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Multidimensional perfectionism in sport: A meta-analytical review

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Keywords: motivation, performance, wellbeing, athletes, personality

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Abstract

The current study provides an updated and meta-analytical review of research examining multidimensional perfectionism in sport. In doing so, studies that report the relationship of perfectionistic strivings and perfectionistic concerns with a range of motivation, emotion/wellbeing and performance criterion variables are examined. A literature search yielded 52 studies and 697 effect sizes for 29 criterion variables. Random effects models revealed that perfectionistic strivings displayed small-to-medium relationships with a mix of maladaptive and adaptive motivation and emotion/wellbeing, and a small-to-medium relationship with better performance. By contrast, perfectionistic concerns displayed a small-to-medium relationship with maladaptive motivation and emotion/wellbeing, and were unrelated to performance. After controlling for the relationship between the two dimensions of perfectionism, the relationships displayed by residual perfectionistic strivings were indicative of it being less problematic, and the relationships displayed by residual perfectionistic concerns were indicative of it being more problematic, than their unresidualised counterparts. There was also some preliminary evidence that some of the relationships were moderated by gender, age, sport type, and instrument. The findings suggest that perfectionistic concerns are clearly maladaptive for athletes whereas perfectionistic strivings are complex and ambiguous.

Key words: motivation, performance, wellbeing, athletes, personality

Multidimensional perfectionism in sport: A meta-analytical review

The consequences of perfectionism for athletes continue to interest researchers and practitioners. The last 10 years have been particularly productive in terms of research with recent estimates being that approximately 75% of all research examining perfectionism in sport has appeared in this period (Hill, Jowett, & Mallinson-Howard, in press). In response to this increase in interest, researchers have begun to formally review research so to summarise existing knowledge and to direct future work. A number of recent reviews have been included in scholarly work such as book chapters (e.g., Jowett, Mallinson, & Hill, 2016). However, the last reviews of research to appear in peer-reviewed journals were provided much early by Stoeber (2011) and Gotwals, Stoeber, Dunn, and Otto (2012). In the current review paper we extend previous work by providing the first meta-analysis of research examining multidimensional perfectionism in sport. In doing so, we reassess the conclusions of previous reviews, in particular Stoeber and Gotwals and colleagues.

Multidimensional perfectionism

Perfectionism is broadly defined as a combination of excessively high personal standards and overly critical self-evaluation (Frost, Marten, Lahart, & Rosenblate, 1990). There are a number of different models and measures that have been used to examine perfectionism. Based on factor analytical evidence, these different models and measures have been organized into a higher-order model. The higher-order model includes two higher-order or superordinate dimensions of perfectionism. The first superordinate dimension, perfectionistic strivings (PS), has been described as “aspects of perfectionism associated with self-oriented striving for perfection and the setting of very high personal performance standards" (Gotwals et al., 2012, p.264). The second superordinate dimension, perfectionistic concerns (PC), has been described as “aspects

associated with concerns over making mistakes, fear of negative social evaluation, feelings of discrepancy between one's expectations and performance, and negative reactions to imperfection" (Gotwals et al., 2012, p.264). As it encompasses multiple models and instruments, the higher-order model provides a useful heuristic when seeking to integrate and organize research examining perfectionism.

It is common for athletes to identify themselves as perfectionists. The accounts of these athletes are often provided in media interviews (e.g., Flatman, 2014) and autobiographies (e.g., Agassi, 2009). More detailed accounts of perfectionism have also been provided in qualitative research (e.g., Gotwals & Spencer-Cavaliere, 2014; Hill, Witcher, Gotwals, & Leyland, 2015; Sellars, Evans, & Thomas, 2016). In such research, athletes have provided compelling descriptions of the various ways in which perfectionism influences their lives. They also suggest that the influence of perfectionism is exceedingly complex. In one recent study, for example, international level athletes described perfectionism as a major source of their motivation, and instrumental to their sporting success (Hill et al., 2015). However, the same athletes also described how perfectionism was a significant source of personal and interpersonal difficulties. These difficulties included negative mental (e.g., worry), emotional (e.g., anxiety), and physical experiences (e.g., sleepless nights), as well as poorer relationships with others such as family and friends.

With this complexity in mind, the likely consequences of perfectionism have been subject to considerable debate among researchers and practitioners. There are those who have argued that in some guises perfectionism can be healthy and a defining characteristic of elite athletes (e.g., Dunn, Causgrove Dunn, Gamache, & Holt, 2014; Gould, Dieffenbach, & Moffett, 2002; Henschen, 2000). There are also those that have argued that perfectionism is likely to have few beneficial long-term effects and is instead a significant vulnerability factor for athletes to possess

(e.g., Flett & Hewitt, 2014, 2016; Hall, 2016). Whether perfectionism is something to be encouraged or avoided is an empirical question that can be answered through the systematic study of perfectionism in athletes. To this end, perfectionism in sport has been examined in a range of samples that includes different genders, ages, and sports, and using a wide range of criterion variables that span motivation, emotion/wellbeing, and performance. Though the roles of many of the criterion variables that have been examined are not straightforward (e.g., the facilitative versus debilitative effects of anxiety on performance), by considering whether in all likelihood patterns of different criterion variables will be beneficial (i.e., adaptive) or detrimental (i.e., maladaptive) to an athlete over time and in different contexts, researchers and practitioners can get some purchase on the probable consequences of perfectionism for athletes or, at least, the correlates and nomological network of perfectionism in athletes.

There are three notable reviews of research examining perfectionism in sport in peer-reviewed journals. The first is a narrative review by Stoeber (2011). This review described 16 studies of athletes. The aim of the study was to examine if PS and PC were related to adaptive and/or maladaptive criterion variables. The findings of this review indicated that PC were related to maladaptive motivation (e.g., fear of failure, ego orientation, mastery avoidance) and emotion (e.g., negative affect, anxiety, and anger), and unrelated to athletic performance. By contrast, PS were more ambiguous and related to a mix of motivation (e.g., task and ego orientation) and emotion (e.g., positive and negative affect). The review did not discuss the relationship between PS and performance. When unique relationships were considered (i.e., the original studies had used analyses that controlled for the relationship between the two dimensions of perfectionism, reporting partial or semi-partial correlations), residual PS were found to be less ambiguous and more adaptive than PS. This was evident in that, unlike PS, residual PS were positively related to

adaptive motivation (e.g., mastery approach) and emotion (e.g., self-confidence), and negatively related maladaptive motivation (e.g., performance avoidance) and emotion (e.g., cognitive anxiety). Based on his review, Stoeber concluded that "…only perfectionistic concerns are clearly maladaptive, whereas perfectionistic strivings may form part of a healthy striving for excellence" (p. 128).

This narrative review was followed shortly after by a systematic review conducted by Gotwals et al. (2012). In response to debate regarding whether PS were likely to be adaptive for athletes (see Flett & Hewitt, 2005, 2006; Hall, 2006), their review focused on the maladaptive and adaptive criterion variables related to PS and residual PS. PC were not examined. In addition to being more comprehensive and systematic than Stoeber's (2011) review, Gotwals et al.'s (2012) review also reported the size and statistical significance of the relationships between PS and the criterion variables. Their review included 26 research articles, reporting 31 studies, published between 1998 and 2010. Collectively, 92 bivariate and partial correlations with adaptive characteristics and 109 bivariate and partial correlations with maladaptive characteristics were examined. Correlations were categorised as providing supportive evidence, contrary evidence, mixed evidence, or inconclusive/null evidence of the adaptive or maladaptive characteristics of PS and were summarised via "vote counting" of each category.

As in Stoeber's (2011) review, Gotwals et al.'s (2012) review found PS to be related to a mix of motivation (e.g., intrinsic motivation and introjected regulation) and emotion (e.g., self-confidence and anxiety) but positively related to athletic performance (e.g., season's best performance). Again, PS were clearly more adaptive when its relationship with PC was controlled for. This was evident in that the relationship between residual PS and less adaptive motivation was smaller (e.g., ego orientation, mastery avoidance and external regulation), non-

significant (e.g., performance avoidance and introjected regulation), or become statistically significant (e.g., fear of failure). Similarly, the relationship between residual PS and positive emotion was stronger (e.g., self-esteem) and its relationship with negative emotion became non-significant (e.g., negative affect, anger, and self-esteem instability) or changed in direction from positive to negative (e.g., cognitive anxiety). The relationship between residual PS and performance was largely the same as for PS. On the basis of their review, Gotwals concluded "that perfectionistic strivings among athletes are predominantly adaptive, occasionally neutral, and rarely maladaptive. However, this trend is only apparent when the negative influence of perfectionistic concerns is controlled" (p.263).

An updated systematic review and meta-analysis

The two previous reviews have been valuable in terms of summarizing research examining perfectionism among athletes and especially PS. However, an additional review of research examining perfectionism in sport is warranted for a number of reasons.

Firstly, it has been five years since the publication of Gotwals et al.'s (2012) review and seven years since the end of their literature search (June, 2010). While this may be considered a relatively short period of time, researchers have been particularly productive over this period. This includes, for example, the publication of a special issue dedicated to perfectionism in sport and dance (Hill, Appleton, & Hall, 2014), new longitudinal research (e.g., Crocker, Gaudreau, Mosewich, & Kljajic, 2014), and research examining hitherto unexamined criterion variables (e.g., rumination; Thienot, Jackson, Dimmock, Grove, Bernier, & Fournier, 2014).

Secondly, the consequences of perfectionism in sport and, in particular PS, continue to be subject to debate. Researchers such as Flett and Hewitt (2014, 2016) recently reaffirmed their stance that perfectionism is best considered a vulnerability factor for athletes. In support of their perspective

they have described a diathesis-stress model (Flett, Hewitt, & Dyck, 1989), overstriving (Flett & Hewitt, 2006), dark striving (Flett, Hewitt, & Sherry, 2016) and perfectionistic reactivity (Flett & Hewitt, 2016) as means of understanding why this is the case. In their view, when conceptualised in a manner consistent with classical descriptions of perfectionism, even PS are likely to be problematic. Since the two reviews, Hill (2014, 2017) has also questioned the conclusions of Stoeber (2011) and Gotwals et al. (2012) regarding PS on the grounds that they pertain primarily to residual PS, not PS. With this ongoing debate as a backdrop, revisiting research in this area is timely.

Thirdly, Gotwals et al. (2012) included criterion variables only if they were clearly adaptive or maladaptive and excluded those that were considered unclear. Consequently, a more comprehensive account of research can be provided by being as inclusive as possible regarding criterion variables. Some of the previously excluded variables may offer additional insight into perfectionism. Performance approach goals, for example, are thought to encapsulate a complex combination of achievement and competency related beliefs that contribute to adaptive outcomes but also may contribute to maladaptive outcomes if competency beliefs change. This vulnerability is very similar to descriptions of PS (e.g., Flett & Hewitt, 2005, 2006; Hall, 2006).

Fourthly, Gotwals et al. (2012) examined only PS. They did not examine PC. The correlates of PC and residual PC have therefore yet to be systematically reviewed and reported in peer-reviewed research in sport. In addition, although Stoeber's (2011) review suggests that PC are less affected by its correlation with PS than the reverse (i.e., residual PC are more similar to PC than residual PS to PS), there has been no formal examination of whether this is the case. An additional review is therefore also warranted in this regard.

Finally, although Gotwals et al. (2012) reported the strength and statistical significance of the

relationships between PS and criterion variables in each study, they did not provide any summative account of the same relationships across studies. That is, they did not meta-analyze the studies in their review. Meta-analysis allows researchers to statistically combine effect sizes provided in individual studies, weight effect sizes according to their estimated precision, and therefore provide best estimates of population effects. It also allows for the examination of variability in effect sizes across studies. As acknowledged by Gotwals et al. (2012), their vote counting method is an important limitation as it has low statistical power and tends to underestimate effects. In fact, power actually decreases as the number of studies added to this type of analysis increases (Hedges & Olkin, 1980). Gotwals et al. (2012) did not use meta-analytical techniques due to the wide range of criterion variables in research and concerns regarding combining variables. However, in the time since Gotwals et al.'s (2012) review, additional studies have made it possible to meta-analyse studies for a number of criterion variables, particularly in the area of motivation (e.g., achievement goals, motivation regulation, and fear of failure) and emotion/wellbeing (e.g., self-esteem, anxiety, and enjoyment).

The current study

In summary, the first purpose of this study was to provide an updated and meta-analytical review of research examining multidimensional perfectionism in sport. The second purpose was to explore variability between studies in terms of the observed relationships. Based on the findings of previous reviews, it was hypothesized that (i) PS would be related to a mixed profile of motivation, emotion/wellbeing, and performance and (ii) PC would be related to a maladaptive profile of motivation, emotion/wellbeing, and performance. In addition, it was hypothesised that when the relationship between the two dimensions of perfectionism are controlled for, (iii) residual PS would be related to an adaptive profile (i.e., display larger negative relationships

with maladaptive motivation and emotion/wellbeing, and larger positive relationships with adaptive motivation and emotion/wellbeing) and (iv) residual PC would display a profile similar to PC. Four possible moderators were examined in terms of variability among studies based upon gender (males vs females), age (adults vs adolescents), sport type (team vs individual), and instrument/subscales used to measure perfectionism. This aspect of the study was considered exploratory so we proposed no hypotheses.

