the current study the internal consistency was $\alpha = .76$.

2.3.5. Moral reasoning The Socio-Moral Reflection Measure (SRM-SF, Gibbs et al., 1992) assessed participants' moral judgment. The social values assessed included contract, affiliation, life, property, law, and legal justice. Participants responded to each of the 11 statements using a three-point scale (*Very important*, *Important* and *Not important*) to indicate the level importance they attributed to each. They were then asked to give a short reason as to why they had attributed that level of importance to an item.

For example:

How important is it for parents to keep their promises to their children?

VERY IMPORTANT	IMPORTANT	NOT IMPORTANT

Why?……
………………………………

As recommended by Gibbs et al., the lead researcher was self-trained using the guidelines and training materials provided by Gibbs et al. which have good inter-rater reliability, $r_{(23)} = .99$, $p < .001$. The resultant SRM-SF score indicated the participants' global stage or level of moral development. For data analysis the score is multiplied by 100 to create a continuous range of 100 (indicating lower levels of moral reasoning and corresponding to Kohlberg's [1976] moral level one, stage one) to 400 (indicating higher levels of moral reasoning and corresponding to Kohlberg's moral level three, stage six). The measure is reported by the authors to have acceptable levels of test and re-test reliability, $r_{(234)} = .88$, $p < .001$, and comparable validity with the Moral Judgement Interview (Colby & Kohlberg, 1987), $r_{(43)} = .88$, $p < .0001$. In the current study the internal consistency was $\alpha = .93$.

2.3.6. IQ Controlling for different levels of IQ when assessing abilities in theory of mind, empathic understanding, and moral reasoning is of importance (Entorf & Spengler, 2000). Therefore, the present analyses controlled for IQ. The WASI – Wechsler Abbreviated Scale of Intelligence (Wechsler, 1999) was selected to assess IQ.

All five tests are standardised tests and are widely discussed in the literature. None of the tests were developed or altered in any way for the present study.

2.4. Procedure

Written consent was obtained from all participants in line with the relevant University's ethical approval procedure. Participants were tested individually in an empty room at the university. To protect the participant's privacy, the researcher remained silent, out of the participant's direct line of vision, and at a suitable distance. Each participant was given standard verbal instructions and told that the session was not timed but should be completed as quickly as possible. The orders of the measures were counterbalanced to control for order effects.

3. Results

As can be seen in Table 1, there is a difference in the mean scores for each of the five assessments across the three age groups. The standard deviations across the three age groups, indicate that most of the scores were located close to the relevant mean score.

Skewness and kurtosis values were also obtained regarding the distribution of the data. For verbal Theory of Mind and Moral Reasoning, the negative result indicates that all the scores were clustered towards the higher end, in relation to the maximum scores available in this measure. For visual Theory of Mind, self-reported Empathic Understanding, and performance-based Empathic Understanding, the positive results indicate that all the scores were clustered towards the lower end, in relation to the maximum scores available in this

measure. However, all scores were located within the permitted range of -1 to +1 (Clark-Carter, 2010) indicating a relatively normal distribution of the data. Regarding kurtosis of the data, the following was identified: for verbal Theory of Mind, visual Theory of Mind, and Moral Reasoning the negative results across all three age groups indicate that the distribution of scores is relatively flat. For self-reported Empathic Understanding and performance-based Empathic Understanding, the positive results indicate that the scores are clustered towards the centre. However, except for the performance-based Empathic Understanding score, all scores were within the permitted range of -3 to +3 (Clark-Carter, 2010) indicating that the data were relatively normally distributed (Table 2).

To further check for normality, linearity, univariate and multivariate outliers, homogeneity of variance-covariance matrices, and multicollinearity, preliminary assumption testing was conducted. The Kolmogorov-Smirnov statistic was used to assess the distribution of the scores. For each of the five measures the results were $p > .05$ indicating violation of the assumption of normality. However, box plots indicated the existence of several outliers, which may have been the cause of the violation of the assumption of normality. The normal Q-Q plots showed the scores to be clustered around a reasonably straight line in each of the five measures. This suggested a near normal distribution of scores.

