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**Cumulative Lifetime Stressor Exposure and Health in Elite Athletes: The Moderating
Role of Perfectionism**

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Cumulative Lifetime Stressor Exposure and Health in Elite Athletes: The Moderating Role of Perfectionism

Research suggests that lifetime stressor exposure is an important predictor of a variety of health-related outcomes (Burani et al., 2022; McLoughlin et al., 2022a; Slavich & Shields, 2018). Recent work on this topic has used the Stress and Adversity Inventory for Adults (STRAIN) to assess exposure to major stressors occurring over the entire life course. The STRAIN systematically enquires about a stressor's type (e.g., acute life events vs. chronic difficulties), exposure timing (e.g., early life vs. adulthood), primary life domain (e.g., education, work), and social-psychological characteristic (e.g., interpersonal loss, physical danger), and thus provides a comprehensive picture of stressor exposure. Since its initial development, the STRAIN has been used to examine how lifetime stressor exposure predicts numerous biological, behavioural, and clinical outcomes (e.g., Klatzkin et al., 2023). Broadly speaking, this research demonstrates that as lifetime stressor exposure increases, so too does the vulnerability for future psychological problems (e.g., depression, anxiety; Parra et al., 2023), as well as physical health complaints (e.g., colds; Cazassa et al., 2020). Moreover, experiencing more severe stressors over the life course has been identified as a relatively stronger predictor of ill-health as compared to the total count of such stressors (Shields et al., 2023). As a result, it is relatively well established that greater lifetime stressor exposure contributes to various health problems in the general population (Slavich, 2016). However, research on this topic is limited among elite athletes who experience high levels of stress-related burden (c.f. McLoughlin et al., 2021, 2023a).

Initial research within a sporting context has suggested that elite athletes who have experienced greater lifetime stressors report more symptoms of depression and anxiety, as well as poorer psychological well-being (McLoughlin et al., 2021). Additionally, the qualitative findings reported by McLoughlin et al. (2021) suggested that relatively high lifetime stressor

1 exposure fostered poorer health and well-being by promoting greater use of maladaptive long-
2 term coping strategies (e.g., denial), increased susceptibility to future stress, and limiting
3 interpersonal relationships (i.e., social support; McLoughlin et al., 2021). More recently, these
4 qualitative results were extended by McLoughlin et al. (2023b) who used semi-structured
5 interviews, complemented by timelining, to explore *how* lifetime stressor exposure influenced
6 sport performers' health, well-being, and performance. Results revealed the psychological
7 (e.g., maladaptive coping strategies), social (e.g., difficulties in building and maintaining
8 relationships), and behavioural (e.g., risky behaviours) factors that further explain how lifetime
9 stressor exposure influences sport performers' health, well-being, and performance.
10 Furthermore, McLoughlin et al. (2022a) found that greater lifetime stressor exposure was
11 associated with more mental and physical health problems (e.g., depression, respiratory
12 infections). The results revealed that sport performers who experienced more severe lifetime
13 stressors were more likely to appraise potentially stressful situations as a threat (vs. a challenge;
14 McLoughlin et al., 2022a). To further understand the potential mechanisms underlying the
15 stressor-health relationship, McLoughlin et al. (2022b) found that exposure to a moderate
16 number of lifetime stressors was associated with adaptive cardiovascular reactivity, whereas
17 very low or very high stressor exposure was related to maladaptive reactivity. Turning to
18 performance-related outcomes, McLoughlin et al. (2023a) explored male elite athletes'
19 experiences of lifetime stressor exposure and performance in their sport. Results revealed that
20 the athletes viewed their sport as a form of escape from the stressors they experienced in their
21 daily lives (e.g., parental divorce). It was, however, when stressors occurred in the sporting
22 environment (e.g., selection) that the symptoms of mental ill-health were intensified and
23 resulted in performance decrements.

24 Although this body of work has improved our understanding of the stressor-health
25 relationship, this research has not explored any potential moderating factors, such as

1 personality. This is surprising given the prominent role that personality is proposed to play in
2 stress-health theories such as the integrative model of stress and health (Epel et al., 2018).
3 While there is an abundance of moderators that could be examined, one characteristic that has
4 received growing attention is perfectionism (Curran & Hill, 2019; Hill, 2023; Hill et al., 2018).
5 At its broadest, perfectionism is a multidimensional personality trait that is characterised by a
6 combination of striving for flawlessness and overly critical evaluations of behaviour (Frost et
7 al., 1990). One of the most utilised models of perfectionism was proposed by Hewitt and Flett
8 (1991a), which differentiates between three dimensions of perfectionism based upon the
9 direction of perfectionistic thoughts, feelings, and behaviours. The first dimension, self-
10 oriented perfectionism, is the demand of perfection from the self. The second dimension,
11 socially prescribed perfectionism, is the belief that others expect one to be perfect. And the
12 final dimension, other-oriented perfectionism, is the demand of perfection from others (Hewitt
13 & Flett, 1991a). Importantly, these different dimensions are thought to have varying effects on
14 outcomes such as performance and health (Molnar et al., 2012).