Method

Literature search

The computerized search of published work was conducted using the databases PsycINFO, PsycARTICLES, MEDLINE, SPORTDiscuss and ProQuest Dissertations & Theses (UK & Ireland and international). The search terms were perfection* (for perfectionism, perfectionist, and perfectionistic) AND sport. The search date was between January 1990 (the year the first article on multidimensional perfectionism was published) and December 2016. The search of the first four databases was limited to peer-review journals published in English. The search of the ProQuest Dissertations & Theses (UK & Ireland and international) database focused on unpublished work in English. The search produced 2688 studies (318 from the first four databases and 2370 from the last). Next abstracts were screened and studies removed that did not provide an empirical examination of perfectionism in sport or were duplicates. This was reduced to $k = 176$ (146 studies from the first four databases and 11 theses/dissertations, which included 30 studies, from the last database). Finally, a manual search of the reference lists of articles obtained from the electronic search and contacting the corresponding author of any article included in the meta-analysis enquiring about the possession of any unpublished data (unpublished manuscripts, conference papers, or unpublished data sets) was conducted. Thirty

two corresponding authors were contacted resulting in 3 new datasets being retrieved. In total, 179 studies/datasets (146 published work, 30 theses/dissertations, and 3 new datasets) were then evaluated using the inclusion criteria below.

Inclusion criteria

Retrieved studies/datasets were included in the meta-analysis if they: (a) measured perfectionism using established self-report scales that yielded quantitative values (i.e., measures with evidence of adequate validity and reliability); (b) measured perfectionism in a multidimensional manner (as opposed to a unidimensional manner). Indicators of PS were the personal standards subscale from either Frost et al.'s (1990) Multidimensional Perfectionism Scale or its sport adaptations (Sport-MPS and Sport-MPS 2; Dunn et al., 2006; Gotwals & Dunn, 2009), the self-oriented perfectionism subscale from Hewitt and Flett's (1991) Multidimensional Perfectionism Scale or Child and Adolescent Perfectionism Scale (Flett, Hewitt, Boucher, Davidson, & Munro, 1997), the striving for perfection subscale from the Multidimensional Inventory of Perfectionism in Sports (Stoeber, Otto, & Stoll, 2006), the high standards subscale from the revised Almost Perfect Scale (Slaney, Rice, Mobley, Trippi, & Ashby, 2001), and the striving for excellence subscale from the Perfectionism Inventory (R. W. Hill et al., 2004). Indicators of PC were the concerns over mistakes, doubts about action, socially prescribed perfectionism, negative reactions to imperfection, and discrepancy subscales from the same instruments identified above. These indicators were selected based on the typical practice of researchers examining perfectionism, recommendations of those in this area (e.g., Stoeber, 2011), and factor analytical evidence supporting a higher-order model of perfectionism (e.g., Bieling et al., 2004); (c) included an effect size (e.g., correlation coefficient), sufficient information for computation or estimation of an effect size, or this information was obtained from the corresponding author; (d)

were published in English; (e) were a published journal article, unpublished journal article, or thesis/dissertation; (f) included a sample that was not replicated elsewhere (e.g., included in both a journal article and a thesis/dissertation). When this was the case, only the most complete and recent account of the sample/data was used; (h) as the relationship between multidimensional perfectionism and burnout has recently been meta-analysed in sport (Hill & Curran, 2016), studies examining only athlete burnout were excluded. If the studies included other variables it was retained; and (f) the study contained a relationship between perfectionism and a criterion variable that was reported in at least two other studies. While meta-analytical procedures can be used for only two studies, other aspects of meta-analysis, such as assessment of publication bias, are not possible with less than three studies (Borenstein et al., 2009).

The inclusion criteria saw the removal of studies that used qualitative methods (k = 11; all published), studies that used unidimensional measures of perfectionism (k = 19; 17 published and 2 unpublished), studies that used the Positive and Negative Perfectionism Scale (PNPS; Terry-Short, Owens, Slade, & Dewey, 1995) for which there are concerns regarding its validity (k = 6; 5 published and 1 unpublished) (see Egan, Piek, Dyck, & Kane, 2011), studies that included perfectionism but no criterion variables (k = 12; 9 published and 3 unpublished), studies that used non-established measures of perfectionism (k = 2; all published), and studies that were unobtainable (k = 1; published). A small number of studies also included the same samples or used sub-samples of other work in the search. In these cases, the work was treated as duplicates and the most comprehensive account of the data (largest sample and number of criterion variables) was retained. This led to the removal of a number of other studies (k = 6; all published). Some of the studies in the unpublished theses also appeared in published work (k = 16). In these cases the published studies were retained. A number of studies did not report

correlations (*r*), means of calculating them, or were not provided by authors after being contacted (*k* = 19; 18 published and 1 unpublished). Studies examining perfectionism and only athlete burnout were removed (*k* = 8; all published). Finally, studies that did not contain a relationship between perfectionism and a criterion variable that was reported in at least two other studies were also removed (*k* = 26; 23 published and 3 unpublished, and 1 new dataset).

The implementation of the criteria resulted in the final inclusion of 52 studies/datasets (46 published, 4 unpublished, and 2 new datasets) reporting 361 effect sizes capturing the relationship between perfectionism and various criterion variables.

Recorded variables

A coding sheet was completed for each study included in the meta-analysis. It included: (a) publication information (authors/year), (b) mean age of participants, (c) percentage of female participants, and (d) instrument used to measure perfectionism. In addition, bivariate correlations between dimensions of perfectionism, and bivariate correlations between dimensions of perfectionism and criterion variables were recorded. All information was coded by the first author and verified by the second and third authors. All authors are regular contributors to research in the area of perfectionism in sport. Coded information for each study is presented in Table 1.

Meta-analytical procedures

The main analyses were conducted using Comprehensive Meta-Analysis software (Version 3.3; Borenstein, Hedges, Higgins, & Rothstein, 2014). Random-effects models were used to estimate mean effect sizes (allowing variation in effects sizes between studies to be due to both sampling error and other additional sources; Lipsey & Wilson, 2001). Contributions of individual effect sizes to the mean effect sizes were weighted in accord with the random effects models (utilizing

estimates of both within study variance and between study variance; Hedges & Vevea, 1998). For each criterion variable, mean effect sizes and 95% confidence intervals were calculated. In additional analyses we also estimated mean effects that were corrected for measurement error. In these cases we produced the corrected mean effect size for each dimensions of perfectionism and the criterion variable (ρ), corrected standard deviation, and 80% credibility intervals for effects in the population. This analysis was conducted using Field and Gillet's (2010) Meta_Basic SPSS macro (Hunter-Schmidt method) and was based on internal reliabilities (Cronbach's alphas) retrieved from original articles and internal reliabilities provided by authors. In all cases, based on Cohen's (1992) recommendations of small (r = .10), medium (r = .30) and large (r =.50), we considered effect sizes to be negligible r = .00 to .09, small r = .10 to .19, small-to-medium r = .20 to .29, medium r = .30 to .39, medium-to-large .40 to .49, and large r = .50.

Twelve studies included multiple effect sizes. These were longitudinal studies (Hall, Kerr, & Matthews, 1998; Smith, Hill, and Hall, n.d. - unpublished data), experimental/intervention studies (Hill, Hall, Duda, & Appleton, 2011; Mosewich, Crocker, Kowalski, & DeLongis, 2013), studies measuring multiple sub-dimensions of PS or PC (Jowett, Hill, Hall, & Curran, 2013; Kaye, Conroy, & Fifer, 2008; Madigan, Stoeber, & Passfield, 2016; Stoeber, Stoll, Salmi, & Tiikkaja, 2009), studies measuring the same sub-dimensions of PS and PC but in different situations (e.g., training vs competition; Stoeber, Stoll, Pescheck & Otto, 2008) and studies measuring multiple indicators of the same criterion variables (e.g., different facets of fear of failure or intensity and frequency of anxiety; Martinent, Ferrand, Guillet, & Gautheur, 2010; Sagar & Stoeber, 2009; Stoll, Lau, & Stoeber 2008). Only one effect size per relationship per study is typically used in meta-analyses so to avoid artificial inflation of sample size, distortion of standard error estimates, and overrepresentation of studies that include multiple effect sizes

(Lipsey & Wilson, 2001). Therefore, in the case of the two experimental/intervention studies, pre-intervention correlations were included in one study (as groups were treated differently thereafter; Mosewich et al., 2013) and the mean correlation across all time points for the other (as all groups were treated the same throughout; Hill et al., 2011). In all other cases, mean effect sizes were used from the multiple relationships reported.

So to examine PS and PC having controlled for their relationship, all analyses were repeated using partial correlations. This approach was selected so to replicate the approach of Gotwals et al. (2012). Partial correlations capture the unique relationship between a dimension of perfectionism and a criterion variable by controlling for their relationships with the other dimension of perfectionism. Here, we refer to these new variables as residual PS and residual PC. Partial correlations were calculated using formula provided by Cohen, Cohen, West and Aiken (2003, p. 74, equation 3.3.11). In total, 336 semi-partial correlation coefficients were calculated. Noteworthy differences between dimensions of perfectionism and their residual counterparts were determined on the basis of non-overlapping 95% confidence intervals. So to also provide information regarding mean effects corrected for measurement error for partial correlations, internal reliabilities for residual PS and residual PC were calculated using the reliability of the original predictor variable (e.g., PS) and the relationship between the original predictor variable and the criterion variable (e.g., PS-task orientation) (see Lynam, Hoyle, & Newman, 2006).

Heterogeneity in the effect sizes was assessed by examining total heterogeneity of mean effect sizes (Q_T) and the degree of inconsistency in the observed relationship across studies (I^2) (Higgins, Thompson, Deeks, & Altman, 2003; Higgins & Thompson, 2002). A statistically significant Q_T indicates that the mean effect size does not adequately represent the distribution of

effects. The degree of inconsistency (I^2) provides a complementary index of the percentage of the total variation due to true heterogeneity rather than chance: 100% x (Q_T – df)/ Q_T. Values of 25, 50, and 75 are considered low, medium and high levels of heterogeneity (Higgins & Thompson, 2002).

In the cases where statistically significant heterogeneity was found additional subgroup analyses were conducted with the aim of exploring sources of heterogeneity. Subgroup analysis explored whether effect sizes differed depending on a predominately male or female sample (based on percentage of males versus females), predominantly adolescent or adult sample (based on mean age of sample), predominately individual or team sports sample (based on percentage of sample reporting individual or team sport participation) and the instruments/subscales used. In the subgroup analysis, random-effects models were used with pooled within–group estimates of variability of effect sizes for subgroups. This pooled approach was taken due to the small number of studies within each subgroup (estimates of variance of effect sizes within each subgroup are considered to be imprecise to be used). Significant subgroup differences were inferred by statistically significant between subgroup variance (Q_B) and interpreted using 95% confidence intervals.

Publication bias was assessed using (i) Rosenthal's (1979) fail-safe number (the number of non-significant, unpublished, or missing studies with null effects that would result in the observed effect size becoming non-significant, $p > .05$). Rosenthal (1979) recommended that the fail-safe number should exceed $5k + 10$, where k equals the number of effect sizes, (ii) Egger's test of regression intercept (Egger, Smith, Schneider, & Minder, 1997). In the absence of publication bias, Egger's regression intercept from a funnel plot of effect sizes against the reciprocal of its standard error would not differ significantly from zero, and (iii) Duval and Tweedie's (2000)

"trim and fill" method to correct for any asymmetry evident in the funnel plot and provide publication bias adjusted estimates of effect sizes. Due to the small number of studies involved (k <3), publication bias estimates were not estimated in the subgroup analyses.

Results

Overall effect sizes

Mean effect sizes (corrected and uncorrected) between dimensions of perfectionism and motivation, emotion/wellbeing, and performance are reported in Table 2. There a number of cases where, as would be expected, corrected mean effect sizes were larger than uncorrected mean effect sizes so to move them from, for example, being small to small-to-medium (45 changes in total). There were also a few notable differences between the two estimates in regards to whether relationships were statistically significant: PS and performance avoidance goal, PC and intrinsic motivation, PS and self-esteem, residual PS and worry, residual PC and task orientation, residual PS and mastery avoidance goal. An overview of the uncorrected mean effect sizes is provided below and differences between uncorrected and correct means in regards to statistical significance are noted when this was the case.

Motivation. PS displayed a negligible positive relationship with task-involving coach climate and performance avoidance goal, a small positive relationship with task-orientation, mastery avoidance goal, and fear of failure, and a small-to-medium positive relationship with ego orientation, ego-involving coach climate, identified regulation, introjected regulation, external regulation and perceived athletic ability. It also displayed medium positive relationships with intrinsic motivation and mastery approach goal and a medium-to-large positive relationship with performance approach goal. PS displayed a negligible negative relationship with amotivation. In the case of performance avoidance goal, the uncorrected mean effect size estimate was

statistically significant but the corrected mean effect size was not statistically significant for PS. Thirteen differences were noted for residual PS. Residual PS displayed a small positive relationship with ego orientation (previously small-to-medium positive), task-involving coach climate (previously negligible positive) and introjected motivation (previously small-to-medium positive), small-to-medium positive relationships with performance approach goal (previously medium-to-large positive) and task orientation (previously small positive), a medium positive relationship with perceived athletic ability (previously small-to-medium positive), and a medium-to-large positive relationship with intrinsic motivation (previously medium positive). Residual PS was also unrelated to an ego-involving coach climate, mastery avoidance goal, performance avoidance goal, external regulation, and fear of failure (previously negligible, small, and small-to-medium positive relationships) and displayed a small negative relationship with amotivation (previously negligible negative). In the case of mastery avoidance goal, the uncorrected mean effect size estimate was not statistically significant but the corrected mean effect size was statistically significant for residual PS.