Thus, to investigate a possible age effect regarding ToM, empathic understanding, and moral reasoning (across the three age groups) for the five different measures a MANCOVA was performed, controlling for IQ. A statistically significant effect was found to exist between the three age groups: $F_{(5, 61)} = 3.86$, $p < .001$; Wilks' Lambda = 58; partial η2 = .241. To explore this effect, a oneway, between groups, ANCOVA was conducted on each of the five assessments, followed by post- hoc comparisons using Tukey's HSD test ($p = .01$). Regarding verbal ToM there was a statistically significant age effect, $F_{(2, 66)} = 9.02$, $p < .001$. An effect size of .2 was calculated using eta squared. Post- hoc comparisons indicated that

the scores for the adolescent group did not differ significantly from that of the young-adult group. However, the middle-adult group scores were significantly higher than the adolescent group and the young adult group. A similar statistically significant age effect was noted in relation to visual ToM, $F_{(2, 66)} = 54.46$, $p < .001$. An effect size of .2 was calculated using eta squared. However, post-hoc comparisons indicated that the scores for the adolescent group were lower than the young-adult and middle-adult and the scores for the young-adult group were lower than the middle-adult group. Considering empathic understanding (self-report), there was a statistically significant effect of age, $F_{(2, 66)} = 8.11$, $p < .001$. An effect size of .2 was calculated using eta squared. Post-hoc comparisons indicated that although the scores for the adolescent group were significantly lower than those for the young-adult and the middle-adult groups, there was no significant difference between the young-adult group and the middle-adult group. Similarly, there was a statistically significant effect of age on empathic understanding (performance-based), $F_{(2, 66)} = 3.73$, $p = .029$. An effect size of .2 was calculated using eta squared. As with self-reported empathy, post- hoc comparisons indicated that the adolescent group scored significantly lower than the young-adult and the middle-adult groups but the young-adult group did not differ significantly from that of the middle-adult group. Lastly, a statistically significant effect of age on moral reasoning was detected, $F_{(2, 66)} = 9.32$, $p < .001$. An effect size of .2 was calculated using eta squared. Posthoc comparisons indicated that the adolescent group scored significantly lower than the young-adult and the middle- adult groups, and that the young-adult group scores did not differ significantly from the middle-adult group.

The relationships between verbal and visual ToM self-reported and performance-based empathic understanding, and moral reasoning were investigated using Pearson's product-moment correlation coefficient. As shown in Table 3, a small to moderate positive association was found to exist between all measures (Table 4).

4. Discussion

The current study set out to examine possible age-related differences in verbal and visual ToM, self-report and performance-based empathic understanding, and moral reasoning, as well as an association between the five measures. A statistically significant agerelated difference was found in all measures between the adolescent group and the middle-adult group. In addition, except for verbal ToM, all measures detected a statistically significant age-related difference between the adolescent group and the young adult group. However, except for verbal and visual ToM, no statistically significant age-related difference was found between the young-adult and middle-adult groups. A small to medium association was identified between all five measures. These findings will now be discussed.

In line with most past studies (ToM: Valle et al., 2015; empathic understanding: Hastings et al., 2015; moral reasoning: Kohlberg, 1976), the present study found an age-related improvement in most measures, from adolescence into young adulthood in the majority of measures. One explanation for this may be the socio-individual changes that take place during this time. For example, significant gains in mobility may allow these age groups to negotiate for more prosocial decision making (Carlo et al., 2007; Grotevant, 1998). Adolescence and young adulthood present's opportunities for renegotiating existing relationships (e.g., with parents) and for developing new peer relationships that might impact (positively or negatively) social behaviours and which last into adulthood (Carlo et al., 2007). Further, this may provide opportunities to initiate specific forms of behaviours such as volunteerism and involvement in charitable organisations. Similarly, in line with Kohlberg's (1976) proposal, the findings of the present study suggest that individuals may reach are more developed form of morality during early adulthood.

However, one exception to this was in verbal ToM where no significant statistical difference was found between the adolescent group and the young-adult group, although a significant statistical difference was found between the adolescent group and the middle-adult group. This might also be explained by social maturity (Van den Bos, Rodriguez, Schweitzer, & McClure, 2015). These researchers noted that compared to younger children and older adults, adolescents and younger adults often exhibit greater levels of impatience. They recorded the time it took for the participants to make decisions and noted that adolescents and younger people were more likely to make quicker decisions, often jumping to conclusions. This was explained in the context of brain maturation and the structural connections between two key areas of the brain that are activated during decision making which are not as strong in adolescents and young adults when compared to older adults. Given that the verbal ToM task used in the present study was quite lengthy and required the participants to concentrate on the content in order to make an informed decision, this may offer some explanation as to why a non-significant effect was found between adolescents and young adults.