15 Some investigators have suggested that perfectionism is essential to obtain success in
16 sport (e.g., Hardy et al., 2017). However, research has also examined perfectionism in relation
17 to health in both general and clinical populations (Flett et al., 2022; Sirois & Molnar, 2016;
18 Smith et al., 2021). In this regard, there is evidence that the direction, size, and strength of
19 associations differs based on which dimension is examined. Generally, socially prescribed
20 perfectionism has shown the strongest positive associations with mental (e.g., depression;
21 Limburg et al., 2016) and physical (e.g., migraines; Flett et al., 2016) health outcomes.
22 Similarly, other-oriented perfectionism is positively related to health outcomes, but the effects
23 are typically smaller in size (e.g., Saboonchi & Lundh, 2003). Finally, the association between
24 self-oriented perfectionism and health is more ambiguous, with some studies showing positive
25 associations and others revealing negative associations (e.g., Molnar et al., 2012).

1 Beyond this, perfectionism has also been linked to psychological stress (Hewitt &
2 Dyck, 1986). In this regard, Flett and Hewitt (2002) proposed several theoretical pathways
3 through which perfectionism may affect stress. Two pathways are particularly relevant for the
4 present study. The first pathway, stress perpetuation, refers to the tendency for those high in
5 perfectionism to maintain a stressful episode via the use of maladaptive coping techniques (e.g.,
6 rumination over mistakes). The second pathway, stress enhancement, refers to the tendency for
7 those high in perfectionism to adopt self-defeating cognitive appraisals (e.g., threat, harm, loss)
8 resulting in the magnification of stress (e.g., over emphasising the importance of minor
9 mistakes). These pathways may help explain why perfectionism, and particularly high levels
10 of socially prescribed and other-oriented perfectionism, predict ill-health. However, in contrast
11 to socially prescribed and other-oriented perfectionism, self-oriented perfectionism may buffer
12 stress (e.g., via problem-focused coping). Despite some research supporting these pathways in
13 athletic populations (e.g., Hill et al., 2018), no study has investigated whether perfectionism
14 moderates the association between lifetime stressor exposure and health in elite athletes.

15 To address this, we examined (a) how lifetime stressor exposure was associated with
16 general physical and mental health complaints among elite athletes, and (b) the extent to which
17 these associations were moderated by perfectionism (socially prescribed, self-oriented, or
18 other-oriented). Based on the research described above, we first hypothesized that greater
19 lifetime stressor exposure (count and severity) would be related to poorer mental and physical
20 health among elite athletes. Second, we hypothesized that perfectionism would moderate the
21 relationship between elite athletes' lifetime stressor exposure and health, such that higher self-
22 oriented perfectionism would attenuate, and greater socially prescribed and other-oriented
23 perfectionism would strengthen, these stress-health associations.

24 **Method**

25 *Participants*

1 Participants were 110 elite athletes (64 females, 45 males, 1 preferred to self-describe)
2 aged between 18 and 59 years old ($M_{age} = 29.98$ years, $SD_{age} = 10.54$), from a variety of sports
3 (e.g., swimming, rugby). All participants were classified as elite because they had competed,
4 or were currently competing, at an international or professional level (Swann et al., 2015). An
5 *a priori* power calculation using G*Power software revealed that a minimum sample of 64
6 participants was required given a medium effect of 0.30, an alpha of 0.05, and power of 0.80.
7 The effect size was based on prior research linking lifetime stressor exposure to symptoms of
8 depression (McLoughlin et al., 2021).

9 ***Study Design and Procedure***

10 This study used a cross-sectional design. Following institutional ethical approval,
11 participants were recruited through the researchers' existing contacts and social media. Prior to
12 taking part, participants read an information sheet that described the study aim and informed
13 them of their ethical rights. After participants had provided consent, data was collected through
14 an online survey which took approximately 45 minutes to complete.

15 ***Measures***

16 *Cumulative Lifetime Stressor Exposure*

17 Lifetime stressor exposure was assessed using the Adult STRAIN (Slavich & Shields,
18 2018). The STRAIN is an online interview assessing 55 major life stressors (e.g., job loss). For
19 every stressor that is endorsed, follow-up questions are asked assessing severity (1 = *not at all*
20 to 5 = *extremely*), frequency (1 to 5 or more times), timing (1 = *ongoing* to 7 = *over 5 years*),
21 and duration (years and/or months; Slavich & Shields, 2018). The STRAIN assesses stressors
22 across two types (acute life events vs. chronic difficulties) and time periods (early life vs.
23 adulthood), as well as 12 life domains (housing, education, work, health, marital/partner,
24 reproduction, financial, legal, other relationships, death, life-threatening situations, and
25 possessions) and five social-psychological characteristics (interpersonal loss, physical danger,

1 humiliation, entrapment, and role change/disruption). This study focused on the STRAIN's two
2 main outcomes: (1) total count of lifetime stressors experienced (range = 0-166), and (2) total
3 severity of lifetime stressors experienced (range = 0-265). The STRAIN has very good
4 concurrent ($r_s = 0.15-0.62$) and discriminant validity, with excellent test-retest reliability ($r_s =$
5 $0.90-0.95$; Cazassa et al., 2020). Furthermore, the STRAIN has demonstrated good predictive
6 validity in relation various health-related outcomes (Moseley et al., 2021).