PC displayed a negligible positive relationship with identified regulation, a small-to-medium positive relationship with an ego orientation, a medium positive relationship with performance approach goal, performance avoidance goal, mastery avoidance goal, and amotivation, and a medium-to-large positive relationship with ego-involving coach climate, introjected regulation, external regulation, and fear of failure. PC displayed a negligible negative relationship with task orientation and a small negative relationship with task-involving coach climate. It was unrelated to mastery approach goal, intrinsic motivation and perceived athletic ability. In the case of intrinsic motivation, the uncorrected mean effect size estimate was not statistically significant but the corrected mean effect size was statistically significant for PC.

Ten differences were noted for residual PC. The positive relationship between residual PC and ego orientation was negligible (previously small-to-medium), performance approach goal was small (previously medium), external regulation was small-to-medium (previously medium-to-large), and ego-involving climate and introjected motivation were medium (both previously medium-to-large). Residual PS also displayed a small negative relationship with mastery approach goal, intrinsic motivation, and perceived athletic ability (all previously unrelated). Finally, residual PC were unrelated to task orientation (previously negligible negative) and identified regulation (previously negligible positive). In the case of task orientation, the uncorrected mean effect size estimate was not statistically significant but the corrected mean effect size was statistically significant for residual PC.

Emotion/Wellbeing. PS displayed a negligible positive relationship with somatic anxiety, a small positive relationship with self-esteem, self-confidence, trait anxiety, cognitive anxiety, and worry, a small-to-medium positive relationship with positive affect and enjoyment, and a medium positive relationship with self-criticism. It was also unrelated to negative affect, rumination, depressive symptoms and satisfaction. In the case of self-esteem, the uncorrected mean effect size estimate was statistically significant but the corrected mean effect size was not statistically significant for PS.

Five differences were noted for residual PS. Residual PS displayed a small-to-medium positive relationship with self-esteem (previously small positive), a medium positive relationship with self-confidence (previously small), small negative relationships with cognitive anxiety and somatic anxiety (previously small positive and negligible positive) and was also unrelated to worry (previously small positive). In the case of worry, the uncorrected mean effect size estimate was not statistically significant but the corrected mean effect size was statistically significant for

residual PS.

PC displayed a small-to-medium positive relationship with negative affect, a medium positive relationship with somatic anxiety and worry, and a medium-to-large positive relationship with trait anxiety, cognitive anxiety, self-criticism, rumination, and depressive symptoms. It also displayed small-to-medium negative relationships with self-confidence and satisfaction, and a medium-to-large negative relationship with self-esteem. PC were unrelated to positive affect and enjoyment.

Six differences were noted for residual PC. Specifically, it had a small negative relationship with positive affect (previously unrelated), a small-to-medium negative relationship with enjoyment (previously unrelated) and a medium negative relationship with self-confidence (previously small-to-medium negative). Residual PC also had a medium positive relationship with depressive symptoms and rumination (both previously medium-to-large positive), and a large positive relationship with cognitive anxiety (previously medium-to-large).

Performance. PS displayed a small-to-medium positive relationship with athletic performance. This was also the case for residual PS. PC were unrelated to athletic performance. However, residual PC displayed a small negative relationship with athletic performance.

Heterogeneity between studies

Twenty-six of 29 criterion variables included at least one relationship that had statistically significant heterogeneity across studies (70 of 112 relationships). Exceptions were trait anxiety, self-criticism, and worry. When considering true heterogeneity (I^2), 37 of 112 of relationships displayed medium heterogeneity (>50%) and 37 of 112 displayed high heterogeneity (>75%). Subgroup analyses on studies using predominately male versus female, predominately adolescent versus adult, predominately individual versus team sports, and different instruments/subscales

found significant subgroup differences (Q_B) in 41 cases (Table 3).

Gender. Predominately male and female samples differed in the relationships between PS and ego-involving climate, PS and negative affect, residual PS and ego-involving coach climate, PC and positive affect, and PC and satisfaction. Differences were evident in the size of the relationships (PC and positive affect, PC and satisfaction), in other cases, the size of the relationships and whether the relationships were statistically significant (PS and ego-involving climate, PS and negative affect), and in one case the direction and whether the relationship was statistically significant (residual PS and ego-involving climate).

Age. Predominately adult and adolescent samples differed in the relationships between PS and perceived athletic ability, PS and negative affect, PC and introjected regulation, PC and amotivation, PC and positive affect, residual PC and introjected regulation, and residual PC and amotivation. In one additional case, residual PC and ego-involving climate, evidence of a difference was mixed (a statistically significant Q_B but overlapping confidence intervals). In regards to the nature of the other differences, differences were evident in the size of the relationships (PC and introjected regulation, PC and amotivation, residual PC and introjected regulation, and residual PC and amotivation) and, again, in other cases, the size of the relationships and whether the relationships were statistically significant (PS and perceived athletic ability, PC and positive affect, and PS and negative affect).

Sport type. Predominately team sport and individual sport samples differed in the relationships between PS and somatic anxiety, PC and self-confidence, residual PC and ego-involving coach climate, residual PC and cognitive anxiety, and residual PC and enjoyment. Differences were evident in the size of the relationships (residual PC and ego-involving climate, residual PC and cognitive anxiety), size and whether the relationships were statistical significant (residual PC and

enjoyment), direction and whether the relationships were statistical significant (PS and somatic anxiety), and size, direction, and whether the relationships were statistically significant (PC and self-confidence),

Instrument/subscales. Different instruments/ subscales also produced different relationships (23 cases in total). There were nine cases for PS and residual PS of which three provided mixed support for moderation (a statistically significant Q_B but overlapping confidence intervals - residual PS and ego-involving climate, residual PS and external regulation, residual PS and perceived athletic ability). For the six other cases, composite/multiple instruments displayed more adaptive motivation when compared with personal standards and self-oriented perfectionism subscales (PS and ego orientation, PS and identified regulation, PS and fear of failure, residual PS and ego orientation, and residual PS and identified regulation), and personal standards and striving for perfection were associated with better performance than self-oriented perfectionism (residual PS and performance).

There were 14 cases for PC and residual PC of which five provided mixed support for moderation (a statistically significant Q_B but overlapping confidence intervals - PC and perceived athletic ability, residual PC and external regulation, residual PC and somatic anxiety, residual PC and depression, residual PC and enjoyment). For the other nine cases, one was for motivation and seven were for emotion/wellbeing. In regards to motivation, concern over mistakes displayed more maladaptive motivation than other instruments/subscales (PC and mastery avoidance). In regards to emotion/wellbeing, composite/multiple instruments typically displayed more maladaptive emotion/wellbeing than other instruments/subscales (PC and positive affect, PC and negative affect, residual PC and positive affect, residual PC and negative affect). For other criterion variables, in which composite/multiple instruments were not used, negative reactions to

imperfection displayed more maladaptive emotion/wellbeing than other instruments/subscales (PC and cognitive anxiety, residual PC and self-confidence, residual PC and cognitive anxiety).

Publication bias

When inspecting fail-safe-numbers for the overall relationships, 44 of 112 relationships did not exceed Rosenthal's (1979) recommendation. Egger's test of regression intercept included zero for 108 of 112 relationships (PS and self-confidence, residual PC and task orientation, residual PC and depressive symptoms, residual PC and athletic performance being the exceptions). Duval and Tweedie's (2000) trim and fill method provided revised estimates for 68 of 112 relationships. In these cases, the estimates may provide a more accurate estimate of the relationships. However, only in five cases were the trim and fill estimates notably different: PS-performance avoidance goal (positively related changed to unrelated), residual PS-performance avoidance goal (negatively related changed to unrelated), PS-amotivation (negatively related changed to unrelated), PC-positive affect (unrelated changed to negatively related), and residual PS-satisfaction (unrelated change to positively related). In all cases, including these five, none of the trim and fill estimates differed statistically to the original estimates (as indicated by overlapping confidence intervals).

Discussion

The first purpose of the current study was to provide an updated and meta-analytical review of research examining multidimensional perfectionism in sport. It was hypothesized that (i) PS would be related to a mixed profile of motivation, emotion/wellbeing, and performance, and (ii) PC would be related to a maladaptive profile of motivation, emotion/wellbeing, and performance. In addition, it was hypothesised that when the relationship between the two dimensions of perfectionism are controlled for (iii) residual PS would be related to an adaptive

profile (i.e., display larger negative relationships with maladaptive motivation and emotion/wellbeing, and larger positive relationships with adaptive motivation and emotion/wellbeing) and (iv) residual PC would display a profile similar to PC.

The first hypothesis was supported in that PS were characterized by a mix of achievement goals (e.g., task and ego orientation), motivation regulation (intrinsic, identified, introjected, and external), emotion/wellbeing (e.g., self-confidence and cognitive anxiety), and better athletic performance. The second hypothesis was supported in that PC were characterized primarily by maladaptive achievement goals (e.g., ego orientation and performance avoidance goal), motivation regulation (e.g., introjected, external, and amotivation), emotion/wellbeing (e.g., cognitive anxiety and somatic anxiety), and was unrelated to performance. In support of the third hypothesis, residual PS were characterized by a notably more adaptive profile than PS. This was evident for motivation (e.g., unrelated to ego-involving coach climate, mastery avoidance goal, and fear of failure) and emotion/wellbeing (e.g., negatively related to cognitive anxiety and somatic anxiety). In contradiction of hypothesis four, there were a number of notable differences between the profile of PC and residual PC. Residual PC were characterized by a more maladaptive profile. Again, this was evident for motivation (e.g., negatively related to mastery approach goal, intrinsic motivation, and perceived athletic ability) and, to a lesser degree, emotion/wellbeing (e.g., negatively related to positive affect and enjoyment).

Perfectionistic concerns and residual perfectionistic concerns

Based on his narrative review, Stoeber (2011) concluded that PC were clearly maladaptive. The findings of our review support this conclusion and provide substantial empirical evidence to do so. The correlates of PC suggest that, motivationally, it is best characterised by perceptions that success is derived from comparative ability (and not effort and mastery), more controlling

motives (introjected and external regulation), and a strong sense of apathy/helplessness (amotivation). There is also evidence that PC are related to a lower sense of self-value (lower self-esteem and higher self-criticism) which may also explain the positive relationships between PC and negative emotional experiences (e.g., anxiety and depressive symptoms). PC also appears to confer no benefits in terms of athletic performance. As such, based on the current review, it is difficult to see any benefits of PC for athletes. Rather, PC are likely to require close monitoring and management by athletes and by those responsible for the welfare of athletes.

Differences between the profiles of PC and residual PC were greater than expected and similar in extent to the differences between PS and residual PS. Specifically, controlling for the relationship between PS and PC accentuated the negative pattern of motivation and emotion/wellbeing evident for PC. Hitherto our review, views were that PC were typically less affected by partialling (Hill, 2014), even that in some contexts it was relatively safe to examine perfectionistic concerns without statistically controlling for perfectionistic strivings (Stoeber & Damian, 2016). However, our findings suggest that this is not always the case. Given the differences between PC and residual PC, we recommend that when researchers are interested in the unique relationship between PC and criterion variables, they should always control for the relationship between PS and PC and examine partial (and semi-partial) correlations.

Perfectionistic strivings and residual perfectionistic strivings

In both Stoeber (2011) and Gotwals et al.'s (2012) reviews, PS were related to a mix of motivation and emotion. This was evident here in that PS was positively related to both adaptive and maladaptive achievement related beliefs (e.g., task and ego orientations), motives (e.g., intrinsic motivation, introjected regulation, extrinsic regulation, and fear of failure), and emotion/wellbeing (e.g., self-esteem and anxiety). However, it was not evident for performance

with which PS was positively correlated. PS are clearly complex and their precise implications for athletes uncertain. On the basis of these correlations, we conclude, as did Stoeber and Gotwals et al., that PS are likely to be highly energizing and may carry some benefits for performance (at least under some circumstances). However, this profile also appears consistent with the idea that PS confers motivational and psychological vulnerability. In this regard, the findings are supportive of suggestions of the insidious nature of PS (Hewitt & Flett, 2014, 2016). This conclusion contrasts with the conclusions of Stoeber and Gotwals et al. because, although these authors were clearly mindful of the differences between the PS and residual PS, they lent heavily on the properties of residual PS when making conclusions about PS.