Brain maturation may also explain the apparent stability between the young adult-group and the middle-adult group in all measures. Indeed, Best and Miller (2010) noted similarities in the brain maturation processes of most cognitive components related to prosocial behaviours. Duval, Piolino, Bejanin, Eustache, and Desgranges (2011) suggested that this may be because cognitive abilities have been shown to change slowly between adolescence and very young adulthood, but peak around the ages of 25–35 years. However, this does not justify why a significant age-related difference was found between all three groups in visual ToM, in the current study. One explanation for this may be that a significant percentage of all people are visual, not verbal, learners (Bradford, 2011). Indeed, Bobek and Tversky (2016) concurred, noting that visual knowledge transference was a more effective way of

improving cognitive performance. Given that the visual ToM task, in the present study, involved very little reading, and largely involved looking at pictures, may explain why a difference was detected.

However, there are other factors that future studies may wish to consider in relation to age-related differences in ToM, empathic understanding, and moral reasoning. Firstly, the extent to which ability is mediated by cultural, sub-cultural, situational, and/or individual factors is important. Specifically, past research has suggested that societies vary greatly in the degree to which cooperative behaviour is normative. For example, in field studies of individual cultures, some societies are described as respecting prosocial and communal values (Eisenberg & Mussen, 1989), whilst others demonstrate cultures where such behaviours are rare and hostility or even cruelty is the norm (Turnbull, 1972). Consequently, these variations are likely to affect the acquisition and development of prosociality. Future research may also wish to consider possible gender effects. For example, regarding moral reasoning, men are said to approach problems from an 'ethics of justice' perspective, whilst women are said to approach similar problems from an 'ethics of care' perspective (Gilligan, 1982). The extent to which such differences stem from biological variances or from the ways in which males and females are socialised is difficult to determine, particularly as such differences tend to emerge slowly across time (Spelke, 2005). As this may also apply to the acquisition and implementation of ToM and empathic understanding, future consideration of gender may be warranted (see Spenser, Bull, Betts, & Winder, under review). Lastly, the present study did not include either a child group or an older-adult group, which future studies may wish to do.

Despite these limitations, the present study adds to the literature. Specifically, although there is a body of literature relating to children's ToM (e.g., Begeer et al., 2010; Wellman & Liu, 2004), there is a paucity in relation to adult research. The present study addresses this gap. Further, regarding empathic understanding and moral reasoning, whilst some research

has have considered adult groups (e.g., Birditt & Fingerman, 2005; Reiter et al., 2017), few have included three age groups, as in the present study. Also, it is believed that the current study is the first to consider visual and verbal ToM, self-report and performance based empathic understanding, as well as moral reasoning, in a single study. In sum, the present study adds to an understanding of age-related differences in ToM, empathic understanding, and moral reasoning, which in turn may help to inform interventions designed to address reduced functioning in these areas, in several fields. For example, Alexander, Entwisle, and Dauber (2003) suggested that the development of acceptable behavioural skills in young people may enhance academic achievement. Similarly, therapeutic interventions designed for parents at risk of harming a child may help to reduce the occurrence of abuse (Sheppard & Clibbens, 2013). Finally, whilst 'thinking skills' are becoming increasingly recognised as a key in the rehabilitation of offenders (and those at risk of offending), more targeted interventions may lead aid a reduction in offending behaviours (Ross, Duckworth, Smith, Wyness, & Schoon, 2011).

In conclusion, this study suggests that, in relation to age, individuals do differ in their abilities regarding ToM, empathic understanding, and moral reasoning. This may contribute to a further understanding of how individuals make sense of, and respond to, the social world around them. Further, these findings indicate that age may not be a prohibitive factor in relation to the further development or re-enforcement of values and behaviours necessary in many aspects of everyday life such as educational attainment and a reduction in anti-social or offending behaviours.

References

Alexander, K. L., Entwisle, D. R., & Dauber, S. L. (2003). *On the success of failure: A reassessment of the effects of retention in the early grades.* New York: Cambridge University Press.