7 *Physical Health Complaints*

8 The Physical Health Questionnaire (PHQ; Schat et al., 2005) measured physical health
9 complaints (headaches, upset stomachs, colds) over the past month via 14 items. Eleven items
10 (e.g., "How often have you experienced headaches?") were scored on a 7-point Likert scale
11 ranging from 1 (*not at all*) to 7 (*all the time*), two items (e.g., "How many times have you had
12 minor colds that made you feel uncomfortable but did not keep you sick in bed or make you
13 miss work?") were scored on a 7-point Likert scale ranging from 0 *times* to 7+ *times*, and one
14 item ("When you had a bad cold or flu, how long did it typically last?") was scored on a 7-
15 point Likert scale ranging from 1 *day* to 7+ *days*. All items were summed (range = 12-98), with
16 higher scores indicating greater physical health complaints. The PHQ has demonstrated
17 acceptable factorial validity and excellent convergent and divergent validity (Schat et al.,
18 2005), and in this study, it had good internal consistency ($\alpha = .85$).

19 *Mental Health Complaints*

20 The Kessler 6-Item Psychological Distress Inventory (K-6; Kessler et al., 2002)
21 measured general mental health complaints over the past month via six items (e.g., "How often
22 did you feel so depressed that nothing could cheer you up?"), with each item scored on a 5-
23 point Likert scale ranging from 1 (*never*) to 5 (*very often*). All items were summed (range = 6-
24 30), with higher scores indicating greater mental health complaints. The K-6 has shown

1 excellent factorial validity and strong predictive validity in relation to mental health (e.g.,
2 depression; Kessler et al., 2002). In this study, it had excellent internal consistency ($\alpha = .92$).

3 *Perfectionism*

4 The Multidimensional Perfectionism 15-Item Scale (MPS-15; Hewitt & Flett, 1991b)
5 measured perfectionism. The MPS-15 has three subscales: self-oriented perfectionism (e.g.,
6 “One of my goals is to be perfect in everything I do”), other-oriented perfectionism (e.g., “It
7 doesn’t matter to me when someone close to me does not do their absolute best”), and socially-
8 prescribed perfectionism (e.g., “Anything that I do that is less than excellent will be seen as
9 poor work by those around me”). Each item was scored on a 7-point Likert scale ranging from
10 1 (*strongly disagree*) to 7 (*strongly agree*). The five items for each subscale were summed
11 (range = 5-35), with higher scores indicating greater perfectionism. The MPS-15 has shown
12 good reliability and validity (Hewitt & Flett, 1991b; Stoeber, 2018), and, in this study, it had
13 good internal consistency for self-oriented perfectionism ($\alpha = .85$), and acceptable internal
14 consistency for other-oriented ($\alpha = .71$) and socially-prescribed ($\alpha = .79$) perfectionism.

15 *Data Analysis*

16 Data were analysed using SPSS version 27.0. Prior to any analyses, 17 outliers (z -scores
17 ≥ 3.29) were detected and removed from the dataset. Following these outlier analyses, visual
18 inspection confirmed all data were normally distributed. Additional checks for other
19 assumptions of linear regression analyses were conducted, with visual inspection of bivariate
20 scatterplots confirming all data were linearly related and homoscedastic.

21 To examine if total lifetime stressor count or severity predicted mental and physical
22 health complaints, hierarchical linear multiple regression analyses were run. Specifically,
23 physical and mental health complaints were entered into separate models as dependent
24 variables, while in each model, independent variables were entered at step 1 (i.e., total lifetime
25 stressor count or severity), and *a priori* covariates were entered at step 2 (i.e., age and gender).

1 Next, hierarchical linear regression analyses were run to examine if different stressor types
2 (i.e., acute life events vs. chronic difficulties), exposure times (i.e., early-life vs. adulthood),
3 life domains (e.g., work), or social-psychological characteristics (e.g., physical danger)
4 predicted general physical and mental health complaints, above and beyond covariates.

5 Moderation analyses were then conducted via the PROCESS SPSS custom dialog
6 (Hayes, 2018) to examine if self-oriented, other-oriented, or socially-prescribed perfectionism
7 moderated the relationship between lifetime stressor exposure (i.e., total count or severity) and
8 physical and mental health complaints. Lifetime stressor count or severity [X] were entered as
9 independent variables, physical and mental health complaints [Y] as dependent variables, and
10 the perfectionism dimensions [W] were entered as moderating variables. A moderation model
11 was deemed statistically significant if the 95% confidence intervals did not cross zero.

12 **Results**

13 *Descriptive Statistics*

14 All descriptive statistics including the means and standard deviations for, and
15 correlations between, the main study variables are shown in Table 1.

16 *Lifetime Stressor Count and Health*

17 Cumulative lifetime stressor count was associated with physical ($\beta = .34, p < .001$) and
18 mental ($\beta = .49, p < .001$) health complaints, above and beyond age and gender (Table 2).
19 Moreover, total count of acute life events was associated with physical ($\beta = .23, p = .024$) and
20 mental ($\beta = .24, p = .018$) health complaints, above and beyond age and gender. Similarly, total
21 count of chronic difficulties was associated with physical ($\beta = .24, p = .020$) and mental ($\beta = .36,$
22 $p < .001$) health complaints, above and beyond age and gender. Furthermore, total count of
23 early-life adversity was associated with mental health complaints ($\beta = .24, p = .019$), above and
24 beyond age and gender, but not physical health complaints ($\beta = -.18, p = .084$). In contrast, total

1 count of adulthood stressors was associated with physical ($\beta = .24, p = .023$) and mental ($\beta =$
2 $.30, p = .003$) health complaints, above and beyond age and gender.