In regards to residual PS, the two previous reviews found strong support for residual PS being more adaptive than PS. This was also the case here. The difference between PS and residual PS was evident for a range of maladaptive motivation related variables which were positively related to PS but not residual PS (ego-involving coach climate, mastery avoidance goal, and fear of failure). It was also evident to a lesser degree for emotion/wellbeing variables (cognitive anxiety, somatic anxiety, and worry) which were positively related to PS but unrelated or negatively related to residual PS. What findings regarding residual PS allow us to conclude has recently been subject to debate (Hill, 2014, 2017; Stoeber & Gaudreau, 2017). With this debate in mind, we conclude that athletes with the same level of PC and higher PS are likely to report better motivation and emotion/wellbeing than those lower in PS. Note, however, we do not conclude that PS are associated with adaptive motivation and emotion/wellbeing or that PS forms part of a healthy striving for excellence as Stoeber (2011) stated. In addition, we do not ascribe the qualities of residual PS to PS as Gotwals et al.'s (2012) conclusion does.

Moderation by gender, age, and sport type

The second purpose of the current study was to explore variability between studies in terms of effect sizes. Four possible moderators were examined; gender (males vs females), age (adults vs adolescents), sport type (team vs individual), and instruments/subscales used. A note of caution is required for these analyses as in addition to being exploratory, the analyses are based on very few studies and there are some instances of multiple studies being compared to only one study. However, as one of the advantages of meta-analysis is the ability to examine sources of variability in effect sizes, it would be remiss not to begin to do so at this first opportunity.

In regards to gender, differences between predominately male and predominately female samples were found on five occasions for four criterion variables (ego-involving coach climate, negative affect, positive affect and satisfaction). On four occasions, predominately female samples fared worse in regards to the relationships displayed. A small number of studies have previously examined whether gender moderates the relationship between perfectionism and criterion variables in sport. These examinations are normally part of preliminary analyses used to decide if primary analyses should proceed controlling for gender or if males and females should be examined separately (e.g., Madigan, Stoeber, & Passfield, 2015). Typically, research has found overall patterns of relationships to be similar for males and females. We are aware of only one exception in sport in which Hall, Hill, Appleton, and Kozub (2009) found that the relationship between perfectionism and exercise dependence in middle distance runners differed based on gender (inferred via gender invariance of a path model). The relationships here may be further examples of the moderating influence of gender. However, overall, based on our review there is currently infrequent evidence of gender being a moderating factor for the relations of perfectionism in sport.

There was slightly more evidence of age being a moderating factor. This was the case on eight

occasions for five criterion variables (introjected regulation, amotivation, perceived athletic ability, negative affect, and positive affect). In all but two cases, predominately adult samples fared worse than adolescents in regards to the relationships displayed. There is little research to draw upon in regards to examination of perfectionism and age in sport or other contexts. In speculating on why age may act as a moderator, the findings could be indicative of developmental processes and/or indicative of how the effects of perfectionism change across parts of the life span. One interesting possibility is that these findings reflect a naive optimism among younger athletes. Indirect support for this possibility is provided by research in which positive future thinking has been found to moderate the relationship between PS, PC and hopelessness, which is similar to amotivation and encompasses negative affect (O'Connor, O'Connor, O'Connor, Smallwood & Miles, 2004). It is also possible that, as the importance of winning and outperforming others in sport increases through adolescence (Kavussanu, Seal, & Phillips, 2006), the negative consequences of perfectionism may be more evident as athletes get older, become more elite, and if intrinsic motives dwindle. These possibilities would be interesting focuses of future research. However, again, overall, based on our review there is currently infrequent evidence of age being a moderating factor for the relations of perfectionism in sport.

Like for gender and age, there was some infrequent evidence that the type of sport also acted as a moderator. This was found on five occasions for five criterion variables (ego-involving climate, self-confidence, somatic anxiety, cognitive anxiety, and enjoyment). Generally, samples that included predominately athletes in team sports fared worse than athletes in individual sports in regards to the relationships displayed. The unique psychological processes that operate in team sports have been studied extensively and can offer ways in which we might understand why

sport type may be a moderating factor (see Allen, Greenlees, & Jones, 2013, for a review). On one hand, one might expect the greater social interaction and inter-dependency in team sports to offer the opportunity for greater social support and sense of relatedness. However, on the other hand, participation in team sports reduces a sense of personal control and increases the sense of social scrutiny and likelihood of interpersonal conflict. These latter issues are likely to be especially important in context of perfectionism. PC, in particular, are related to a need for approval from others and fears of negative evaluation (Hewitt & Flett, 1991). Moreover, in other interpersonal contexts, PC are related to greater difficulty fostering and maintaining positive relations with important others (e.g., Haring, Hewitt, & Flett, 2003). These findings provide at least some theoretical grounding for researchers who aim to examine whether sport type moderates the relations of perfectionism in sport in the future.

The most evidence of moderation was found for the use of different instruments/subscales. This was found unambiguously on 14 occasions for nine criterion variables (ego orientation, mastery avoidance goal, identified regulation, fear of failure, self-confidence, positive affect, negative affect, cognitive anxiety, and performance). In some instances therefore the instrument selected will make a difference in the effects observed in research. We note that this was also found in other meta-analyses when examining perfectionism and psychopathology (Limburg, Watson, Hagger, & Egan, in press). The two most notable features regarding our analyses are, first, that the instrument/subscale used seems to be more important when examining PC than PS and, second, the instrument/subscale used seems more important when examining emotion/wellbeing than motivation or performance. The first finding is unsurprising. Although different instruments and models can be considered part of the same higher-order model, the specific content of sub-dimensions varies with some sub-dimensions more distinct and different to others. This is

particularly the case with regards to indicators of PC which capture a much wider array of features than indicators of PS. The second finding is more novel and indicates that sub-dimensions of PC may share a similar pattern of motivation and performance but their effects may differ notably in regards to emotion/wellbeing. Based on our review, then, researchers will need to be mindful of generalizing findings across different instruments/subscales, particularly for PC and particularly for emotion/wellbeing.

Limitations and other recommendations for future research

On the basis of the findings of our review, it is possible to provide a number of suggestions for future research that reflect limitations of existing research and the findings and limitations of the current review.

One limitation is that in collating and organizing numerous criterion variables for the review, we have provided a simplified account of their likely consequences by categorizing them as either adaptive or maladaptive. We adopted the terms “adaptive” and “maladaptive” so to denote variables that, when aggregated across contexts or time, will in all likelihood be either more or less beneficial or detrimental to athletes. In reality, like perfectionism, few of the criterion variables will be beneficial or detrimental for all athletes all of the time, and some criterion variables can be considered a natural part of participation in sport (e.g., negative affect following failure). As research examining perfectionism in sport continues to increase, a more nuanced view of the relationships between dimensions of perfectionism and criterion variables will likely emerge and a better understanding of perfectionism will follow. We hope that the current review serves as a useful starting point for this future research and recommend that researchers seek to uncover the complexities that may exist for the relationships we have presented.

A related limitation is that in the current review, in most cases, perfectionism and the criterion

variables were examined in less than five studies. We therefore recommend that additional research is undertaken to examine perfectionism and the criterion variables included in this review. The low number of studies obviously influences the degree of confidence we can have in the findings of our review. The most studied relationships included, perhaps unsurprisingly, motivation related variables such as achievement goals and motivation regulation. Thereafter, research was generally sparser. More research is therefore required in order to confirm the estimates, or provide better estimates, of the relationships presented here. This is especially the case for the criterion variables for which fail-safe numbers did not exceed recommendations, when Egger's test of regression intercept did not include zero, or when revised estimates were provided by the trim and fill method.

In addition to more research examining the criterion variables included in the current review, there is also scope to examine criterion variables that were excluded ($k < 3$). These criterion variables included psychological need thwarting and need satisfaction, anger, passion, and attitudes towards doping. These are important and commonly examined variables in sport research generally and therefore their continued examination will offer further insight into the likely consequences of perfectionism for athletes. Other criterion variables that have been examined in less than three studies include more pathological outcomes such as eating disorders. Flett and Hewitt (2016) recently raised concerns that by not focusing on such outcomes, too positive a picture of perfectionism is being painted in sport in comparison to other domains. Therefore research examining criterion variables of this kind may be particularly useful in providing a fuller picture of the contribution of perfectionism to the experiences of athletes.

Another limitation and recommendation is a common one. Almost all of the studies included in the review adopted cross-sectional designs. We therefore currently know a reasonable amount

regarding the correlates of perfectionism in sport but very little regarding the nature of these relationships such as whether they are causal and/or reciprocal. Longitudinal work has begun for perfectionism and burnout (e.g., Madigan et al., 2015). However, beyond this relationship, few longitudinal studies exist. Based on our review, some criterion variables are especially good candidates for inclusion in longitudinal research. This includes achievement goals and anxiety. Recent work in dance has found somewhat surprising results when examining the relationship between perfectionism and achievement climate over time with both acting on each other in a reciprocal manner (see Nordin-Bates, Hill, Cumming, Aujla, & Redding, 2014). Such findings allude to a complex set of relationships that are also likely to be evident in sport. Given the current state of research in sport at the moment, longitudinal work is among the highest priorities.

As noted earlier, the moderation analyses in the current review are based on a very small number of studies. Again, more studies will provide better, less biased, estimates of effect sizes. The moderation analysis also included dichotomized continuous variables (mean age, proportion of sample that is male or female, and proportion of sample from an individual or team sport). This is problematic in that is can contribute to a range of issues such as a loss of statistical power and spurious findings (Royston, Altman, & Sauerbrei, 2006). Subgroup analysis also examines moderating factors without controlling for the influence of other moderating factors. In other words, if there are more adolescents and females in team sports, the unique effects of each moderating factor cannot be isolated. Ideally, to address these latter two issues, continuous variables would be examined using meta-regression to allow unique relationships to be examined. However, currently there are too few studies for this type of analysis (Borenstein et al., 2009). Once additional research has taken place, the issue of moderation across studies will

need to be revisited.

Finally, generalisability of the findings of the review is limited based upon the inclusion and exclusion criteria we adopted. This includes decisions regarding the instruments of perfectionism considered valid and reliable, the smaller number of proxies of PS and PC selected, and other issues such as limiting research included in the review to work published in English. With regards to the latter issue, research from non-English speaking countries is included in the review when published in English (e.g., Puente-Díaz, 2013). However, research from non-English speaking countries makes up only a small amount of total research examining perfectionism in sport. By excluding work published in other languages, research from different countries and cultures is under-represented in this review. This limitation is perhaps particularly noteworthy given that there is emerging evidence of cultural differences in the correlates of perfectionism (e.g., Stoeber, Kobori, & Tanno, 2013), as well as evidence of differences in levels of perfectionism and how it has changed over time in different counties (see Curran & Hill, in press). Again, whether different countries and cultures act as moderators of the relationships observed in the current review will need to be examined as more research takes place.

Practical implications

Given the limitations identified in existing research, offering advice regarding perfectionism to practitioners in sport based on current research is difficult. There is still a considerable amount of research to be undertaken to provide a sound empirical basis for such advice. However, with substantially more research outside of sport as a backdrop, we believe it is uncontroversial to suggest that PC is likely to be harmful for most athletes most of the time. We therefore suggest that practitioners should be mindful of the dangers of PC for athletes and the need to support athletes in their efforts to manage its negative effects. We note that outside of sport, other meta-

analytical evidence exists of the relationships of PS and PC, but particularly PC, with psychopathology (e.g., Limburg et al., in press) and that these relationships are demonstrable over time (e.g., Smith et al., 2016). We see no reason why these relationships would not be expected for athletes. Therefore, it is our opinion that perfectionism is likely to pose a significant risk for mental health for athletes and will require a concerted effort from those responsible for the welfare of athletes to help manage perfectionism, PC in particular.

In regards to how practitioners might better help athletes, there is a growing body of research that exists that has found techniques that many practitioners in sport will be familiar with may be effective at reducing perfectionism (e.g., cognitive behaviour therapy; see Lloyd, Schmidt, Khonodoker, & Tchanturia, 2014). There are only a small number of studies that have directly examined interventions for perfectionism in sport but, again, some of these studies have provided evidence of success using these or similar techniques (e.g., Mosewich, Crocker, Kowalski, & DeLongis, 2013). These techniques, then, provide the first point of call for practitioners working with perfectionistic athletes. We also believe that there will be benefits to practitioners creating environments that may help moderate perfectionism in a more indirect fashion through the promotion of more adaptive motivational climates. This approach would align well with interventions focused on the integration and application of different theories of motivation in sport (e.g., Duda, 2013). It is also an approach that could be integrated comparatively easily into practitioner training and applied widely. However, as yet, there has been no direct test of whether such interventions would be effective in regards to perfectionism in sport. For a fuller understanding of the management and treatment of perfectionism, we encourage practitioners to consult Hewitt, Flett, and Mikail (2016) and Egan, Wade, Shafran, and Antony (2014).

Conclusions

The current study provides the first meta-analytical review of multidimensional perfectionism in sport. In summarizing research, it was evident that PC are clearly maladaptive for athletes whereas PS are more complex and ambiguous. This is evident in the relationships between the two dimensions of perfectionism and motivation, emotion/wellbeing, and performance.

