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Perfectionism and Training Distress in Junior Athletes:
The Mediating Role of Coping Tendencies

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Abstract

Training distress occurs when athletes fail to cope with physiological and psychological stress and can be an early sign of overtraining syndrome. Recent research has found that perfectionism predicts increases in training distress in junior athletes over time. The current study provides the first empirical test of the possibility that coping tendencies mediate the perfectionism-training distress relationship. Adopting a cross-sectional design, 171 junior athletes (mean age = 18.1 years) completed self-report measures of perfectionistic strivings, perfectionistic concerns, problem-focused coping, avoidant coping, and training distress. Structural equation modelling revealed that avoidant coping mediated the positive relationship between perfectionistic concerns and training distress, and mediated the negative relationship between perfectionistic strivings and training distress. Problem-focused coping did not mediate any relationships between dimensions of perfectionism and training distress. The findings suggest that the tendency to use coping strategies aimed at avoiding stress may partly explain the relationship between perfectionism and training distress but the tendency to use, or not use, problem-focussed coping does not.

Keywords: perfectionism, junior athletes, overtraining, stress, motivation, health

Introduction

Training regimes associated with competitive sport place athletes under both physical and psychological stress. When training regimes become excessive and accompany inadequate recovery, athletes may experience training distress and overtraining syndrome (Meeusen et al., 2013). Due to the negative consequences of training distress and overtraining syndrome, researchers have sought to determine factors that may make junior athletes more susceptible to their development. A recent study provided evidence that perfectionism may be one such factor (Madigan, Stoeber, & Passfield, 2017a). In the current study, we extend this line of research by examining whether the manner in which junior athletes typically cope with stress mediates the perfectionism-training distress relationship.

Training Distress and Overtraining Syndrome

Overtraining syndrome is a maladaptation to training (Meeusen et al., 2013). It is characterised by fatigue, mood disturbances, and a sport-specific decrease in athletic performance that can persist for weeks and sometimes months (Meeusen et al., 2013). The aetiology of overtraining syndrome is complex. The primary antecedents are thought to be excessive training and inadequate recovery. Specifically, the failure of athletes to cope effectively with the physiological and psychological stressors that accompany training and competition. However, non-training stressors are also thought to play an important role in the development of overtraining syndrome. This is because non-training stressors disrupt the recovery process, as well as place greater overall strain on coping resources (Meeusen et al., 2013).

Junior athletes may be at an increased risk of overtraining syndrome with current estimates suggesting that as many as 30% of elite junior athletes may experience overtraining syndrome (Matos, Winsley, & Williams, 2011). There are a number of reasons for why this is the case. Junior athletes often combine their athletic training with academic

responsibilities. This places additional demands on junior athletes. In addition, junior athletes typically do not have fully developed support systems to deal with non-training related stressors (Brenner, 2007). For example, they often have less of a variety of coping strategies to draw from, in comparison to adults athletes (Anshel, 1996). Finally, junior athletes generally have less experience of the stressors that accompany sport competition, particularly as they progress to more elite levels (Winsley & Matos, 2011).

Individuals often present with a wide range of different symptoms of overtraining syndrome (Meeusen et al., 2013). One early sign of overtraining syndrome is training distress (Kenttä, Hassmén, & Raglin, 2001). Training distress is defined as training-related psychological disturbance (Raglin & Morgan, 1994). While some training distress might be expected as the demands on athletes ebb and flow, high levels of training distress are indicative of failed adaptation to training and, as such, elevated levels are thought to provide an early warning sign of the development of overtraining syndrome. When measuring training distress, researchers focus on training-related mood disturbance as opposed to general mood disturbance and therefore often include depression-related content (e.g., Raglin & Morgan, 1994). This is important because depression has been shown to be one of the major correlates of overtraining syndrome and is indicative of the psychological, not just physiological, underpinning of overtraining syndrome (e.g., Morgan et al., 1987).

There is a growing body of literature investigating training distress and overtraining syndrome. Research that has focused on biological markers of training distress and overtraining has found a range of important biochemical (e.g., glutamine), hormonal (e.g., adrenocorticotrophic hormone) and physiological correlates (e.g., heart rate variability; see Meeusen et al., 2013 for a review). Research examining psychological markers has produced findings that are more mixed. For example, limited evidence has been found for the correlation between hardiness, intrinsic motivation, and optimism with training distress and

overtraining (e.g., Wilson & Raglin, 2004). Collectively, this research suggests that, while our understanding of the physical aspects of training distress and overtraining is developing, we have a less than clear understanding of the psychological factors that may predispose athletes to training distress and overtraining syndrome.