3 In terms of count, the lifetime stressor characteristics that were associated with physical
4 health complaints, while controlling for age and gender, included: health ($\beta = .26, p = .006$),
5 marital/partner ($\beta = .28, p = .003$), life-threatening situations ($\beta = .20, p = .040$), physical danger
6 ($\beta = .32, p = .001$), entrapment ($\beta = .22, p = .022$), and role change ($\beta = .23, p = .019$). Housing,
7 work, financial, other relationships, death, possessions, interpersonal loss, and humiliation
8 were not significantly associated with physical health complaints (Figure 1a). The
9 characteristics that were associated with mental health complaints, while controlling for age
10 and gender, included: health ($\beta = .28, p = .004$), marital/partner ($\beta = .19, p = .043$), financial (β
11 $= .19, p = .043$), other relationships ($\beta = .20, p = .037$), interpersonal loss ($\beta = .32, p = .001$),
12 physical danger ($\beta = .21, p = .033$), humiliation ($\beta = .25, p = .008$), and entrapment ($\beta = .36, p$
13 $< .001$). Housing, work, death, life-threatening situations, possessions, and role change were
14 not significantly associated with mental health complaints (Figure 1b).

15 ***Lifetime Stressor Severity and Health***

16 Cumulative lifetime stressor severity was associated with physical ($\beta = .38, p < .001$)
17 and mental ($\beta = .57, p < .001$) health complaints, above and beyond age and gender (Table 2).
18 Moreover, total severity of acute life events was associated with physical ($\beta = .35, p = .001$)
19 and mental ($\beta = .42, p < .001$) health complaints, above and beyond age and gender. Similarly,
20 total severity of chronic difficulties was associated with physical ($\beta = .26, p = .013$) and mental
21 ($\beta = .40, p < .001$) health complaints, above and beyond age and gender. Furthermore, total
22 severity of early-life adversity was associated with physical ($\beta = .21, p = .040$) and mental (β
23 $= .27, p = .008$) health complaints, above and beyond age and gender. Comparably, total severity
24 of adulthood stressors was associated with physical ($\beta = .30, p = .005$) and mental ($\beta = .42, p$
25 $< .001$) health complaints, above and beyond age and gender.

1 In terms of severity, the lifetime stressor characteristics that were associated with
2 physical health complaints, while controlling for age and gender, included: health ($\beta = .38, p <$
3 $.001$), marital/partner ($\beta = .29, p = .002$), other relationships ($\beta = .24, p = .015$), life-threatening
4 situations ($\beta = .25, p = .011$), interpersonal loss ($\beta = .28, p = .005$), physical danger ($\beta = .40, p <$
5 $.001$), humiliation ($\beta = .27, p = .005$), entrapment ($\beta = .24, p = .010$), and role change ($\beta = .31, p$
6 $= .001$). Housing, work, financial, death, and possessions were not significantly associated with
7 physical health complaints (Figure 1a). The characteristics that were associated with mental
8 health complaints, while controlling for age and gender, included: housing ($\beta = .20, p = .037$),
9 health ($\beta = .45, p < .001$), marital/partner ($\beta = .27, p = .004$), financial ($\beta = .25, p = .008$), other
10 relationships ($\beta = .21, p = .036$), death ($\beta = .25, p = .013$), life-threatening situations ($\beta = .29, p$
11 $= .003$), interpersonal loss ($\beta = .42, p < .001$), physical danger ($\beta = .41, p < .001$), humiliation
12 ($\beta = .30, p = .002$), entrapment ($\beta = .39, p < .001$), and role change ($\beta = .33, p = .001$). Work and
13 possessions were not significantly associated with mental health complaints (Figure 1b).

14 ***Moderation Analyses***

15 No significant moderation effects were found with mental health complaints as the
16 dependent variable, or when socially-prescribed or other-oriented perfectionism were entered
17 as moderators (Table 3). However, self-oriented perfectionism moderated the lifetime stressor
18 exposure and physical health complaints relationship (Table 3). To illustrate these significant
19 interaction effects, the associations between lifetime stressor exposure, self-oriented
20 perfectionism, and physical health complaints are depicted in Figures 2a and 2b.

21 Self-oriented perfectionism moderated the relationship between lifetime stressor count
22 and physical health complaints ($F_{(3, 89)} = 6.16, p < .001, R^2 = 0.17$). Specifically, when self-
23 oriented perfectionism was low, a positive association was observed between lifetime stressor
24 count and physical health complaints ($b = 0.76, 95\% \text{ CI } [0.40, 1.12], t = 4.21, p < .001$). Yet,
25 at the mean value of self-oriented perfectionism ($b = 0.18, 95\% \text{ CI } [-0.09, 0.45], t = 1.35, p =$

1 .180), and when self-oriented perfectionism was high ($b = -0.20$, 95% CI [-0.60, 0.20], $t = -$
2 0.98 , $p = .329$), the lifetime stressor count and physical health relationship was not significant.
3 The Johnson-Neyman method illustrated that lifetime stressor count was associated with
4 physical health complaints when self-oriented perfectionism was ≤ 29.21 . When self-oriented
5 perfectionism exceeded 29.21, the association was no longer significant.