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1 Table 1. *Research examining multidimensional perfectionism in sport*

			Perfectionism				PS	PC	PS	PC
Study	Sample	Instru.	PS	PC	$r_{PS\ PC}$	Criterion variables	*r*	*r*	*pr*	*pr*
Appleton & Hill (2012)	231 junior athletes (12% females; *M* age =	CAPS	SOP	SPP	**.23**	Intrinsic motivation	**.35**	.05	**.35**	-.03
	16.92, *SD* = 2.63; 71% team sports)					Identified regulation	.07	**.14**	.04	**.13**
						Introjected regulation	**.22**	**.30**	**.15**	**.25**
						External regulation	**.24**	**.24**	**.18**	**.18**
						Amotivation	**-.12**	**.25**	**-.18**	**.28**
Appleton, Hall, & Hill (2009)	201 male junior and adult athletes (*M* age =	HF-MPS	SOP	SPP	**.24**	Task orientation	**.24**	-.09	**.27**	**-.15**
	15.64, *SD* = 1.92; 88% team sports)					Ego orientation	**.32**	.10	**.30**	.02
						Satisfaction (with goal progress)	-.06	**-.20**	-.01	**-.19**
Brannan, Petrie, Greenleaf,	204 female adult athletes (*M* age = 20.16,	F-MPS	PStan	CM	**.41**	Self-esteem	.08	**-.45**	**.26**	**-.53**
Reel, & Carter (2009)	*SD* = 1.31; 72% team sports)									
Burton, Gillham, & Glenn	214 female junior athletes (*M* age = 14.60,	F-MPS	-	PC+	**-**	Task orientation	-	.00	**-**	**-**
(2013)	no *SD* reported; 100% team sports)					Ego orientation	-	**.24**	**-**	**-**
						Trait self-confidence	-	-.11	**-**	**-**
						Somatic anxiety	-	**.32**	**-**	**-**
						Worry	-	**.37**	**-**	**-**
Carter & Weissbrod (2011)	87 female university athletes (*M* age =	HF-MPS	SOP	SPP	**.66**	Enjoyment	.08	-.03	.13	-.11
	19.13, *SD* = 2.80; sports unknown)					Depressive symptoms	**.44**	**.58**	.06	**.35**
						Somatic anxiety	**-.02**	**.25**	**-.24**	**.35**
						Worry	.10	**.33**	-.15	**.35**

						Trait anxiety	.18	**.38**	-.09	**.34**
	50 male university athletes (*M* age = 19.32, *SD* = 1.87; sports unknown)	HF-MPS	SOP	SPP	**.47**	Enjoyment	**.37**	-.15	**.49**	**-.34**
						Depressive symptoms	**.37**	**.33**	.23	.16
						Somatic anxiety	.18	.19	.10	.12
						Worry	**.29**	**.40**	.11	**.29**
						Trait anxiety	.08	**.35**	-.09	**.35**
Crocker, Gaudreau, Mosewich & Kljajic (2014)	274 university athletes (46% females; *M* age = 19.88, *SD* = 1.53; 68% team sports)	S-MPS-2	PStan	CM	**.20**	Positive affect	**.42**	-.03	**.43**	-.11
						Negative affect	.00	**.30**	-.06	**.31**
Dunn, Causgrove Dunn, & Syrotuik (2002)	174 male adolescent Canadian footballers (*M* age = 18.24; *SD* = 0.66; 100% team sports)	S-MPS	PStan	CM	**.40**	Task orientation	**.20**	**-.16**	**.28**	**-.26**
						Ego orientation	**.23**	**.23**	**.15**	**.15**
Dunn, Causgrove Dunn,& McDonald (2012)	255 university athletes (44% females; *M* age = 20.9, *SD* = 2.18; 100% team sports)	HF-MPS	SOP	SPP	**.43**	Perceived athletic ability	.05	.02	.05	-.00
Elison & Partridge (2012)	285 adult athletes (46% females; *M* age = 19.8, *SD* = 1.54; 60% team sports)	PI	SE	CM	**.28**	Fear of failure	.01	**.37**	-.09	**.38**
Frost & Henderson (1991)	40 female university athletes (no *M* age or *SD* reported; 75% team sports)	FMPS	PStan	CM	-	Trait self-confidence	-.03	**-.61**	-	-
						Trait anxiety	.31	**.47**	-	-
Gaudreau & Verner-Filion (2012)	208 adult athletes (43% females; *M* age = 18.30, *SD* = 3.25; 87% team sport)	HF-MPS-Sh	SOP	SPP	**.37**	Positive affect	.10	-.04	.12	-.08
Gotwals & Dunn (2009)	251 intercollegiate athletes (46% females; *M* age = 21.26, *SD* = 2.35; 100% team sports)	S-MPS-2	PStan	CM	**.32**	Self-esteem	.04	**-.45**	**.17**	**-.49**
Gotwals, Dunn & Wayment	87 intercollegiate athletes (57% females; *M*	F-MPS	PStan	CM	**.50**	Self-esteem	.09	**-.43**	**.32**	**-.54**

(2003)	age = 19.65, *SD* = 1.62; 0% team sports)					Perceived athletic ability	.00	**-.34**	.18	**-.39**
						Satisfaction (with performance)	-.14	**-.59**	.14	**-.59**
Gucciardi, Mahoney, Jalleh,	423 junior and adult athletes (58% females;	S-MPS	PStan	CM	**.30**	External regulation	**.14**	**.28**	.06	**.25**
Donovan, & Parkes (2012)	*M* age = 25.64, *SD* = 8.57; 45% team					Intrinsic motivation	**.37**	-.05	**.43**	**-.16**
	sports)					Mastery avoidance goal	**.20**	**.41**	.07	**.36**
						Performance avoidance goal	**.15**	**.37**	.04	**.34**
						Mastery approach goal	**.35**	-.08	**.39**	**-.18**
						Performance approach goal	**.35**	**.42**	**.21**	**.31**
						Fear of failure	**.24**	**.63**	.04	**.57**
Hall, Kerr, & Matthews	119 high school runners (62% females, *M*	F-MPS	PStan	CM	**.62**	Ego orientation[av.]	**.25**	**.30**	.08	.18
(1998)	age = 14.00, *SD* = 0.99; 0% team sports)					Task orientation [av.]	**.25**	-.03	**.34**	**-.23**
						State cognitive anxiety [av.]	.15	**.29**	-.04	**.25**
						State somatic anxiety [av.]	-.12	.07	**-.21**	.18
						State self-confidence [av.]	**.33**	.11	**.33**	-.11
						Perceived athletic ability	**.33**	.12	**.32**	-.10
Hill (2009, thesis)	206 junior and adult athletes (45% females,	HF-MPS	SOP	SPP	**.27**	Task-involving coach climate	**.14**	-.10	**.17**	**-.14**
	M age = 19.41, *SD* = 2.53; 71% team					Ego-involving coach climate	**.25**	**.44**	.12	**.37**
	sports)					Self-criticism [av.]	**.26**	**.43**	.13	**.36**
Hill (2014)	291 adult athletes(34% females; *M* age =	F-MPS	PStan	CM	**.32**	Performance approach goal	**.51**	**.37**	**.38**	**.19**
	20.65, *SD* = 3.68; 78% team sports)					Performance avoidance goal	-.15	**.60**	**-.29**	**.68**
						Mastery approach goal	**.44**	-.02	**.47**	**-.15**
						Mastery avoidance goal	.15	**.58**	-.03	**.56**
						Intrinsic motivation [av.]	**.54**	.05	**.55**	-.11

						Identified regulation	.19	.00	**.20**	-.06
						Introjected regulation	**.35**	**.63**	**.12**	**.51**
						External regulation	**.49**	**.68**	**.21**	**.48**
						Amotivation	-.04	**.62**	**-.20**	**.67**
						Fear of failure	**.23**	**.75**	-.01	**.70**
						Self-criticism	**.39**	**.51**	**.21**	**.37**
						Rumination	.12	**.35**	.01	**.33**
Hill, Hall, Appleton, & Kozub (2008)	151 male junior soccer players (*M* age = 14.40, *SD* = 2.40; 100% team sports)	HF-MPS	SOP	SPP	**-.16**	Satisfaction (with goal progress)	**.33**	**-.23**	**.29**	**-.17**
Hill, Hall, & Appleton (2010)	255 male junior cricketers (*M* age = 15.51, *SD* = 1.63; 100% team sports)	HF-MPS	SOP	-	-	Fear of failure	**.18**	-	-	-
						Self-criticism	**.38**	**–**	**–**	**–**
Hill, Hall, Duda, & Appleton (2011)	68 adult athletes (29% females; *M* age = 19.75, *SD* = 1.25; 93% team sports)	HF-MPS-sh	SOP	SPP	**.33**	P: Distance/Average RPM [av.]	.10	-.01	.11	-.04
						Positive affect [av.]	.17	.01	.18	-.05
						Negative affect [av.]	.15	.18	.09	.14
						Satisfaction (with performance) [av.]	.11	.16	.06	.13
Hill, Stoeber, Brown & Appleton (2014)	231 adult rowers/36 boats (51% females; *M* age 21.70, *SD* = 3.60; 100% team sports)	HF-MPS-sh	SOP	SPP	**.38**	P: Improvement in boat position	-.05	.06	-.08	.09
Ho, Appleton, Cumming, & Duda (2015)	212 deaf junior and adult athletes (26% females; *M* age = 27.30, *SD* = 9.30; 71% team sports)	HF-MPS	SOP	SPP	**.37**	Negative affect	**.14**	.13	.10	.08

	205 junior and adult athletes (38% females; *M* age 18.80, *SD* = 3.90; 100% team sports)	HF-MPS	SOP	SPP	**.29**	Negative affect	**-.16**	**.21**	**-.23**	**.26**
Jowett, Hill, Hall, & Curran (2013)	211 junior athletes (24% females; *M* age = 15.61, *SD* = 1.73; 86% team sports)	HF-MPS-sh/ S-MPS-2	SOP/PS	SPP/CM	**.44** [av.]	Intrinsic motivation [av.]	**.26**	-.04	**.31**	**-.17**
						Identified regulation [av.]	**.34**	**.21**	**.27**	.06
						Introjected regulation [av.]	**.18**	**.31**	.05	**.25**
						External regulation [av.]	**.16**	**.43**	-.03	**.40**
						Amotivation [av.]	-.08	**.24**	**-.20**	**.31**
Kaye, Conroy, & Fifer (2008)	371 adult athletes (40% females; *M* age = 21.20, *SD* = 2.70; 42% team sports)	HF-MPS/ F-MPS	SOP/PS	SPP/CM	**.36** [av.]	Fear of failure [av.]	**.12**	**.43**	-.03	**.41**
						Negative affect [av.]	.15	**.41**	.00	**.38**
						Positive affect [av.]	**.24**	**-.13**	**.30**	**-.23**
						Mastery approach goal [av.]	**.31**	-.03	**.34**	**-.14**
						Mastery avoidance goal [av.]	.04	**.20**	-.03	**.20**
						Performance approach goal [av.]	**.33**	**.20**	**.27**	.08
						Performance avoidance goal [av.]	.07	**.25**	-.02	**.24**
Kristiansen, Abrahamsen, & Stensrud (2012)	24 junior and adult swimmers (38% females; *M* age = 18.25, *SD* = 1.60; 0% team sports)	F-MPS	PStan	CM	**.50**	Task-involving coach climate	-.01	-.04	.01	-.04
						Ego-involving coach climate	.36	**.59**	.06	**.44**
Lemyre, Hall, & Roberts (2008)	141 junior and adult athletes (43% females; *M* age = 20.10, *SD* = 4.79; 0% team sports)	F-MPS	PStan	CM	**.60**	Ego orientation	**.31**	**.33**	.13	**.17**
						Task orientation	-.15	**-.20**	-.04	-.14
						Ego-involving coach climate	**.19**	**.43**	-.08	**.39**
						Task-involving coach climate	.08	**-.24**	**.27**	**-.36**
						Satisfaction (with performance)	-.07	**-.21**	.07	**-.21**