Astington, J. W. (2004). Bridging the gap between theory of mind and moral reasoning. *New Directions for Child and Adolescent Development, 103*, 63–72.

Baglio, G., Blasi, V., Sangiuliano Intra, F., Castelli, I., Massaro, D., Baglio, F., et al. (2016). Social competence in children with borderline intellectual functioning: Delayed development of theory of mind across all complexity levels. *Frontiers in Psychiatry, 7*, 1604. https://doi.org/10.3389/fpsyg.2016.01604.

Baron-Cohen, S., Wheelwright, S., Hill, J., Raste, Y., & Plumb, I. (2001). The "Reading the mind in the eyes" Test revised version: A study with normal adults, and adults with Asperger syndrome or high-functioning autism. *Journal of Child Psychology and Psychiatry, 42*(2), 241–251. https://doi.org/10.1111/1469-7610.00715.

Begeer, S., Malle, B. F., Nieuwland, M. S., & Keysar, B. (2010). Using Theory of Mind to represent and take part in social interactions: Comparing individuals with highfunctioning autism and typically developing controls. *The European Journal of Developmental Psychology, 7*, 104–122. https://doi.org/10.1080/ 17405620903024263.

Bernstein, D. M., Godfrey, R. D., Davidson, A., & Loftus, E. F. (2004). Conditions affecting the revelation effect for autobiographical memory. *Memory & Cognition, 32*(3), 455–462.

Best, J. R., & Miller, P. H. (2010). A developmental perspective on executive function. *Child Development, 81*(6), 1641–1660. https://doi.org/10.1111/j.1467-8624. 2010.01499.x.

Birch, S. A. J., & Bloom, P. (2007). The curse of knowledge in reasoning about false beliefs. *Psychological Science, 18*(5), 382–386. https://doi.org/10.1111/j.14679280.2007.01909.x.

Birditt, K. S., & Fingerman, K. L. (2005). Do we get better at picking our battles? Age group

differences in descriptions of behavioural reactions to interpersonal tensions. *The Journals*

of Gerontology, Series B: Psychological Sciences and Social Sciences, 60(3), 121–128.

https://doi.org/10.1093/geronb/60.3.p121.

Blair, R. J. R., & Cipolotti, L. (2000). Impaired social response reversal. A case of' acquired

sociopathy'. *Brain: A Journal of Neurology, 123*(6), 1122–1141.

Blair, R. J. R., & Coles, M. (2000). Expression recognition and behavioural problems in early

adolescence. *Cognitive Development, 15*, 421–434. https://doi.org/10. 1016/S0885-

2014(01)000039-9.

Bobek, E., & Tversky, B. (2016). Creating visual explanations improves learning. *Cognitive*

Research: Principles and Implications, 1(1), 27. https://doi.org/10.1186/ s41235-016-

0031-6.

Brackett, M. A., & Mayer, J. D. (2003). Convergent, discriminant and incremental validity of

competing measures of emotional intelligence. *Personality and Social Psychology Bulletin,*

29, 1147–1158.

Bradford, W. C. (2011). *Reaching the visual learner: Teaching property through art.*

Available at SSRN:The Law Teacher11. https://ssrn.com/abstract=587201.

Byom, L. J., & Mutlu, B. (2013). Theory of mind: Mechanisms, methods, and new directions.

Frontiers in Human Neuroscience, 7, 413. https://doi.org/10.3389/fnhum. 2013.00413.

Bzdok, D., Schilbach, L., Vogeley, K., Schneider, K., Laird, A. R., Langner, R., et al. (2012).

Parsing the neural correlates of moral cognition: ALE meta-analysis on morality, theory of

mind, and empathy. *Brain Structure & Function, 217*(4), 783–796.

https://doi.org/10.1007/s00429-012-0380-y.

Callaghan, T., Rochat, P., Lillard, l., Claux, M. L., Odden, H., Itakura, S., et al. (2004).

Synchrony in the onset of mental-state reasoning. Evidence from five cultures.

Psychological Science, 16(5), 378–384. https://doi.org/10.1111/j.0956-7976.2005.01544.x.

Carlo, G., Crockett, L. J., Randall, B. A., & Roesch, S. C. (2007). Parent and peer correlates

of prosocial development in rural adolescents: A longitudinal study. *Journal of Research on*

Adolescence, 17, 301–324.