6 Self-oriented perfectionism also moderated the relationship between lifetime stressor
7 severity and physical health complaints ($F_{(3, 89)} = 5.97$, $p < .001$, $R^2 = 0.17$). Specifically, when
8 self-oriented perfectionism was low ($b = 0.30$, 95% CI [0.16, 0.44], $t = 4.17$, $p < .001$), and at
9 the mean value of self-oriented perfectionism ($b = 0.12$, 95% CI [0.01, 0.24], $t = 2.14$, $p <$
10 $.035$), a positive association was found between lifetime stressor severity and physical health
11 complaints. However, when self-oriented perfectionism was high, the lifetime stressor severity
12 and physical health association was not significant ($b = 0.01$, 95% CI [-0.16, 0.18], $t = 0.09$, p
13 $= 0.931$). The Johnson-Neyman method illustrated that lifetime stressor severity was associated
14 with physical health complaints when self-oriented perfectionism was ≤ 30.23 . When self-
15 oriented perfectionism exceeded 30.23, the association was no longer significant.

16 **Discussion**

17 Although greater lifetime stressor exposure has been associated with physical and
18 mental health issues in the general population (Shields et al., 2023), relatively little is known
19 about how lifetime stressors impact the physical and mental health of elite athletes, or the
20 factors moderating this association. To address these issues, we examined how cumulative
21 lifetime stressor exposure was associated with general physical and mental health complaints
22 among elite athletes, and the extent to which this association was moderated by perfectionism.
23 We found that greater lifetime stressor exposure was associated with more general physical and
24 mental health complaints, with exposure to more severe lifetime stressors increasing the
25 likelihood of general physical and mental health complaints. These associations were robust

1 while controlling for age and gender, which are known predictors of poorer health (e.g.,
2 Droogenbroeck et al., 2018). Furthermore, self-oriented perfectionism was found to moderate
3 the relationship between lifetime stressor exposure (count and severity) and physical health.

4 With respect to stressor timing, the results revealed that total count and severity of
5 adulthood stressors were a marginally stronger predictor of elite athletes' health than early life
6 stressors. This finding is consistent with prior research (e.g., McLoughlin et al., 2022a), which
7 has suggested that exposure to greater and more severe recent life stressors is more predictive
8 of ill-health. Interestingly, the data also revealed that whereas total count of early life adversity
9 only predicted mental health complaints, total severity of early life adversity predicted both
10 mental and physical health complaints. Therefore, these results suggest that, for the first time,
11 it is the severity of early life adversities that predicts physical health complaints in elite athletes,
12 rather than the total lifetime stressor count.

13 Turning to stressor type, total count of chronic difficulties was more strongly related to
14 health compared to acute life events. This finding is consistent with prior research (e.g., Slavich
15 et al., 2019), which has often found that chronic difficulties are particularly detrimental to
16 health. Despite this, however, we also found that total severity of acute life events was a
17 relatively stronger predictor of physical and mental health complaints than the total severity of
18 chronic difficulties. The use of qualitative research may be able to provide a more in-depth
19 exploration of these contrasting findings, which are particularly important given that ill-health
20 can interfere with social and occupational functioning (Wahlbeck, 2015). Taken together, these
21 findings imply that stressors may have varying effects on health depending on their timing
22 (e.g., adulthood vs. early life) and type (e.g., acute life events vs. chronic difficulties).

23 Stressors from diverse life domains and with unique social-psychological
24 characteristics were found to be differentially associated with physical and mental health
25 complaints. Most notably, the lifetime stressor count and severity indices most consistently and

1 significantly associated with health were physical danger (e.g., being robbed at gunpoint),
2 health (e.g., on-going health problems), and interpersonal loss (e.g., close friend moves away).
3 These results partially support prior research with elite athletes (e.g., McLoughlin et al., 2021),
4 which found that interpersonal loss and physical danger were relatively consistent predictors
5 of poorer mental health. These findings also advance prior research (e.g., McLoughlin et al.,
6 2021), demonstrating that health-related stressors can be harmful for health outcomes.

7 This study examined whether perfectionism moderated the association between lifetime
8 stressor exposure and health among elite athletes. As hypothesized, self-oriented perfectionism
9 moderated the relationship between lifetime stressor exposure (both count and severity) and
10 physical health complaints. Thus, these results suggest that self-oriented perfectionism may
11 attenuate the positive association between lifetime stressor exposure and physical health
12 complaints. This finding supports prior research suggesting that this dimension of
13 perfectionism is highly complex and can sometimes be associated with adaptive functioning
14 (e.g., Hill et al., 2018). In contrast, no moderation effects were found for self-oriented
15 perfectionism and mental health complaints. One potential explanation for this finding could
16 be that to portray themselves as “perfect”, the athletes may have masked symptoms of mental
17 ill-health to hide ‘negative’ aspects of themselves (Hewitt et al., 2003). Indeed, the desire to
18 appear perfect has been associated with greater stigma and negative attitudes towards help
19 seeking for mental health difficulties (e.g., Watson et al., 2021). Furthermore, there were no
20 moderation effects for other-oriented or socially-prescribed perfectionism and health
21 complaints. One potential explanation for this null finding could be that the sample did not
22 have high enough levels of other-oriented ($M = 15.56$, Range = 7-30) or socially-prescribed (M
23 = 17.03, Range = 6-33) perfectionism for any moderating effects to emerge.

24 From an applied perspective, the findings might be useful in helping practitioners and
25 sporting organizations better identify elite athletes who may be at elevated risk of physical and

1 mental health problems (Rice et al., 2021). Indeed, by assessing elite athletes' lifetime stressor
2 exposure using the STRAIN, practitioners could identify athletes who have been exposed to a
3 large amount and severe personal stressors across their lives, and particularly stressors that are
4 chronic or have occurred recently. Furthermore, although self-oriented perfectionism
5 moderated the relationship between lifetime stressor exposure and physical health complaints,
6 caution is required from a practical standpoint given that this dimension of perfectionism has
7 also been linked to burnout, psychological difficulties, and performance decrements (Hill &
8 Curran, 2016). However, given that many elite level athletes exhibit perfectionism (e.g., Gould
9 et al., 2002), and attribute this to their success (Madigan, 2019), practitioners should be aware
10 of the complex role of some types of perfectionism (e.g., self-oriented) and consider tailored
11 support for those displaying high levels of perfectionism (James & Rimes, 2018).