						Perceived athletic ability	**.23**	-.05	**.33**	**-.23**
Lizmore, Dunn, & Causgrove Dunn (unpublished data)	239 university athletes (41% females; *M* age = 20.5 years, *SD* = 1.99; 100% team sports)	S-MPS-2	PS+	PC+	**.34**	Rumination	**.24**	**.58**	.04	**.51**
Machida, Ward, & Vealey (2012)	206 university athletes (67% females; *M* age = 19.62, *SD* = 1.25; 40% team sports)	S-MPS-2	PS+	PC+	**-.25**	Task orientation	**.14**	-.01	**.14**	.03
						Ego orientation	**-.21**	**.15**	**-.18**	.10
						Task-involving coach climate	-.02	-.11	-.05	-.12
						Ego-involving coach climate	.10	**.49**	**.20**	**.53**
Madigan, Stoeber, & Passfield (2016)	141 junior athletes (14% females; *M* age = 17.3, *SD* = 0.80; 81% team sports)	MIPS/S-MPS-2	PS+	PC+	.69 [av.]	Intrinsic motivation [av.]	**.33**	.05	**.41**	**-.23**
						Identified regulation [av.]	**.28**	.04	**.34**	**-.20**
						Introjected regulation [av.]	**.29**	**.37**	.04	**.22**
						External regulation [av.]	.06	**.32**	**-.21**	**.38**
						Amotivation [av.]	-.10	.07	**-.20**	**.19**
Mallinson, Hill, Hall, & Gotwals (2014)	241 junior athletes (59% females; *M* age = 15.11, *SD* = 2.03; 77% team sports)	S-MPS-2	PStan	PC+	**.58**	Enjoyment	**.20**	-.10	**.32**	**-.26**
Mallinson-Howard, Hill, & Hall (2015, thesis)	222 adolescents (71% females; *M* age = 13.51, *SD* = 1.53; 81% team sports)	S-MPS-2	PStan	PC+	**.65**	Positive affect	.09	**-.28**	**.34**	**-.44**
						Negative affect	**.35**	**.48**	.04	**.31**
						Worry	**.18**	**.33**	-.04	**.28**
						Somatic anxiety	**.21**	**.34**	-.01	**.26**
Mallinson-Howard, Hill, & Hall (2015, thesis)	252 adolescents (92% females; *M* age = 13.65, *SD* = 1.14; 95% team sports)	SMPS-2	PStan	PC+	**.64**	Task-involving coach climate	**.13**	-.06	**.22**	**-.18**
						Ego-involving coach climate	.04	**.20**	-.11	**.23**
						Enjoyment	**.30**	-.05	**.43**	**-.30**
Martinent, Ferrand, Guillet,	166 adult athletes (47% females; *M* age =	S-MPS	PStan	CM	-	State somatic anxiety [av. ‡]	**.18**	**.19**	-	-

& Gautheur (2010)	21.29, *SD* = 2.58; 64% team sports)					State cognitive anxiety [av. ‡]	**.24**	**.37**	-	-
						State Self-confidence [av. ‡]	.14	-.05	-	-
McArdle & Duda (2004)	196 junior athletes (61% females; *M age* =	F-MPS	PStan	CM	**.38**	Task orientation	**.22**	-.07	**.27**	**-.16**
	14.00, *SD* = 1.42; 0% team sports)					Ego orientation	**.32**	**.23**	**.25**	.11
						Intrinsic motivation	**.35**	.06	**.35**	-.07
						Identified regulation	**.18**	.08	**.16**	.01
						Introjected regulation	**.23**	**.34**	.10	**.27**
						External regulation	**.30**	**.36**	**.17**	**.25**
						Amotivation	-.02	**.23**	-.11	**.26**
McArdle & Duda (2008)	196 junior athletes (61% females; *M* age	F-MPS	PStan	CM	**.39**	Self-esteem	**.31**	-.14	**.39**	**-.27**
	14.00, *SD* = 1.42; 0% team sports)									
Mosewich, Crocker,	52 female university athletes (29 athletes *M*	S-MPS-2	-	CM	**-**	Rumination	**-**	**.57**	-	-
Kowalski, & DeLongis	age = 20.28, *SD* = 2.25; 22 athletes *M* age =					Self-criticism	**-**	**.51**	**–**	**–**
(2013) †	20.27, *SD* = 1.08; 67% team sports)									
Mouratidis & Michou (2011)	333 junior athletes (32% females; *M* age =	F-MPS	PStan	CM	**.10**	Self-confidence	**.43**	**-.27**	**.44**	**-.28**
	15.59, *SD* = 2.37; 74% team sports)					Perceived athletic ability	**.48**	**-.13**	**.49**	**-.16**
	63 junior basketballers (12% females; *M*	F-MPS	PStan	CM	**.45**	Perceived athletic ability	**.40**	-.04	**.47**	**-.22**
	age = 14.40 years, *SD* = 1.58; 100% team									
	sport)									
Ommundsen, Roberts,	1719 junior soccer players (28% females;	F-MPS	PStan	PC+	**.53**	Task orientation	**.14**	**-.06**	**.20**	**-.16**
Lemyre, & Miller (2005)	male *M* age = 14.30, *SD* = 2.30; female *M*					Ego orientation	**.30**	**.22**	**.21**	**.07**
	age = 13.90, *SD* = 1.80; 100% team sport)					Task-involving coach climate	**.05**	**-.09**	**.11**	**-.14**
						Ego-involving coach climate	**.31**	**.45**	.08	**.32**

Puente-Díaz (2013)	204 junior tennis players (34% females; *M* age = 14.13, *SD* = 2.45; 0% team sport)	F-MPS	PStan	CM	**.32**	Enjoyment	.10	-.01	.11	-.04
						Performance avoidance goal	.06	**.20**	-.00	**.19**
						Performance approach goal	**.29**	.12	**.26**	.03
						Mastery avoidance goal	-.02	-.04	-.01	-.04
						Mastery approach goal	**.26**	-.03	**.28**	-.12
						Fear of failure	**.16**	**.28**	.07	**.24**
Sagar & Stoeber (2009)	388 university athletes (46% females; *M* age = 20.07, *SD* = 1.80; 46% team sports)	S-MPS	PStan	CM	**.56**	Positive affect (after success)	**.11**	.02	**.12**	-.05
						Negative affect (after failure)	**.11**	**.30**	-.07	**.29**
						Fear of failure [av.]	**.25**	**.47**	-.01	**.39**
Sankaran (2012, thesis)	67 track and field athletes and 31 non-athletes (57% females; *M* age = 21.44, *SD* = 2.86; 0% team sports)	MIPS	-	NRI	**-**	Trait anxiety	-	**.58**	**-**	**-**
						Rumination	-	**.62**	**-**	**-**
Shanmugam, Jowett, & Meyer (2011)	588 adult athletes (59% females; *M* age = 20.75, *SD* = 3.44; 47% team sports)	F-MPS/DAS	PStan	SCP	**.29**	Self-esteem	.04	**-.42**	**.15**	**-.45**
						Depressive symptoms	**.08**	**.42**	-.04	**.41**
Shanmugam, Jowett, & Meyer (2014)	152 university athletes (62% females; *M* age = 20.08, *SD* = 2.27; 60% team sports)	DAS	-	SCP	-	Self-esteem	**-**	**-.49**	-	**-**
						Depressive symptoms	**-**	**.41**	-	**-**
Smith, Hill, & Hall (unpublished data)	162 male junior soccer players (*M* age = 16.15, *SD* = 1.84; 100% team sports)	HF-MPS-sh	SOP	SPP	-.01[av.]	Depressive symptoms [av.]	-.18	**.34**	-.16	**.33**
Stoeber & Becker (2008)	74 female soccer players (*M* age = 24.10, *SD* = 6.30; 100% team sport)	MIPS-C	SP	NRI	**.58**	Fear of failure	-.07	.16	-.20	**.25**
Stoeber, Otto, Pescheck, Becker, & Stoll (2007)	115 university athletes (54% females; *M* age = 21.00, *SD* = 2.10; 54% team sports)	MIPS-C	SP	NRI	**.63**	State cognitive anxiety	**.20**	**.54**	-.15	**.52**
						State somatic anxiety	.11	**.42**	-.18	**.45**

						State self-confidence	.15	**-.26**	**.39**	**-.45**
	74 female soccer players (*M* age = 24.10,	MIPS-C	SP	NRI	**.58**	State cognitive anxiety	.20	**.67**	-.17	**.67**
	SD = 6.30; 100% team sports)					State somatic anxiety	.17	**.43**	-.09	**.40**
						State self-confidence	-.03	**-.28**	.16	**-.32**
	204 high school athletes (36% females; *M*	MIPS-C	SP	NRI	**.35**	State cognitive anxiety	.03	**.57**	**-.15**	**.60**
	age = 15.80, *SD* = 0.90; 65% team sports)					State somatic anxiety	.04	**.54**	-.13	**.56**
						Sate self-confidence	**.18**	**-.39**	**.31**	**-.48**
	142 university athletes (39% females; *M*	MIPS-C	SP	NRI	**.56**	Trait cognitive anxiety	.10	**.46**	**-.17**	**.49**
	age = 22.80, *SD* = 3.00; 52% team sports)					Trait somatic anxiety	.07	**.31**	-.12	**.33**
						Trait self-confidence	.02	**-.34**	**.24**	**-.42**
Stoeber, Stoll, Pescheck, &	204 high school athletes (36% females *M*	MIPS-T /	SP	NRI	**.38**[av.]	Mastery goal [av.]	**.24**	-.07	**.29**	**-.17**
Otto (2008)	*age* = 15.80, *SD* = 0.90; 65% team sports)	MIPS-C				Performance approach goal [av.]	**.24**	**.26**	**.15**	**.18**
						Performance avoidance goal [av.]	.08	**.38**	-.06	**.38**
	147 sport science undergraduates (39%	MIPS-T /	SP	NRI	**.55**[av.]	Mastery approach goal [av.]	**.50**	**.26**	**.41**	-.02
	females; *M* age = 22.80, *SD* = 3.00; 52%	MIPS-C				Mastery avoidance goal [av.]	**.27**	**.35**	.09	**.23**
	team sports)					Performance approach goal [av.]	**.35**	**.36**	**.17**	**.19**
						Performance avoidance goal [av.]	.11	**.19**	.01	.15
Stoeber, Stoll, Salmi, &	138 male junior ice hockey players (age	MIPS/	SP/PStan	NRI/CM	**.45**[av.]	Mastery approach goal [av.]	**.45**	**.24**	**.37**	.04
Tiikkaja (2009)	reported as 14 or 15 yrs old; 100% team	S-MPS				Performance approach goal [av.]	**.50**	**.46**	**.23**	**.29**
	sport)					Mastery avoidance goal [av.]	**.31**	**.50**	.08	**.38**
						Performance avoidance goal [av.]	**.25**	**.34**	.10	**.25**
Stoeber, Uphill, & Hotham	112 adult triathletes (22% females; *M* age =	S-MPS	PStan	CM	**.59**	P: Race time	**.43**	.18	**.39**	-.08
(2009)	36.50, *SD* = 7.60; 0% team sport)					Performance approach goal	**.53**	**.49**	**.26**	**.19**

						Performance avoidance goal	.12	**.47**	-.17	**.49**
						Mastery approach goal	**.38**	.13	**.37**	-.11
						Mastery avoidance goal	**.24**	**.46**	-.03	**.38**
	321 adult triathletes (17% females; *M* age = 37.20, *SD* = 7.90; 0% team sport)	S-MPS	PStan	CM	**.64**	P: Race time	**.28**	.05	**.32**	**-.16**
						Performance approach goal	**.61**	**.52**	**.31**	**.13**
						Performance avoidance goal	**.17**	**.30**	-.03	**.25**
						Mastery approach goal	**.47**	**.30**	**.35**	.00
						Mastery avoidance goal	**.35**	**.51**	.03	**.35**
Stoll, Lau, & Stoeber (2008)	122 sport science undergraduates (53% females; *M* age = 24.40, *SD* = 2.40; sports unknown)	MIPS-T	SP	NRI	**.30**	P: Points scored/increment points per series [av.]	.17	-.01	**.18**	-.06
Thienot, Jackson, Dimmock, Grove, Bernier, & Fournier (2014)	343 junior and adult athletes (48% females; *M* age = 23.14, *SD* = 5.87; 59% team sports)	HF-MPS-sh/ F-MPS-sh	PS+	PC+	**.33**	Worry	**.12**	**.46**	-.03	**.44**
						Rumination	-.01	.07	-.03	.08
Thompson, Kaufman, De Petrillo, Glass, & Arnkoff (2011)	25 adult athletes (44% females; *M* age = 48.28; 0% team sports)	F-MPS	PStan	CM	-	P: Improvement in best mile time	.30	**.69**	-	-

Note. Intru. = Instrument, CAPS = Child and Adolescent Perfectionism Scale (Flett, Hewitt, Boucher, Davidson, & Munro, 2000), HF-MPS = Multidimensional Perfectionism Scale (Hewitt & Flett, 1991), HF-MPS-Sh = Short version of Multidimensional Perfectionism Scale (Cox, Enns, & Clara, 2002), F-MPS = Multidimensional Perfectionism Scale (Frost et al., 1990); F-MPS-sh = Short version of Multidimensional Perfectionism Scale (Cox et al., 2002); S-MPS = Sport Multidimensional Perfectionism Scale (Dunn et al., 2002), S-MPS-2 = Sport Multidimensional Perfectionism Scale 2 (Gotwals & Dunn, 2009), PI = Perfectionism Inventory (R. W. Hill, Huelsman, Furr, Kibler, Vicente, & Kennedy, 2004), MIPS /-T /-C = Multidimensional Inventory of Perfectionism in Sport / training / competition (Stoeber, Otto, & Stoll, 2006), DAS = Dysfunctional Attitude Scale (Weissman & Beck, 1978); SOP = self-oriented perfectionism, SP = Striving for perfection, PStan = Personal standards, SE = Striving for excellence; PS+ = A composite of multiple subscales indicative of

perfectionistic strivings; SPP = Socially prescribed perfectionism, CM = Concern over mistakes, NRI = Negative reactions to imperfection, SCP = Self-critical perfectionism; PC+ = A composite of multiple subscales indicative of perfectionistic concerns; P = Performance; *r* = bivariate correlation coefficient; *pr* = partial correlation coefficient. † = correlations are for relationships at time one of experimental study (before intervention). av. = effect sizes are an average of multiple effect sizes. ‡ in calculating scores of anxiety, an average of frequency, intensity, and direction of anxiety was used (direction was reversed).