Clark-Carter, D. (2004). *Quantitative psychological research: A student's handbook.* East

Sussex: Taylor & Francis.

Clark-Carter, D. (2010). *Quantitative Psychological Research. The Complete Student's*

Companion. East Sussex: Taylor & Francis.

Colby, A., & Kohlberg, L. (1987). *The measurement of moral judgment vol. 2: Standard*

issue scoring manual. Cambridge University Press.

Conte, E., Grazzani, I., & Pepe, A. (2018). Social cognition, language, and prosocial

behaviors: A multitrait mixed-methods study in early childhood. *Early Education and*

Development, 29(6), 814–830. https://doi.org/10.1080/10409289.2018.1475820.

Cox, C. L., Uddin, L. Q., Di Martino, A., Castellanos, F. X., Milham, M. P., & Kelly, C.

(2012). The balance between feeling and knowing: Affective and cognitive empathy are

reflected in the brain's intrinsic functional dynamics. *Social Cognitive and Affective*

Neuroscience, 7(6), 727–737. https://doi.org/10.1093/scan/ nsr051.

Davis, M., & Stone, T. (2003). Synthesis: Psychological understanding and social skills. In B.

Repacholi, & V. Slaughter (Eds.). *Individual differences in theory of mind. Macquarie*

monographs in cognitive science (pp. 305–352). Hove, E. Sussex: Psychology Press.

Decety, J., Michalska, K. J., & Akitsuki, Y. (2008). Who caused the pain? A functional MRI

investigation of empathy and intentionality in children. *Neuropsychologia, 46*, 2607–2614.

Dunfield, K. A. (2014). A construct divided: Prosocial behavior as helping, sharing, and

comforting subtypes. *Frontiers in Psychology, 5*, 958. https://doi.org/10.3389/

fpsyg.2014.00958.

Duval, C., Piolino, P., Bejanin, A., Eustache, F., & Desgranges, B. (2011). Age effects on

different components of theory of mind. *Consciousness and Cognition, 20*(3), 627–642.

https://doi.org/10.1016/j.concog.2010.10.025.

Eggum, N. D., Eisenberg, N., Kao, K., Spinrad, T. L., Bolnick, R., Hofer, C., et al. (2011).

Emotion understanding, theory of mind, and prosocial orientation: Relations over time in

early childhood. *The Journal of Positive Psychology, 6*(1), 4–16.

https://doi.org/10.1080/17439760.2010.536776.

Eisenberg, N. (1982). The development of reasoning regarding prosocial behavior. In N.

Eisenberg (Ed.). *The development of prosocial behaviour* (pp. 219–249). New York:

Academic Press.

Eisenberg, N., & Fabes, R. (1998). Prosocial development. In W. Damon, & N. Eisenberg

(Eds.). *Handbook of child psychology (vol. 3). Social, emotional,and personality

development*(5th ed.). New York: Wiley.

Eisenberg, N., & Mussen, P. (1989). *The roots of prosocial behaviour in children.*

Cambridge: Cambridge University Press.

Eisenberg, N., Cumberland, A., Guthrie, I. K., Murphy, B. C., & Shepard, S. A. (2005). Age

changes in prosocial responding and moral reasoning in adolescence and early adulthood.

Journal of Research on Adolescence, 15, 235–260. https://doi.org/10.1111/j.1532-

795.2005.00095.x.

Ellemers, N., van der Toorn, J., Paunov, Y., & van Leeuwen, T. (2019). The psychology of

morality: A review and analysis of empirical studies published from 1940 through 2017.

Personality and Social Psychology Review, 23(4), 332–366.

https://doi.org/10.1177/1088868318811759.

Entorf, H., & Spengler, H. (2000). Socioeconomic and demographic factors of crime in

    Germany: Evidence from panel data of the German states. *International Review of Law*

    and Economics, 20(1), 75–106.

Gibbs, J. C., Basinger, K. S., Fuller, D., & Fulkler, R. L. (1992). *Moral maturity: Measuring*

    the development of sociomoral reflection. New Jersey: Lawrence Erlbaum Associates. Inc.

Gilligan, C. (1982). *In a different voice: Psychological theory and women's development.*

Cambridge, MA: Harvard University Press.

Grotevant, H. (1998). Adolescent development in family contexts. In W. Damon, & N.