Perfectionism

One psychological factor that has been found to be related to training distress is perfectionism. Perfectionism is a personality characteristic that includes striving for flawlessness and setting exceedingly high standards of performance accompanied by tendencies for overly critical evaluations of one's behaviour (Frost, Marten, Lahart, & Rosenblate, 1990). Perfectionism is multidimensional with factor analytic studies providing support for two higher-order dimensions: *perfectionistic strivings* reflecting perfectionist personal standards and a self-oriented striving for perfection and *perfectionistic concerns* reflecting concerns about making mistakes, feelings of discrepancy between one's standards and performance, and negative reactions to imperfection (see Stoeber & Otto, 2006). These two higher-order dimensions have been studied extensively in sport using various models and instruments (see Hill & Madigan, 2017).

Whereas the two dimensions of perfectionism are positively correlated, they show different, and often opposite, patterns of relationships with various outcomes. Recent reviews of research in sport have found that perfectionistic concerns are consistently correlated with negative outcomes (e.g., negative affect), whereas perfectionistic strivings are more ambivalent in that they are correlated with both positive (e.g., positive affect) and negative outcomes (e.g., anger). However, when the overlap with perfectionistic concerns is controlled, perfectionistic strivings show consistent positive relationships with positive outcomes (Gotwals, Stoeber, Dunn, & Stoll, 2012). As such, it is important to differentiate the two dimensions when examining their relationships with variables in sport.

Perfectionism and Training Distress

Perfectionism may be important in regards to training distress and overtraining syndrome for a number of reasons. In regards to indirect evidence, it has been suggested that perfectionistic athletes may train harder and for longer than non-perfectionistic athletes (Flett & Hewitt, 2014). This may seem desirable but, in some cases, training behaviours are likely to become obsessive and excessive. For example, research has shown that both perfectionistic strivings and perfectionistic concerns are positively related to compulsive exercise and training (Hall et al., 2009; Madigan, Stoeber, & Passfield, 2017b). Furthermore, perfectionistic concerns has been found to be positively related to debilitating training-related outcomes in junior athletes such as burnout (a psychosocial syndrome comprising a reduced sense of accomplishment, devaluation, and physical and emotional exhaustion; Hill & Curran, 2016) and, more recently, injury (Madigan, Stoeber, Forsdyke, Dayson, & Passfield, 2018). Therefore, research suggests that perfectionism, and perfectionistic concerns in particular, may contribute to excessive training behaviours and outcomes similar to overtraining syndrome (e.g., burnout).

In regards to direct evidence, one study recently found that perfectionism might be an antecedent of training distress (Madigan et al., 2017a). Specifically, in their study of junior athletes, Madigan and colleagues found that perfectionistic concerns was positively correlated with training distress, whereas perfectionistic strivings was negatively correlated with training distress. In addition, perfectionistic concerns predicted increases in training distress over a three-month period, whereas perfectionistic strivings did not. The study by Madigan et al. (2017a) was the first to show that perfectionism predicted training distress; however, there was no investigation of mediators (i.e., psychological processes that could explain the observed relationship). In line with previous assertions, the manner in which junior athletes typically cope with stress may be one such important mediator (see Flett &

Hewitt, 2014).

Coping Tendencies

Coping is defined as the cognitive and behavioural effort that an individual makes in order to manage internal and external sources of psychological stress (Lazarus & Folkman, 1984). For athletes, coping is important for managing both stress related to training and non-training related stress (Raedeke & Smith, 2004). Research suggests that athletes use a wide range of coping strategies in order to try to reduce stress and can be adept at dealing with the challenges and threats they encounter (Nicholls & Polman, 2007). In sport, when coping is effective it can ensure optimal performance, maintain motivation, and safeguard wellbeing (Crocker, Tamminen, & Gaudreau, 2015). However, when coping is ineffective, especially over a prolonged period, athletes are susceptible to experience the opposite. Among some of the extreme adverse outcomes linked to ineffective coping in athletes are burnout and depression (Nixdorf et al., 2013).