Table 2 *Meta-analytical relationships between perfectionism and criterion variables*

										Trim and Fill estimates			Corrected mean effect size estimates		
Criterion variables	*k*	*N*	r^+	95% CI	Q^T	I^2	Fail-safe N	Egger's intercept	95% CI	k^{TF}	r^+	95% CI	ρ	*SD*	80% CV
Motivation															
Task orientation															
PS	7	2756	.15	.07, .23	17.25**	65.23	78	0.19	-3.36, 3.74	2	.12	.04, .19	.19	.08	.09, .28
PC	8	2997	-.07	-.10, -.03	6.02	0	17†	-0.42	-2.14, 1.29	0	-	-	-.08	.00	-.08, -.08
Residual PS	7	2756	.21	.14, .28	14.87**	59.64	160	0.24	-3.05, 3.83	2	.18	.11, .25	.26	.07	.17, .34
Residual PC	7	2756	-.11	-.23, .01	39.12**	84.66	13†	-4.18	-6.55, -1.80	1	-.09	-.19, .02	-.18	.09	-.30, -.05
Ego orientation															
PS	7	2756	.22	.09, .35	52.14**	88.49	207	-1.80	-7.63, 4.02	2	.18	.06, .30	.31	.15	.12, .50
PC	8	2997	.22	.18, .25	7.02	0.31	228	0.18	-1.71, 2.07	2	.20	.16, .25	.26	.01	.25, .27
Residual PS	7	2756	.16	.04, .27	36.18**	83.41	101	-1.22	-6.17, 3.74	1	.13	.02, .24	.22	.12	.07, .37
Residual PC	7	2756	.09	.05, .12	4.26	0	32†	0.99	-0.36, 2.34	3	.07	.04, .11	.10	.00	.10, .10
Task-involving coach climate															
PS	6	2548	.06	.02, .10	4.20	0	6†	0.29	-1.74, 2.32	0	-	-	.08	.00	.08, .08
PC	6	2548	-.10	-.14, -.06	3.54	0	25†	-0.41	-2.23, 1.40	0	-	-	-.10	.00	-.10, -.10

Residual PS	6	2548	.13	.05, .21	12.88*	61.19	39†	0.37	-3.22, 3.96	0	-	-	.15	.07	.07, .24
Residual PC	6	2548	-.14	-.18, -.10	0.71	0	48	0.14	-0.68, 0.97	2	-.14	-.18, -.11	-.19	.03	-.23, -.16
Ego-involving coach climate															
PS	6	2548	.20	.08, .31	24.41**	79.51	125	-1.44	-5.13, 2.25	1	.19	.07, .29	.31	.10	.18, .44
PC	6	2548	.42	.33, .50	19.73**	74.65	549	-0.43	-4.88, 4.02	2	.39	.30, .47	.43	.04	.42, .63
Residual PS	6	2548	.01	-.08, .09	13.30*	62.41	0†	-1.43	-4.54, 1.67	0	-	-	.08	.07	-.01, .18
Residual PC	6	2548	.37	.28, .45	16.74**	70.14	378	1.26	-2.49, 5.01	2	.32	.22, .42	.43	.07	.34, .51
Mastery approach goal															
PS	8	2007	.39	.33, .45	15.78*	55.69	667	1.76	-4.22, 7.74	0	-	-	.51	.07	.42, .60
PC	8	2007	.09	-.02, .21	45.74**	84.70	18†	5.04	-4.29, 14.38	1	.06	-.06, .18	.08	.18	-.15, .31
Residual PS	8	2007	.38	.34, .41	7.39	5.24	599	-0.24	-4.49, 4.02	0	-	-	.46	.15	.28, .65
Residual PC	8	2007	-.10	-.15, -.04	11.01	36.43	28†	2.68	-1.79, 7.14	1	-.11	-.17, -.05	-.14	.04	-.20, -.08
Performance approach goal															
PS	9	2211	.42	.33, .50	49.68**	83.90	957	0.59	-9.12, 10.31	0	-	-	.50	.13	.33, .67
PC	9	2211	.36	.27, .45	46.32**	82.73	677	0.49	-8.89, 9.88	2	.32	.22, .41	.43	.14	.26, .61
Residual PS	9	2211	.26	.21, .30	11.40	29.84	323	-1.32	-5.83, 3.18	0	-	-	.32	.05	.26, .38
Residual PC	9	2211	.18	.11, .24	19.24*	57.42	148	-0.29	-6.33, 5.76	3	.13	.06, .21	.22	.09	.11, .33
Mastery avoidance goal															
PS	8	2007	.19	.09, .29	34.53**	79.73	130	2.54	-6.32, 11.40	1	.16	.06, .26	.22	.12	.06, .37
PC	8	2007	.38	.24, .51	86.22**	91.88	630	-0.09	-14.65, 14.47	2	.32	.17, .45	.45	.20	.19, .71
Residual PS	8	2007	.02	-.03, .06	4.39	0	0†	0.26	-3.01, 3.52	1	.01	-.03, .06	.02	.00	.02, .02
Residual PC	8	2007	.31	.18, .43	63.74**	89.02	408	-1.42	-13.86, 11.02	0	-	-	.31	.18	.15, .62
Performance avoidance goal															
PS	9	2211	.09	.02, .17	24.63**	67.52	32†	1.05	-5.73, 7.84	3	.04	-.03, .12	.10	.11	-.03, .24
PC	9	2211	.35	.26, .44	48.74**	83.59	654	-0.42	-10.04, 9.21	1	.37	.28, .45	.43	.13	.26, .59

Residual PS	9	2211	-.05	-.13, .03	27.34**	70.74	3†	-0.33	-7.54, 6.88	2	-.08	-.16, -.00	-.06	.11	-.20, .07
Residual PC	9	2211	.34	.21, .46	88.85**	91.00	626	-0.77	-13.76, 12.21	2	.39	.27, .50	.42	.18	.18, .65
Intrinsic motivation															
PS	6	1493	.37	.29, .45	16.73*	70.12	345	-3.31	-15.75, 9.14	2	.41	.33, .48	.39	.01	.38, .41
PC	6	1493	.01	-.04, .06	3.57	0	0†	2.64	-2.27, 7.55	0	-	-	.01	.00	.01, .01
Residual PS	6	1493	.41	.33, .48	14.64*	65.84	416	-3.72	-15.00, 7.55	1	.42	.35, .49	.52	.09	.41, .63
Residual PC	6	1493	-.13	-.18, -.07	5.35	6.46	31†	-0.17	-7.66, 7.33	0	-	-	-.15	.00	-.15, -.15
Identified regulation															
PS	5	1070	.21	.12, .30	9.85*	59.40	57	4.48	-16.01, 24.97	0	-	-	.27	.08	.16, .37
PC	5	1070	.09	.02, .17	6.44	37.86	7†	1.79	-.15.75, 19.34	0	-	-	.12	.05	.05, .18
Residual PS	5	1070	.20	.10, .29	10.60*	62.26	50	6.09	-13.89, 26.08	0	-	-	.25	.09	.14, .37
Residual PC	5	1070	-.01	-.11, .10	11.37*	64.84	0†	-5.14	-26.91, 16.54	0	-	-	-.00	.10	-.13, .13
Introjected regulation															
PS	5	1070	.25	.19, .32	5.07	21.05	89	-3.13	-17.89, 11.62	0	-	-	.33	.01	.31, .35
PC	5	1070	.40	.24, .54	34.74**	88.49	252	-14.07	-46.50, 18.36	1	.43	.29, .54	.52	.16	.20, .83
Residual PS	5	1070	.10	.04, .16	1.73	0	8†	-3.37	-10.26, 3.53	0	-	-	.13	.00	.13,.13
Residual PC	5	1070	.31	.18, .42	20.04**	80.04	140	-13.12	-33.40, 7.16	1	.33	.22, .43	.41	.15	.22, .60
External regulation															
PS	6	1493	.24	.11, .36	35.86**	85.06	132	-1.54	-20.84, 17.76	1	.27	.14, .39	.31	.17	.10, .52
PC	6	1493	.40	.23, .54	64.26**	92.22	399	-0.60	-26.57, 25.38	1	.43	.28, .56	.50	.18	.27, .73
Residual PS	6	1493	.04	-.08, .16	17.74**	77.45	0†	-3.74	-20.75, 13.28	0	-	-	.10	.15	-.08, .29
Residual PC	6	1493	.29	.21, .37	8.77	54.41	125	3.27	-8.15, 14.69	0	-	-	.42	.12	.26, .59
Amotivation															
PS	5	1070	-.07	-.13, -.01	1.47	0	2†	-1.38	-9.53, 6.77	2	-.05	-.10, .01	-.09	.00	-.09, -.09

PC	5	1070	.30	.08, .49	58.23**	93.13	143	-25.26	-52.24, 1.71	1	.35	.15, .52	.39	.22	.11, .67
Residual PS	5	1070	-.18	-.24, -.12	1.26	0	40	0.79	-6.97, 8.56	1	-.17	-.23, -.12	-.22	.00	-.22, -.22
Residual PC	5	1070	.36	.14, .55	61.74**	93.52	210	-24.22	-57.02, 8.58	1	.40	.21, .56	.46	.23	.17, .76
Fear of failure															
PS	8	2293	.16	.09, .23	18.65**	62.47	108	-4.08	-9.92, 1.76	0	-	-	.21	.09	.09, .33
PC	7	2038	.47	.32, .60	102.11**	94.12	1011	-7.50	-24.83, 9.82	1	.51	.37, .63	.61	.19	.37, .85
Residual PS	7	2038	-.01	-.06, .03	6.93	13.44	0†	-2.26	-6.58, 2.07	0	-	-	-.02	.00	-.02, -.02
Residual PC	7	2038	.44	.31, .56	72.61**	91.74	833	-5.05	-20.30, 10.20	1	.47	.35, .59	.59	.20	.34, .84
Perceived athletic ability															
PS	6	1185	.26	.09, .41	41.85**	88.05	123	-3.01	-15.98, 9.95	0	-	-	.33	.22	.04, .61
PC	6	1185	-.06	-.17, .06	18.32**	72.70	0†	-2.20	-10.68, 6.28	1	-.10	-.23, .03	-.08	.11	-.22, .07
Residual PS	6	1185	.31	.16, .45	37.58**	86.70	172	-0.85	-13.71, 12.01	1	.27	.10, .42	.36	.25	.04, .68
Residual PC	6	1185	-.17	-.26, -.07	13.76*	63.67	40†	-3.31	-3.31, 2.78	0	-	-	-.17	.11	-.31, -.03
Emotion/wellbeing															
Self-esteem															
PS	5	1326	.11	.01, .21	12.36*	67.63	12†	2.22	-6.41, 10.85	1	.13	.04,.22	.11	.09	-.01, .22
PC	6	1478	-.40	-.49, -.31	19.36**	74.23	371	0.43	-7.96, 8.82	2	-.37	-.45,-.28	-.47	.09	-.58, -.36
Residual PS	5	1326	.25	.15, .34	11.92*	66.44	88	3.75	-2.62, 10.11	0	-	-	.26	.09	.15, .37
Residual PC	5	1326	-.46	-.53, -.37	12.41**	67.78	370	-0.62	-10.12, 8.88	1	-.44	-.52, -.36	-.53	.07	-.62, -.44
Self-confidence															
PS	8	1193	.16	.03, .29	36.83**	80.99	70	-5.77	-10.70, -0.85	2	.22	.09, .34	.25[a]	.20	.00, .51
PC	9	1407	-.24	-.36, -.14	29.42**	76.21	144	-1.76	-8.36, 4.83	1	-.23	-.34, -.12	-.25[a]	.16	-.46, -.05
Residual PS	6	987	.33	.25, .41	9.44	47.05	163	-3.87	-8.49, 0.75	2	.38	.29, .46	.40	.13	.24, .57
Residual PC	6	987	-.35	-.45, -.24	17.14**	70.83	185	-0.31	-9.85, 9.23	1	-.32	-.42, -.21	-.43	.12	-.58, -.28