    Eisenberg (Eds.). *Handbook of child psychology (vol. 3). Social, emotional, and*

    personality development. New York: John Wiley.

Grühn, D., Rebucal, K., Diehl, M., Lumley, M., & Labouvie-Vief, G. (2008). Empathy across

    the adult lifespan: Longitudinal and experience-sampling findings. *Emotion, 8*(6), 753–

    765. https://doi.org/10.1037/a0014123.

Hamlin, J. K. (2013). Moral Judgment and Action in Preverbal Infants and Toddlers:

    Evidence for an Innate Moral Core. *Current Directions in Psychological Science, 22*(3),

    186–193. https://doi.org/10.1177/0963721412470687.

Hastings, P. D., Miller, J. G., & Troxel, N. R. (2015). Making good: The socialization of

    children's prosocial development. In J. E. Grusec, & P. D. Hastings (Eds.). *Handbook of*

    socialization: Theory and research (pp. 637–660). Guilford Press.

Hay, D. F., & Cook, K. V. (2007). The transformation of prosocial behavior from infancy to

    childhood. In C. A. Brownell, & C. B. Kopp (Eds.). *Socioemotional development in the*

    toddler years: Transitions and transformations (pp. 100–131). Guilford Press.

Henry, J. D., Phillips, L. H., Ruffman, T., & Bailey, P. E. (2013). A meta-analytic review of

age differences in theory of mind. *Psychology and Aging, 28*, 826–839. https://

doi.org/10.1037/a0030677.

Kohlberg, L. (1976). Moral stages and moralization: The cognitive-developmental approach.

In T. Lickona (Ed.). *Moral development and behavior: Theory, research, and social issues.*

New York: Holt, Reinhart &Winston.

Labouvie-Vief, G., & González, M. M. (2004). Dynamic integration: Affect optimization and

differentiation in development. In D. Y. Dai, & R. J. Sternberg (Eds.). *The educational*

psychology series. Motivation, emotion, and cognition: Integrative perspectives on

intellectual functioning and development (pp. 237–272). Lawrence Erlbaum Associates

Publishers.

Lawson, J., Baron-Cohen, S., & Wheelwright, S. (2004). Empathising and systemising in

adults with and without Asperger's Syndrome. *Journal of Autism and Developmental*

Disorders, 34, 301–310. https://doi.org/10.1023/B:JADD.0000029552.42724.1b.

Makino, H. (2010). *The development of a new performance-based test for measuring*

emotional intelligence: Humanity-Empathy-Assertiveness-Respect Test. (Doctoral

Dissertation). UMI Dissertation Publishing Retrieved from (UMI Number: 3409390).

Mayer, J. D., Salovey, P., & Caruso, D. (2002). *Mayer-salovey-caruso emotional intelligence*

test (MSCEIT) user's manual. Toronto, Ontario: Multi-Health Systems.

McDonald, N., & Messinger, D. (2011). The development of empathy: How, when, and why.

In A. Acerbi, J. A. Lombo, & J. J. Sanguineti (Eds.). *Free will, emotions, and moral*

actions: Philosophy and neuroscience in dialogue. IF-Press.

Moran, J. M., Jolly, E., & Mitchell, J. P. (2012). Social-cognitive deficits in normal aging.

Journal of Neuroscience, 16, 5553–5561. https://doi.org/10.1523/ JNEUROSCI.5511-

11.2012.

Myers, M. W., & Hodges, S. D. (2011). The structure of self-other overlaps and its relationship to perspective taking. *Personal Relationships, 19*, 663–679. https://doi. org/10.1111/j.1475-6811.2011.01382.x.

O'Toole, S. E., Monks, C. P., & Tsermentseli, S. (2017). Executive function and theory of mind as predictors of aggressive and prosocial behaviour and peer acceptance in early childhood. *Social Development, 26*(4), 907–920. https://doi.org/10.1111/sode.12231.

Phillips, L. H., Bull, R., Allen, R., Insch, P., Burr, K., & Ogg, W. (2011). Lifespan aging and belief reasoning: Influences of executive function and social cue decoding. *Cognition, 120*(2), 236–247. https://doi.org/10.1016/j.cognition.2011.05.003.

Qureshi, A. W., Monk, R. L., Samson, D., & Apperly, I. A. (2020). Does interference between self and other perspectives in theory of mind tasks reflect a common underlying process? Evidence from individual differences in theory of mind and inhibitory control. *Psychonomic Bulletin & Review, 27*, 178–190. https://doi.org/ 10.3758/s13423-019-01656-z.