Two common types of coping strategies are problem-focused and avoidant coping. Problem-focused coping involves strategies aimed at removing sources of stress. By contrast, avoidant coping involves strategies aimed at evading sources of stress (see Skinner, Edge, Altman, & Sherwood, 2003). Problem focused coping is effective more often than not because it can help reduce levels of stress. Avoidant coping is more complex: It can be effective and helpful in certain situations (for example through attempts to ignore the sense of fatigue or discomfort during heavy exercise) but in the long-term its use is normally regarded as ineffective. This is because it can result in the chronic accrual of stress (see Nicholls & Polman, 2007). As such, although the effectiveness of coping varies from situation-to-situation, the tendency to use some coping strategies more often than others (e.g., avoidant coping more often than problem-focused coping) are likely to play a key role in how junior athletes adapt to general stressors and training and competitive stressors alike.

Perfectionism, Coping Tendencies, and Training Distress

There have been four studies examining the relationship between coping tendencies and perfectionism in sport (Crocker, Gaudreau, Mosewich & Kljajic, 2014; Dunn, Causgrove Dunn, Gamache, & Holt, 2014; Gaudreau & Antl, 2008; Hill, Hall, & Appleton, 2010). In the three studies adopting a similar, variable-centred, approach to the current study (Crocker et al., 2014; Gaudreau & Antl, 2008; Hill et al., 2010), perfectionistic concerns were positively correlated with avoidant coping and unrelated to problem-focused coping, whereas perfectionistic strivings were negatively correlated with avoidant coping and positively correlated with problem-focused coping. In addition, one of these studies found that this differential pattern of coping mediated the relationship between perfectionism and burnout among junior athletes (Hill et al., 2010). This research provides support for a common pattern of coping tendencies correlated with perfectionistic strivings and concerns, as well as evidence of the explanatory power of this pattern of coping for training distress-related outcomes (i.e., burnout).

Little research has examined the relationship between coping and training distress directly. However, several studies have demonstrated that problem-focused coping strategies can lead to improvements in recovery, stress, and burnout (e.g., Martinent & Decret, 2015). For example, junior athletes who engage predominantly in problem-focused coping have been found to report lower levels of stress and higher levels of recovery, whereas those athletes who engage predominantly in avoidant coping (or “disengagement-oriented” coping) have been found to be more likely to report higher levels of stress and lower levels of recovery (Martinent & Decret, 2015). Problem-focused coping strategies have also been correlated with improved mood states (e.g., Ntoumanis & Biddle, 1998). For example, the use of problem-focused coping following an acute sport stressor was correlated with greater positive affect. However, the use of avoidant coping strategies was correlated with lower

positive affect and higher negative affect (see Ntoumanis & Biddle, 1998). This research suggests that the coping strategies employed by athletes have the potential to help reduce (problem-focused coping) or increase (avoidant coping) training distress.

The Present Study

Drawing together work examining training distress, perfectionism, and coping, the aim of the present study was to examine whether coping tendencies mediate the perfectionism-training distress relationship in junior athletes (see Figure 1). It was hypothesised that problem-focused and avoidant coping would mediate the negative relationship between perfectionistic strivings and training distress, and avoidant coping would mediate the positive relationship between perfectionistic concerns and training distress (see again Figure 1). Based on the findings of Hill and colleagues (2010) showing a nonsignificant path between perfectionistic concerns and problem-focused coping, we hypothesised no path between these variables. Finally, we included direct paths from both perfectionism dimensions to training distress to determine whether or not the relationship was fully mediated by coping tendencies.

Method

Participants

A sample of 171 junior athletes (124 male, 47 female) was recruited from the United Kingdom to participate in the present study. Participants' mean age was 18.1 years ($SD = 1.4$; range = 16 to 22). Participants were involved in a range of sports (soccer = 63, rugby = 36, basketball = 17, gymnastics = 14, athletics = 13, and other sports [e.g., cricket, netball] = 30) and trained on average 8.5 hours per week ($SD = 5.7$).

Procedure

The study was approved by the university's ethics committee. Informed consent was obtained from all participants. In addition, parental consent was obtained from participants

below the age of 18. Questionnaires were distributed during training.