12 Despite the important implications arising from this study, it is not without its
13 limitations. First, the study design was cross-sectional, and thus causality cannot be inferred.
14 To facilitate a better understanding of how lifetime stress, perfectionism, and health affect
15 athletes across time, future longitudinal research is recommended (Morgado et al., 2018).
16 Second, the study used self-report measures, which could have been influenced by bias (e.g.,
17 social desirability). Future research could assess objective (e.g., salivary biomarkers) indices
18 of psychological stress. Third, this study only assessed general physical and mental health
19 complaints (e.g., headaches, sadness). Therefore, future research could use alternative
20 measures that may more accurately and reliably screen for mental disorders among athletes
21 (e.g., Sport Mental Health Assessment Tool 1; Gouttebauge et al., 2022), and should account
22 for confounding factors that may interact with perfectionism towards sporting performance
23 (e.g., physical fitness, injury; Madigan et al., 2017). Finally, this study only measured non-
24 sport stressors and did not assess stressors experienced specifically in the sporting context (e.g.,
25 underperformance). Indeed, while the STRAIN is a valid and reliable measure of lifetime

1 stressor exposure, athletes encounter additional stressors to those experienced in everyday life
2 (e.g., organizational and competitive stressors such as coach-athlete relationship difficulties
3 and underperformance; Arnold & Fletcher, 2021). Therefore, future research should assess
4 sport-related stressors as well as personal stressors to improve our understanding of how
5 lifetime stressor exposure, perfectionism, and health interact (see McLoughlin et al., 2022a).

6 In conclusion, the present data demonstrate that exposure to greater and more severe
7 lifetime stressors was associated with poorer health among elite athletes, but that these effects
8 differed depending on the specific types of stressors experienced and when they occurred.
9 Moreover, self-oriented perfectionism attenuated the relationship between lifetime stressor
10 exposure and physical health complaints, suggesting that modifying such beliefs may represent
11 a potentially useful strategy for mitigating the negative effects of lifetime stress on health.
12 Looking forward, practitioners may benefit from being more aware of the stressors that elite
13 athletes experience and how their perfectionistic tendencies may be affecting their health.

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Table 1. Means, standard deviations, and intercorrelations for the main study variables.

Variable	Mean	<i>SD</i>	1	2	3	4	5
1. Mental Health Complaints (6 to 30)	14.12	5.97	-				
2. Physical Health Complaints	33.13	11.78	.61***	-			
3. Self-Oriented Perfectionism	28.69	4.47	-.10	-.07	-		
4. Other-Oriented Perfectionism	15.56	4.62	.10	.07	-.04	-	
5. Socially Prescribed Perfectionism	17.03	6.54	.06	.10	.32***	-.07	-
4. Total Count of Lifetime Stressors	17.68	11.01	.40***	.33***	-.01	-.15	.05
5. Total Severity of Lifetime Stressors	40.02	25.95	.47***	.36***	-.12	-.03	-.03
6. Count of Acute Life Events	10.40	7.17	.28**	.26**	.04	-.16	.06
7. Count of Chronic Difficulties	7.28	5.07	.48***	.36***	-.09	-.11	.02
8. Count of Early Stressors	4.70	4.45	.40***	.24*	-.12	-.01	-.01
9. Count of Adulthood Stressors	12.28	8.62	.28**	.28**	.03	.18	.06
10. Severity of Acute Life Events	19.35	12.08	.35***	.32***	-.09	-.06	-.02
11. Severity of Chronic Difficulties	20.80	16.03	.51***	.35***	-.12	-.01	-.03
12. Severity of Early Stressors	12.54	11.72	.44***	.28**	-.16	-.00	-.02
13. Severity of Adulthood Stressors	27.62	19.81	.36***	.31***	-.07	-.04	-.02

Table 2. Hierarchical regression models examining if lifetime stressor (LTS) count and severity were significantly associated with physical (a) and mental (b) health complaints, both before (model 1) and after adjusting for age and gender (model 2).

(a) Physical Health Complaints

	Model 1			Model 2				Model 1			Model 2		
	B	SE B	β	B	SE B	β		B	SE B	β	B	SE B	β
LTS Count	0.36	0.10	0.33**	0.37	0.10	0.34***	LTS Severity	0.17	0.04	.037***	0.18	0.04	0.38***
	(0.16, 0.56)			(0.17, 0.57)				(0.09, 0.26)			(0.09, 0.26)		
Age				-0.18	0.11	-0.15	Age				-0.23	0.11	-0.18*
				(-0.41, 0.04)							(-0.45, -0.03)		
Gender				-5.11	2.13	-0.22*	Gender				-4.14	2.13	-0.18
				(-9.35, -0.88)							(-8.36, 0.81)		