Reiter, A. M. F., Kanske, P., Eppinger, B., & Li, S. (2017). The aging of the social mind - differential effects on components of social understanding. *Scientific Reports, 7*, 11046. https://doi.org/10.1038/s41598-017-10669-4.

Rheingold, H. L. (1982). Little children's participation in the work of adults, a nascent prosocial behaviour. *Child Development, 53*, 114–125. https://doi.org/10.2307/ 1129643.

Rosi, A., Nola, M., Lecce, S., & Cavallini, E. (2019). Prosocial behaviour in aging: which factors can explain age-related differences in social-economic decision making? *International Psychogeriatrics,* 1–11. https://doi.org/10.1017/S104161021900006.

Ross, A., Duckworth, K., Smith, D. J., Wyness, G., & Schoon, I. (2011). *Prevention and Reduction: A review of strategies for intervening early to prevent or reduce youth crime*

and anti-social behaviour. Department of Education. Centre for Analysis of Youth

Transitions (CAYT) DFE-RR111. ISBN: 978-1-84775-906-1.

Schachnera, A. C. W., Newton, E. K., Thompson, R. A., & Goodman-Wilson, M. (2018).

Becoming prosocial: The consistency of individual differences in early prosocial

behaviour. *Early Childhood Research Quarterly, 43*(2), 42–51.

https://doi.org/10.1016/j.ecresq.2018.01.001.

Shamay-Tsoory, S. G., Tomer, R., & Aharon-Peretz, J. (2005). The neuroanatomical basis of

understanding sarcasm and its relationship to social cognition.

Neuropsychology, 19(3), 288–300. https://doi.org/10.1037/0894-4105.19.3.288.

Sharp, C. (2008). Theory of mind and conduct problems in children: Deficits in reading the

'emotions of the eyes'. *Cognition & Emotion, 22*(6), 1149–1158. https://doi.

org/10.1080/02699930701667586.

Sheppard, M., & Clibbens, J. (2013). Preventive therapy and resilience promotion: An

evaluation of social work led skills development group work. *Child & Family Social Work,

22*(2), 116–126. https://doi.org/10.1111/cfs.12077.

Skoe, E. E. A. (2010). The relationship between empathy-related constructs and care-based

moral development in young adulthood. *Journal of Moral Education, 39*(2), 191–211.

https://doi.org/10.1080/03057241003754930.

Snarey, J. (1995). In a communitarian voice: The sociological expansion of Kohlbergian

theory, research, and practice. In W. Kurtines, & J. Gewirtz (Eds.). *Moral development: An

introduction*Boston, MA: Allyn & Bacon. https://doi.org/10.1023/A:1009026230018.

Spelke, E. S. (2005). Sex differences in intrinsic aptitude for mathematics and science: A

critical review. *The American Psychologist, 60*, 950–958.

Spenser, K. A., Betts, L. R., & Das Gupta, M. (2015). Deficits in Prosocial Skills: A

comparison between young-adult offenders and non-offenders. *Psychology Crime and

Law, 21*(7), 632–647. https://doi.org/10.1080/1068316X.2015.1028542.

Spenser, K. A., Bull, R., Betts, L. R., & Winder, B. (accepted with revisions). International

Journal of Offender Therapy and Comparative Criminology. In press.

Thompson, R. A., & Newton, E. K. (2013). Baby altruists? Examining the complexity of

prosocial motivation in young children. *Infancy, 18*, 120–133. https://doi.org/

10.1111/j.1532-7078.2012.00139.x.

Turnbull, C. M. (1972). *The mountain people*. New York: Simon & Schuster.

Valle, A., Massaro, D., Castelli, I., & Marchetti, A. (2015). Theory of mind development in

adolescence and early adulthood: The growing complexity of recursive thinking ability.

European Journal of Psychology, 11(1), 112–124.

https://doi.org/10.5964/ejop.v11i1.829.e.

Van den Bos, W., Rodriguez, C. A., Schweitzer, J. B., & McClure, S. M. (2015). Adolescent

impatience decreases with increased frontostriatal connectivity. *Proceedings of the

National Academy of Sciences of the United States of America, 112*(29), E3765–E3774.

https://doi.org/10.1073/pnas.1423095112.