Measures

Perfectionism. To measure perfectionism, we followed a multi-measure approach (Stoeber & Madigan, 2016) and used four subscales from two multidimensional measures of perfectionism in sport: the Sport Multidimensional Perfectionism Scale (SMPS; Dunn et al., 2006) and the Multidimensional Inventory of Perfectionism in Sport (MIPS; Stoeber, Otto, Pescheck, Becker, & Stoll, 2007). To measure perfectionistic strivings, we used the 7-item SMPS subscale capturing personal standards (e.g., “I have extremely high goals for myself in my sport”; $M = 3.36$, $SD = 0.61$, Cronbach’s $\alpha = .71$) and the 5-item MIPS subscale capturing striving for perfection (e.g., “I strive to be as perfect as possible” ; $M = 3.28$, $SD = 0.74$, Cronbach’s $\alpha = .76$), and then standardised the scale scores before combining them to measure perfectionistic strivings (cf. Madigan et al., 2015). To measure perfectionistic concerns, we used the 8-item SMPS subscale capturing concerns over mistakes (e.g., “People will probably think less of me if I make mistakes in competition” ; $M = 2.88$, $SD = 0.69$, Cronbach’s $\alpha = .78$) and the 5-item MIPS subscale capturing negative reactions to imperfection (e.g., “I feel extremely stressed if everything does not go perfectly” ; $M = 3.08$, $SD = 0.73$, Cronbach’s $\alpha = .75$), and again standardised the scale scores before combining them. Participants were asked to indicate to what degree each statement characterised their attitudes in their sport responding on a scale from 1 (*strongly disagree*) to 5 (*strongly agree*). The four subscales have demonstrated reliability and validity in previous studies (e.g., Madigan, Stoeber, & Passfield, 2016) and in the present study (e.g., Cronbach’s $\alpha > .70$).¹ Moreover, both are reliable and valid indicators of perfectionistic strivings and

¹Cronbach’s α above .70 are indicative of adequate internal consistency (see e.g., Tabachnick & Fidell, 2007).

perfectionistic concerns (e.g., Stoeber & Madigan, 2016).

Coping Tendencies. To measure coping tendencies, we used the Modified COPE (Crocker & Graham, 1995). To measure problem-focused coping, we combined the planning (4-items; e.g., “I made a plan of action”; $M = 3.21$, $SD = 0.78$, Cronbach’s $\alpha = .70$), active coping (4-items; e.g., “I tried different things to improve”; $M = 3.53$, $SD = 0.80$, Cronbach’s $\alpha = .77$), and suppression of competing activities (4-items; e.g., “I stopped doing other things in order to concentrate on my performance”; $M = 3.10$, $SD = 0.77$, Cronbach’s $\alpha = .71$) subscales. To measure avoidant coping, we combined the denial (4-items; e.g., “I pretended it was not happening or hadn’t really happened”; $M = 2.44$, $SD = 0.79$, Cronbach’s $\alpha = .70$) and behavioural disengagement (4-items; e.g., “I gave up trying to get what I want out of my performance”; $M = 2.12$, $SD = 0.87$, Cronbach’s $\alpha = .77$) subscales. Participants were asked to indicate the degree to which they typically used these strategies during the experience of stress when competing and training in their sport and responded on a scale from 1 (*used not at all*) to 5 (*used very much*). The Modified COPE has demonstrated reliability and validity in numerous studies (e.g., Dunkley et al. 2003) and in the present study (e.g., Cronbach’s $\alpha > .70$).

Training Distress. To measure training distress, we used the Training Distress Scale (TDS; Raglin & Morgan, 1994). The TDS is comprised of ten items, seven items capturing training distress (e.g., “worthless”, “miserable”, “bad tempered”) and three filler items (e.g., “helpful”) which are ignored when calculating TDS scores. Participants were asked to indicate how often within the last week they had been feeling as described (“During training last week, I felt...”) in each item responding on a scale from 1 (*not been feeling this way*) to 5 (*been feeling extremely like this*). The TDS has demonstrated reliability and validity in numerous studies (e.g., Kenttä et al., 2001) and in the present study (e.g., Cronbach’s $\alpha > .70$).

Data Screening

First, we inspected the data for missing values. Because very few item responses were missing ($i = 18$), missing responses were replaced with the mean of the item responses of the corresponding scale (Graham, Cumsille, & Elek-Fisk, 2003). Next, we computed Cronbach's alphas for our variables, which were all satisfactory (Table 1). Following recommendations by Tabachnick and Fidell (2007), data were screened for univariate and multivariate outliers. No outliers were found. Finally, we conducted a Box's M tests to examine if the variance-covariance matrices showed any differences between gender. This test was nonsignificant ($p > .05$). Therefore, all further analyses were collapsed across gender.