* $p < .05$; ** $p < .01$, *** $p < .001$, two-tailed

(b) Mental Health Complaints

	Model 1			Model 2				Model 1			Model 2		
	B	SE B	β	B	SE B	β		B	SE B	β	B	SE B	β
LTS Count	0.25	0.05	0.47***	0.27	0.05	0.49***	LTS Severity	0.12	0.02	.051***	0.13	0.02	0.56***
	(0.16, 0.35)			(0.18, 0.36)				(0.08, 0.16)			(0.09, 0.17)		
Age				-0.19	0.05	-0.31***	Age				-0.22	0.05	-0.36***
				(-0.29, -0.09)							(-0.31, -0.12)		
Gender				-1.50	0.96	-0.13	Gender				-0.78	0.92	-0.67
				(-3.40 to 0.40)							(-2.61 to 1.05)		

* $p < .05$; ** $p < .01$, *** $p < .001$, two-tailed

Table 3. Linear models of predictors of (a) physical and (b) mental health complaints. Lifetime stressor (LTS) count (model 1) and severity (model 2), moderated by self-oriented perfectionism (SOP).

(a)	Physical Health Complaints						
	Model 1			Model 2			
	B	SE B	<i>t</i>		B	SE B	<i>t</i>
Constant	-19.50 (-48.21, 9.21)	14.45	-1.35	Constant	-8.98 (36.59, 18.62)	13.90	-0.65
LTS Count	3.06 (1.44, 4.68)	0.82	3.75***	LTS Severity	1.00 (0.34, 1.66)	0.33	3.03**
SOP	1.64 (0.65, 2.62)	0.49	3.30**	SOP	1.24 (0.28, 2.19)	0.48	2.58*
LTS Count X SOP	-0.10 (-0.15, -0.04)	0.03	-3.39**	LTS Severity X SOP	-0.03 (-0.05, -0.01)	0.01	-2.53*

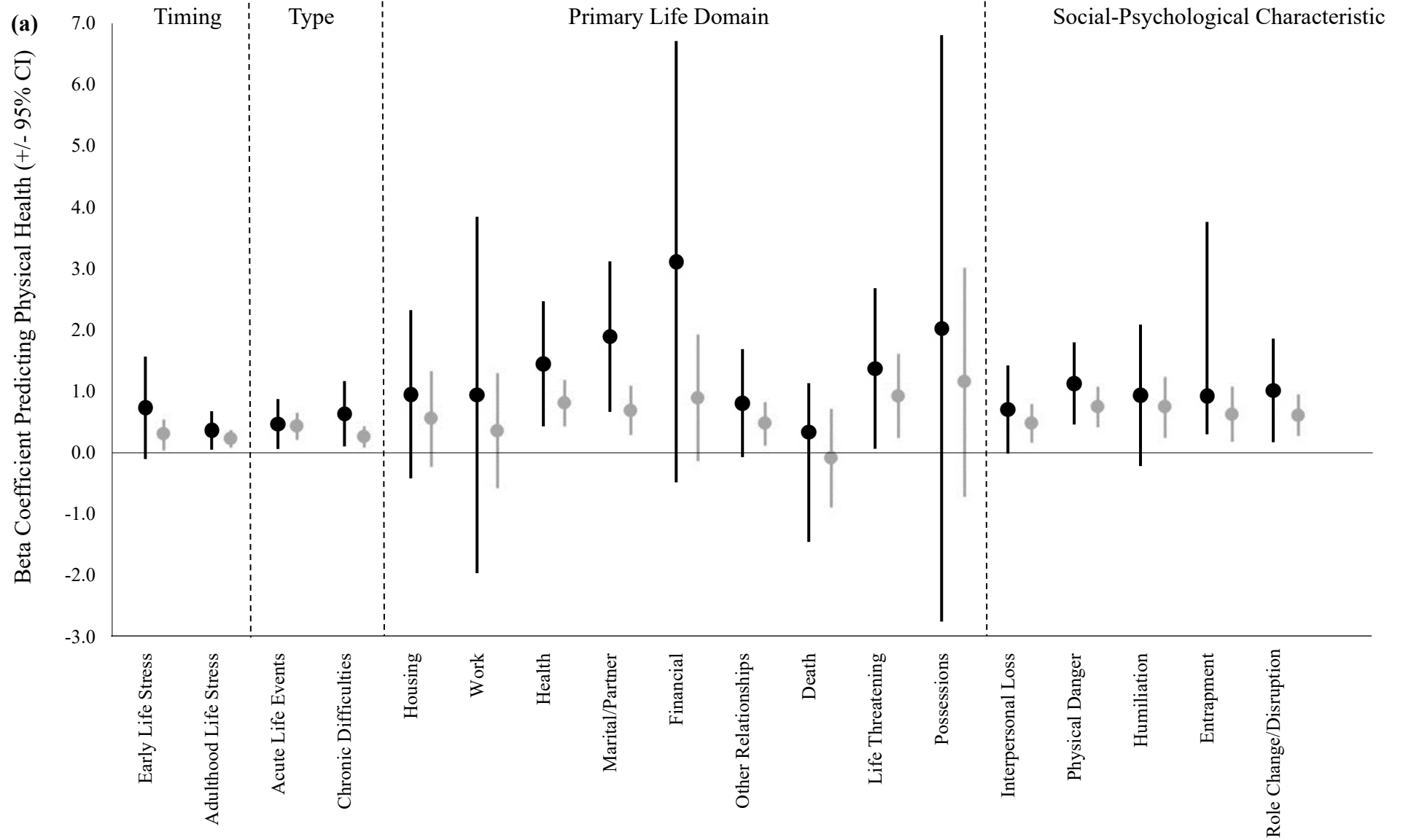
Note. $R^2 = 0.17$, * $p < .05$; ** $p < .01$, *** $p < .001$, two-tailed.