Van der Graaff, J., Branje, S., De Wied, M., Hawk, S., Van Lier, P., & Meeus, W. (2014).

Perspective taking and empathic concern in adolescence: Gender differences in

developmental changes. *Developmental Psychology, 50*(3), 881–888.

https://doi.org/10.1037/a0034325.

Wakabayashi, A., Baron-Cohen, S., Wheelwright, S., Goldenfeld, N., Delany, J., Fine, D., et

al. (2006). Development of short forms of the empathy quotient (EQ-short) and the

systemising quotient (SQ – short). *Personality and Individual Differences, 41*, 929–940.

https://doi.org/10.1016/j.paid.2006.03.017.

Wang, Z., & Wang, L. (2015). The mind and heart of the social child: Developing the

empathy and theory of mind scale. *Child Development Research, 171304*. https://

doi.org/10.1155/2015/171304 8.

Wechsler, D. (1999). *Wechsler Abbreviated Scale of Intelligence.* San Antonio, TX: The

Psychological Corporation.

Wellman, H. M., & Liu, D. (2004). Scaling of theory of mind tasks. *Child Development, 75*,

523–541. https://doi.org/10.1111/j.1467-8624.2004.00691.x.

Wellman, H., & Woolley, J. (1990). From simple desires to ordinary beliefs: The early

development of everyday psychology. *Cognition, 35*, 245–275. https://doi.org/

10.1016/0010-0277(90)90024-E.

Wimmer, H., & Perner, J. (1983). Beliefs about beliefs: Representation and constraining

function of wrong beliefs in young children's understanding of deception. *Cognition,

13*(1), 103–128. https://doi.org/10.1016/0010-0277(83)90004-5.

Zahn-Waxler, C., Radke-Yarrow, M., Wagner, E., & Chapman, M. (1992). Development of

concern for others. *Developmental Psychology, 28*(1), 126–136. https://doi.

org/10.1037/0012-1649.28.1.126.

Table 1

Descriptive statistics for verbal and visual ToM), self-reported and performance-based

Empathic Understanding, and Moral Reasoning by Age Group.

	Adolescents			Young-Adults			Adults		
	n	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
Verbal ToM	46	12.47	2.96	46	13.52	2.95	46	15.56	1.7
Visual ToM	46	12.52	2.89	46	19.39	5.34	46	28	6.19
Self-Report EU	46	26.52	5.03	46	31.87	6.17	46	32.35	5.07
Perf-Based EU	46	10.48	2.96	46	12.48	6.36	46	14.43	5.75
Moral Reasoning	46	274.96	20.21	46	304.13	26.97	46	304.91	31.95

Table 2

Descriptive statistics for verbal and visual ToM, self-reported and performance-based

Empathic Understanding, and Moral Reasoning across whole data set.

	n	*M*	*SD*	Skewness	Kurtosis
Verbal ToM	138	13.85	2.78	−0.58	−0.48
Visual ToM	138	19.92	8.04	0.38	−0.97
Self-Report EU	138	29.61	4.9	0.22	0.38
Perf-Based EU	138	12.53	4.41	0.74	−5.9
Moral Reasoning	138	289.15	30.82	−0.19	−0.813

Table 3

Age Group Comparisons for verbal and visual ToM, self-reported and performance-based

Empathic Understanding, and Moral Reasoning.

	Adolescent to Young-Adult	Adolescent to Middle-Adult	Young-Adult to Middle-Adult
Verbal ToM	$> .05$	$< .05$	$< .05$
Visual ToM	$> .05$	$< .05$	$< .05$
Self-Report EU	$< .025$	$> .05$	$< .025$
Perf-Based EU	$> .05$	$> .05$	$< .05$
Moral Reasoning	$> .01$	$> .05$	$> .01$

Table 4

Correlations between verbal and visual ToM, self-report and performance-based Empathic

Understanding, and Moral Reasoning.

Measure	1	2	3	4	5
1. Verbal ToM	–				
2. Visual ToM	.157 *	–			
3. Self-Report EU	.298 *	.236 *	–		
4. Perf-Based EU	.272*	.286*	.086*	–	
5. Moral Reasoning	.477***	.209*	.160 *	.324**	–

* p <.05.

** p < .01.

*** p < .001.