Analytic Strategy

First, we calculated means, standard deviations, and bivariate correlations for all variables. Then, to test the mediational model in Figure 1, we employed Mplus 7.0 (Muthén & Muthén, 1998-2012) using robust maximum likelihood estimation with the accompanying mean-adjusted chi-square test statistic that is robust to deviations from normality. To evaluate model fit, we chose the following fit indices: comparative fit index (CFI), Tucker-Lewis index (TLI [also known as non-normed fit index, NNFI]), standardised root mean square residual (SRMR), and the root mean square error of approximation (RMSEA; see Marsh, Hau, & Wen, 2004). We used the following cut-off values as benchmarks for acceptable (CFI $> .90$, TLI $> .90$, SRMR $< .10$, RMSEA < 10) and good model fit (CFI $> .95$, TLI $> .95$, SRMR $< .08$, RMSEA $< .08$; Marsh et al., 2004). To test mediation, we used bias-corrected bootstrapping (1,000 samples) to estimate indirect effects (Rucker, Preacher, Tormala, & Petty, 2011). If the 95% confidence interval (CI) does not contain zero, the indirect effects are significant at the $p < .05$ level (Rucker et al., 2011).

Results

Descriptive Statistics and Bivariate Correlations

We first inspected the means and standard deviations for all variables (Table 1). On average, athletes reported higher levels of problem-focused coping than avoidant coping. Furthermore, athletes reported moderate levels of training distress, with the standard deviation suggesting some athletes reported moderate-to-high levels. We then inspected the bivariate correlations between all variables (Table 1). Perfectionistic strivings showed a significant small-to-medium positive correlation with problem-focused coping. Perfectionistic concerns showed a significant small-to-medium positive correlation with avoidant coping and training distress. Moreover, problem-focused coping showed a significant small-to-medium negative correlation with training distress, whereas avoidant coping showed a significant medium-to-large positive correlation.

Structural Equation Modelling with Manifest Variables

The hypothesised model provided a good fit to the data ($\chi^2 [1] = 1.48, p > .22$, scaling factor = 0.86, CFI = .99, TLI = .94, SRMR = .02, RMSEA = .05; Figure 2) and explained 24% of the variance in training distress.² Perfectionistic strivings had a negative direct relationship on training distress, whereas perfectionistic concerns had a positive direct relationship with training distress. Problem-focused coping had a negative relationship with training distress, whereas avoidant coping had a positive relationship with training distress. In turn, perfectionistic strivings had a positive relationship with problem-focused coping and a negative relationship with avoidant coping. Perfectionistic concerns had a positive relationship with avoidant coping.³

²We also examined a second model that included a path between perfectionistic concerns and problem-focused coping. As hypothesised, this path was non-significant ($\beta = -.11, p > .05$).

³Standardised path coefficients are interpreted in the same way as betas from regression

Indirect effects. In the mediational model, perfectionistic strivings had a negative indirect effect on training distress via avoidant coping (indirect effect = $-.06$; 95% CI = $-.12$ to $-.01$). However, perfectionistic strivings had no indirect effect via problem-focused coping (indirect effect = $-.04$; 95% CI = $-.09$ to $.01$). Perfectionistic concerns had a positive indirect effect on training distress via avoidant coping (indirect effect = $.07$; 95% CI = $.02$ to $.14$).

Discussion

The aim of the present study was to examine whether coping tendencies mediate the perfectionism-training distress relationship in junior athletes. Structural equation modelling with manifest variables revealed that avoidant coping mediated the positive relationship between perfectionistic concerns and training distress, and mediated the negative relationship between perfectionistic strivings and training distress. Problem-focused coping did not mediate any relationships between dimensions of perfectionism and training distress.

Perfectionism and Training Distress

The present study replicates previous research findings in that dimensions of perfectionism show differential relationships with training distress. Specifically, perfectionistic concerns were positively related to training distress while perfectionistic strivings were negatively related to training distress in junior athletes (Madigan et al., 2017a). This is the second time that perfectionistic concerns has emerged as problematic, and perfectionistic strivings unproblematic, in regards to training distress and adds further weight to the notion that it is perfectionistic concerns that are most likely to be a source of problems for junior athletes. Rather than the standards that junior athletes have for

analyses (i.e., standardised coefficients refer to how many standard deviations a dependent variable will change for every one standard deviation change in the independent variable).

themselves, then, training distress, like burnout symptoms, appears to be more associated with the concerns and negative reactions to imperfection that junior athletes have. These findings are especially important given that experiencing overtraining syndrome at a young age may predispose athletes to an increased lifetime risk of developing overtraining syndrome (Raglin, Sawamura, Alexiou, Hassmén, & Kenttä, 2000).