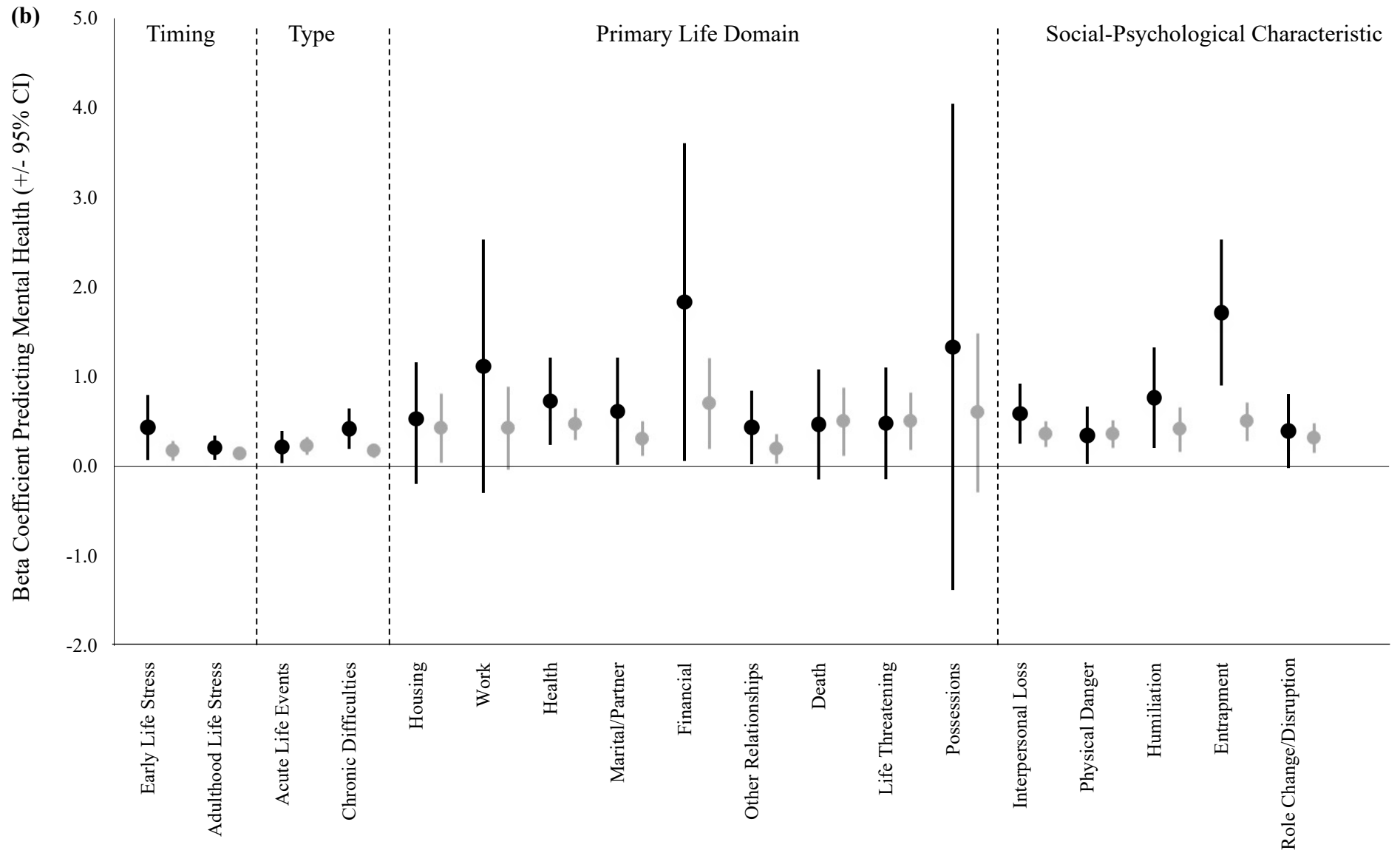
(b)	Mental Health Complaints						
	Model 1			Model 2			
	B	SE B	<i>t</i>		B	SE B	<i>t</i>
Constant	-1.65 (-14.91, 11.61)	6.67	-0.25	Constant	5.39 (-6.99, 17.78)	6.23	0.87
LTS Count	0.76 (0.01, 1.51)	0.38	2.02*	LTS Severity	0.12 (-0.18, 0.41)	0.15	0.80
SOP	0.44 (-0.02, 0.89)	0.23	1.91	SOP	0.17 (-0.26, 0.59)	0.22	0.77
LTS Count X SOP	-0.02 (-0.05, 0.01)	0.01	-1.56	LTS Severity X SOP	-0.001 (-0.01, 0.01)	0.01	-0.16

Note. $R^2 = 0.17$, * $p < .05$; ** $p < .01$, *** $p < .001$, two-tailed.

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Figure 1. Associations between total count and severity of lifetime stress exposure and (a) physical health complaints and (b) mental health complaints, categorized by stressor timing, type, primary life domain, and social-psychological characteristic. Error bars represent 95% confidence intervals.





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Figure 2. A simple slopes equation of the regression of lifetime stressor (a) count and (b) severity on physical health complaints at three levels of self-oriented perfectionism low (1 SD below the mean), moderate (mean), and high (1 SD above the mean).