Perfectionism and Coping

The present study found perfectionistic concerns to show a positive relationship with avoidant coping but no significant relationship with problem-focused coping. We also found perfectionistic strivings to show the opposite set of relationships. This pattern of findings is similar to those of previous studies (e.g., Hill et al., 2010) and provides further evidence of the differences between the two dimensions of perfectionism in regards to coping tendencies. Differences in the conceptual underpinnings of the two dimensions may help to explain these divergent associations. Specifically, perfectionistic strivings are underpinned by a sense of personal control that may promote perceptions of coping efficacy and appraisal of challenge. These features will encourage athletes to use more active forms of coping (i.e., problem-focused). By contrast, perfectionistic concerns are underpinned by a lack of personal control and a sense of helplessness. This will promote perceptions of low coping efficacy and appraisal of threat. These features will lead to a desire to avoid stressful encounters so not to be overwhelmed. Based on the consistency of the findings with previous research (e.g., Crocker et al., 2014; Gaudreau & Antl, 2008; Hill et al., 2010), the general coping tendencies or preferences associated with these two dimensions of perfectionism appear to be well engrained.

Mediational Effects

The findings provided support for the role of coping tendencies as mediators of the relationship between perfectionism and training distress. Of particular note, was the role of

avoidant coping as this mediated both the positive relationship between perfectionistic concerns and training distress and the negative relationship between perfectionistic strivings and training distress. Initially, the importance of avoidant coping and not problem-focused coping may seem counterintuitive. However, it appears that the use of the two most common types of coping are not mutually exclusive. At any given moment, it is conceivable that athletes may have a mix of coping tendencies that include both avoidant strategies (e.g., withdrawing from the current exercise bout) and problem-focused strategies (e.g., planning how to deal with the next exercise bout). Thus, when athletes are engaging in higher avoidant coping they are not necessarily engaging in lower problem-focused coping (and vice versa).

It is the second time that this particular “problem-avoidant” mediation model of coping has been supported in perfectionism research in sport (Hill et al., 2010). This replication raises the possibility that this model represents an important general model describing how perfectionism dimensions influence coping tendencies in sport. Additional research is required to test whether this is the case and whether this model applies to other outcomes. A good starting point would be outcomes similar or related to those examined already (training distress and burnout) such as athlete engagement (Jowett et al., 2016). Research might also examine if this general model manifests in specific contexts in sport such as coping with injury or other specific stressors.

The absence of a relationship between perfectionistic concerns and problem-focused coping is a particularly distinctive feature of the “problem-avoidant” model and is also worthy of further scrutiny. We are intrigued by whether this is a finding that replicates in other samples and if so why. One possibility is that athletes high in perfectionistic concerns do not utilise problem-focused coping as it does not work for them (i.e., it fails to reduce stress; Dunkley et al., 2003). Another possibility is that problem-focused coping tendencies may be completely absent from these athletes’ coping repertoire (i.e., they do not know how

to use them). Regardless, it appears that perfectionistic concerns are associated with a deficit in the use of problem-focused coping which could be problematic for junior athletes, both in the short- and long-term.

Finally, whereas avoidant-coping appears to be a mediator of the perfectionism-training distress relationship, the remaining significant direct paths from both perfectionism dimensions to training distress allude to other mediators. As a starting point, research utilising motivational theory to examine the relationships between perfectionism and burnout and perfectionism and engagement has found psychological need satisfaction, psychological need thwarting and motivation regulation to be mediators of these relationships in junior athletes (e.g., Jowett et al., 2016; Madigan et al., 2016). These variables may play a similar role in regards to training distress. Other work suggests that rigid behavioural adherence may also be important. Specifically, Madigan et al. (2018) found perfectionistic concerns to predict increased injury among junior athletes suggesting that perfectionistic athletes may engage in behaviours (e.g., training) that are over and above what they have been prescribed. Future research examining whether these variables mediate the perfectionism-training distress relationship for junior athletes would be valuable.

Limitations and Other Future Research

The present study had a number of limitations. First, the study employed a cross-sectional design. Future studies will therefore need to examine whether the pathways found in our model replicate when multi-wave longitudinal designs are employed to examine change across time (e.g., Madigan et al., 2016). Finally, the study only examined training distress. Whereas training distress is a key early sign of overtraining syndrome, future research would benefit from including further indicators of overtraining syndrome (Meeusen et al., 2013) to explore whether the relationships we found replicate beyond training distress.

Conclusion

The present study is the first to identify coping tendencies as a possible mechanism that explains the relationship between perfectionism and training distress in junior athletes. The use and non-use of avoidant coping explains this relationship but not the use or non-use of problem-focused coping. Therefore, sports scientists may wish to consider athletes' coping tendencies to help identify junior athletes who are at risk of overtraining syndrome.

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Table 1

Descriptive Statistics, Cronbach's Alphas, and Bivariate Correlations

Variable	1	2	3	4	5
1. Perfectionistic strivings					
2. Perfectionistic concerns	.71***				
3. Problem-focused coping	.33**	.11			
4. Avoidant coping	-.05	.17*	-.12		
5. Training distress	.01	.28*	-.17*	.35***	
<i>M</i>	0.00	0.00	3.28	2.28	1.88
<i>SD</i>	0.90	0.93	0.66	0.70	0.80
Cronbach's alpha	.76	.85	.79	.73	.88

Note. $N = 171$.

* $p < .05$. ** $p < .01$. *** $p < .001$.

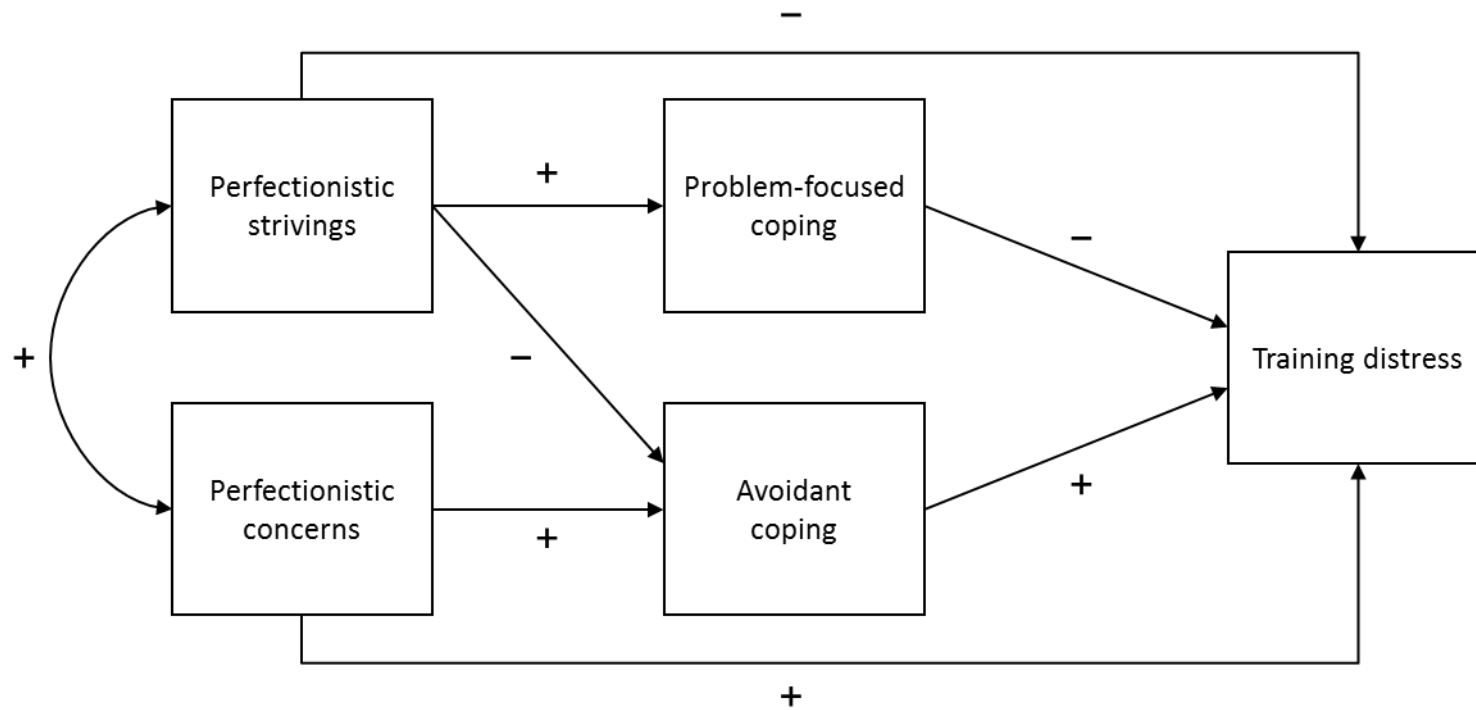


Figure 1. Hypothesised model of the relationships between perfectionistic strivings and concerns, problem-focused and avoidant coping, and training distress. For clarity, intercorrelations between problem-focused and avoidant coping are not shown.

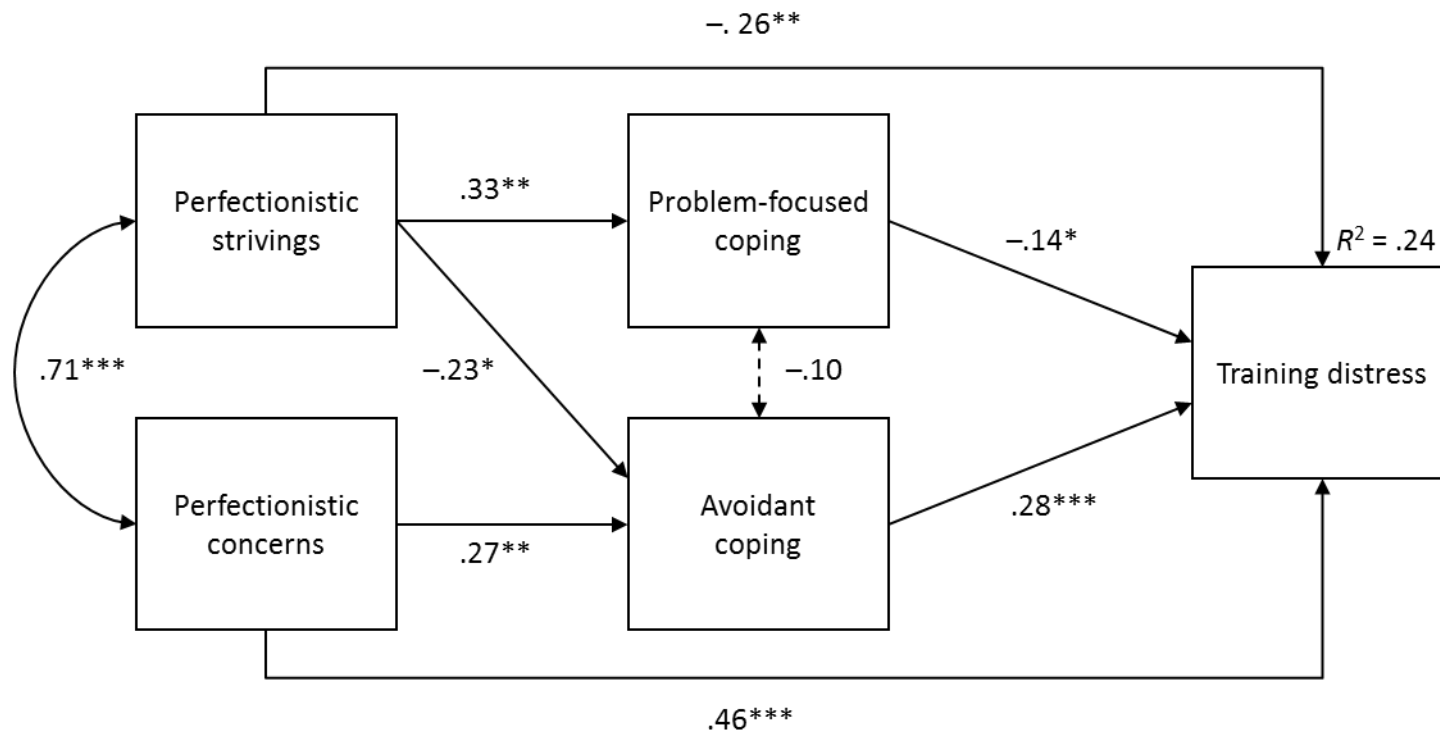


Figure 2. Empirical structural equation model of perfectionistic strivings and concerns and problem-focused and avoidant coping predicting training distress ($N = 171$). Path coefficients are standardised. Dashed paths are nonsignificant ($p > .05$). $*p < .05$. $**p < .01$. $***p < .001$.