Trait anxiety															
PS	3	177	.18	.03, .32	1.20	0	2†	1.09	-42.65, 44.82	0	-	-	-	-	-
PC	4	244	.45	.33,.55	3.32	9.52	52	0.37	-17.68, 18.42	0	-	-	-	-	-
Residual PS	-	-	-	-	-	-	-	-	-	-		-	-	-	-
Residual PC	-	-	-	-	-	-	-	-	-	-		-	-	-	-
Cognitive anxiety															
PS	6	820	.14	.07, .21	5.17	3.25	22†	2.94	-4.20, 10.09	2	.11	.03, .18	.16	.00	.16, .16
PC	6	820	.49	.38, .59	18.61**	73.13	340	2.41	-12.85, 17.67	0	-	-	.55	.11	.41, .70
Residual PS	5	654	-.14	-.21, -.06	1.41	0	11†	0.24	-5.63, 6.12	1	-.13	-.20, -.06	-.15	.00	-.15, -.15
Residual PC	5	654	.52	.38, .63	18.81**	72.73	259	-0.47	-22.01, 21.07	0	-	-	.60	.16	.40, .81
Somatic anxiety															
PS	9	1179	.09	.02, .17	12.28	34.87	14†	-0.85	-5.54, 3.84	0	-	-	.11	.07	.02, .19
PC	1	1393	.32	.23, .41	30.08**	70.08	364	-2.18	-8.33, 3.96	2	.35	.26, .44	.37	.13	.21, .54
	0														
Residual PS	8	1013	-.12	-.18, -.05	7.73	9.39	18†	-0.25	-4.51, 4.01	0	-	-	-.13	.00	-.13, -.13
Residual PC	8	1013	.35	.24, .45	24.97**	71.97	256	-2.44	-9.72, 4.83	0	-	-	.41	.14	.22, .59
Positive affect															
PS	6	1531	.20	.08, .31	25.97**	80.75	86	-0.98	-.12.83, 10.88	1	.22	.11, .32	.25	.12	.09, .40
PC	6	1531	-.08	-.17, .01	15.78**	68.30	9†	-0.23	-9.52, 9.06	1	-.11	-.19, -.01	-.10	.09	-.22, .02
Residual PS	6	1531	.26	.14, .36	25.51**	80.40	148	-0.21	-12.03, 11.61	0	-	-	.32	.13	.15, .49
Residual PC	6	1531	-.14	-.22, -.06	12.63	60.40	39†	0.63	-7.64, 8.91	1	-.15	-.23, -.07	-.21	.14	-.39, -.02
Negative affect															
PS	7	1740	.10	-.02, .21	32.49*	81.53	22†	-0.38	-10.46, 11.21	2	.04	-.08, .16	.13	.15	-.16, .42
PC	7	1740	.27	.15, .38	39.33**	84.74	224	-0.79	-12.69, 11.10	0	-	-	.39	.09	.27, .51
Residual PS	7	1740	-.04	-.11, .04	13.88*	56.76	0†	1.09	-5.89, 8.07	0	-	-	-.04	.08	-.15, .07
Residual PC	7	1740	.26	.19, .34	15.71**	61.80	222	-3.74	-9.94, 2.45	0	-	-	.36	.07	.27, .45

Self-criticism															
PS	3	752	.35	.27, .42	2.92	31.48	74	- 13.20	-67.57, 41.17	0	-	-	.44	.00	.44, .44
PC	3	549	.48	.41, .54	1.34	0	102	0.04	-27.03, 27.11	0	-	-	.59	.00	.59, .59
Residual PS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Residual PC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Worry															
PS	4	702	.15	.08, .22	1.76	0.00	13†	1.04	-3.80, 5.90	1	.14	..07, .21	.19[a]	.00	.19, .19
PC	5	916	.39	.34, .45	4.03	0.83	171	-1.24	-6.03, 3.54	2	.42	.36, .48	.40[a]	.00	.40, .40
Residual PS	4	702	-.03	-.11, .04	2.13	0.00	0†	0.24	-6.11, 6.59	1	-.05	-.12, .02	-.06[a]	00	-.06, -.06
Residual PC	4	702	.36	.26, .45	5.03	40.41	84	-1.64	-10.10, 6.82	2	.42	..31, .51	.34[a]	00	.34, .34
Rumination															
PS	3	873	.12	-.03, .25	9.17*	78.20	6†	23.61	-4.63, 51.65	2	-.01	-.18, .16	-	-	-
PC	5	992	.45	.21, .63	62.60**	93.61	200	6.17	-9.35, 21.69	1	.40	.19, .58	.56[c]	.08	.46, .67
Residual PS	3	873	.00	-.06, .07	0.71	0	0†	6.48	-6.91, 19.86	2	-.03	-.08,.02	-	-	-
Residual PC	3	873	.32	.05, .54	33.25**	93.99	64	44.58	-29.75, 118.91	0	-	n/a	-	-	-
Depressive symptoms															
PS	4	887	.17	-.08, .40	28.27**	89.39	8†	2.53	-13.69, 18.75	0	-	n/a	.11	.18	-.13, .34
PC	5	1039	.42	.35, .49	5.79	30.96	215	0.17	-4.56, 4.90	1	.42	.36, .49	.47	.00	.47, .47
Residual PS	4	887	-.02	-.14, .11	6.71	55.31	0†	1.41	-6.21, 9.03	2	-.09	-.21, .04	-.04	.07	-.13, .05
Residual PC	4	887	.33	.23, .43	5.54	45.84	84	-2.61	-2.89, -2.33	2	.38	.28, .48	.44	.00	.44, .44
Enjoyment															
PS	5	834	.20	.11, .30	7.81	48.75	38	0.12	-8.03, 8.28	0	-	n/a	.26[b]	.06	.19, .34
PC	5	834	-.06	-.13, .01	1.38	0.00	0†	-0.48	-3.80, 2.82	0	-	n/a	-.07[b]	00	-.07, -.07
Residual PS	5	834	.29	.15, .43	18.81**	78.73	88	-0.17	-12.83, 12.48	0	-	n/a	.38[b]	.14	.20,.56
Residual PC	5	834	-.21	-.32, -.09	10.82*	63.05	39	-0.19	-9.40, 9.79	0	-	n/a	-.26[b]	.10	-.38, -.14

Satisfaction (goal progress/ performance)															
PS	5	648	.04	-.14, .21	20.30**	80.30	0†	-0.20	-19.48, 19.08	1	.09	-.14, .24	-	-	-
PC	5	648	-.23	-.42, -.03	26.94**	85.15	40	0.13	-22.08, 22.34	2	-.35	-.52, -.15	-	-	-
Residual PS	5	648	.11	-.01, .23	8.57	53.32	5†	1.04	-11.33, 13.42	2	.17	.05, .29	-	-	-
Residual PC	5	648	-.22	-.41, -.02	26.09**	84.67	36	-0.70	-22.52, 21.12	2	-.34	-.51, -.14	-	-	-
Performance															
Athletic performance															
PS	6	684	.23	.11, .35	10.41*	51.97	44†	-1.26	-5.37, 2.85	1	.26	.13, .38	-	-	-
PC	6	684	.06	-.01, .14	3.91	0	0†	0.70	-1.86, 3.26	1	.06	-.01, .14	-	-	-
Residual PS	5	659	.23	.10, .35	10.01*	60.05	37	-2.96	-7.78, 1.85	2	.30	.17, .42	-	-	-
Residual PC	5	659	-.10	-.18, -.03	2.85	0	0†	2.07	1.31, 2.83	3	-.14	-.20, -.07	-	-	-

Note. *k* = number of studies. PS = Perfectionistic strivings; PC = Perfectionistic concerns; ** $p < .01$, * $p < .05$; † does not exceed recommended cut-off. [a] = Estimates are based on *k* minus 1 due to missing internal reliability coefficients. [b] = Estimates are based on *k* minus 2 due to missing internal reliability coefficients. When values for ρ are not reported this is because *k* is less than 3 due to missing internal reliability coefficients or due to the type of criterion variable (e.g., actual performance or single item).

Table 3 *Subgroup analysis of relationships between perfectionism and criterion variables*

Moderator, perfectionism, and criterion variable	*k*	*N*	r^+	95% CI	Q_B	I^2
Gender						
PS and ego-involving coach climate					21.23**	
Males	4	2090	.30	.26, .34		0
Females	2	458	.07	-.03, .16		0
PS and negative affect					6.78**	
Males	6	1518	.05	-.04, .14		65.15
Females	1	222	.35	.15, .53		0
Residual PS and ego-involving climate					8.05**	
Males	4	2090	-.08	-.18, .01		20.82
Females	2	458	.07	.02,.12		0
PC and positive affect					9.85**	
Males	5	1309	-.04	-.10, .02		12.88
Females	1	222	-.28	-.40, -.15		0
PC and satisfaction					9.29**	
Males	4	561	-.15	-.28, -.00		63.49
Females	1	87	-.59	-.76, -.35		-
Age						
PS and perceived athletic ability					11.52**	
Adults	3	538	.10	-.03, .24		59.17
Adolescents	3	647	.41	.29, .51		56.73
PS and negative affect					6.78**	
Adults	6	1518	.05	-.04, .14		65.16
Adolescents	1	222	.35	.15, .53		0
PC and introjected regulation					34.09**	
Adults	1	291	.63	.56, .70		0
Adolescents	4	779	.33	.26, .39		0
PC and amotivation					44.32**	
Adults	1	291	.62	.53, .69		0
Adolescents	4	779	.21	.14, .28		14.86
PC and positive affect					9.85**	

Adults	5	1309	-.04	-.10, .02		12.88
Adolescents	1	222	-.28	-.40, -.15		0
Residual PC and ego-involving climate					5.32*	
Adults	4	577	.44	.35, .52		36.83
Adolescents	2	1971	.29	.20, .38		51.58
Residual PC and introjected regulation					19.82**	
Adults	1	291	.51	.42, .59		0
Adolescents	4	779	.25	.18, .32		0
Residual PC and amotivation					60.32**	
Adults	1	291	.67	.60, .73		0
Adolescents	4	779	.27	.20, .33		0
Sport type						
PS and somatic anxiety					6.81*	
Team sports	6	923	.13	.07, .19		0
Individual sports	1	119	-.12	-.29, .06		0
PC and self-confidence					3.98**	
Team sports	8	1288	-.25	-.35, -.14		83.35
Individual sports	1	119	.11	-.22, .42		0
Residual PC and ego-involving climate					7.55**	
Team sports	3	2177	.31	.25, .37		32.08
Individual sports	3	371	.47	.38, .56		24.65
Residual PC and cognitive anxiety					9.45**	
Team sports	4	535	.57	.49, .64		34.65
Individual sports	1	119	.25	.03, .44		0
Residual PC and enjoyment					8.69**	
Team sports	2	456	-.28	-.36, -.20		0
Individual sports	1	204	-.04	-.18, .10		0
Instrument/subscale						
PS and ego orientation					50.79**	
Personal standards	5	2349	.30	.26, .33		0
Self-oriented perfectionism	1	201	.32	.19, .44		0
Composite/multiple	1	206	-.21	-.34, -.08		0

PS and identified regulation					9.47**	
Personal standards	2	487	.19	.10, .27		0
Self-oriented perfectionism	1	231	.07	-.06, .20		0
Composite/multiple	2	352	.32	.22, .41		0
PS and fear of failure					17.37**	
Personal standards	4	1306	.23	.18, .28		0
Striving for excellence	1	287	.01	-.11, .13		0
Self-oriented perfectionism	1	255	.18	.06, .30		0
Striving for perfection	1	74	-.07	-18, .16		0
Composite/multiple	1	371	.12	.02, .22		0
Residual PS and ego orientation					29.98*	
Personal standards	5	2349	.21	.16, .25		6.29
Self-oriented perfectionism	1	201	.30	.17, .42		0
Composite/multiple	1	206	-.18	-.31, -.04		0
Residual PS and ego-involving climate					6.32*	
Personal standards	3	417	-.09	-.19, .02		0
Self-oriented perfectionism	1	206	.12	-.03, .27		0
Composite/multiple	2	1925	.05	-.02, .12		67.51
Residual PS and identified regulation					9.91**	
Personal standards	2	619	.18	.10, .27		0
Self-oriented perfectionism	1	231	.04	-.09, .17		0
Composite/multiple	2	352	.30	.20, .39		0
Residual PS and external regulation					6.99*	
Personal standards	2	619	.11	-.03, .24		39.28
Self-oriented perfectionism	1	231	.18	-.01, .36		0
Composite/multiple	2	352	-.11	-.26, .04		64.07
Residual PS and perceived athletic ability					5.45*	
Personal standards	5	930	.37	.26, .47		68.23
Self-oriented perfectionism	1	255	.01	-.20, .29		0
Residual PS and performance					8.70*	
Personal Standards	2	433	.34	.25, .42		0
Self-oriented perfectionism	2	104	.05	-.15, .24		0
Striving for perfection	1	122	.18	.00, .35		0

PC and mastery avoidance					9.13*	
Concern over mistakes	4	1351	.49	.41, .57		67.49
Negative reactions to imperfection	1	147	.35	.03, .54		0
Composite/multiple	1	509	.20	. 00, .38		0
PC and perceived athletic ability					3.94*	
Concern over mistakes	5	930	-.20	-.28, -.11		41.47
Socially prescribed perfectionism	1	255	.00	-.18, .18		0
PC and positive affect					8.91*	
Concern over mistakes	2	662	-.02	-.09, .09		0
Socially prescribed perfectionism	2	276	-.03	-.16, .11		0
Composite/multiple	2	593	-.19	-.28, -.10		70.43
PC and negative affect					13.79**	
Concern over mistakes	2	662	.20	.08, .31		84.14
Socially prescribed perfectionism	3	485	.17	.05, .29		0
Composite/multiple	2	593	.44	.34, .54		4.59
PC and cognitive anxiety					9.83**	
Concern over mistakes	2	285	.34	.21, .45		0
Negative reactions to imperfection	4	535	.55	.48, .62		38.22
PC and somatic anxiety					16.14**	
Concern over mistakes	2	285	.14	.00, .27		1.22
Negative reactions to imperfection	4	535	.44	.35, .52		55.68
Socially prescribed perfectionism	2	137	.23	.05, .40		0
Composite/multiple	2	436	.33	.22, .43		0
Residual PC and external regulation					8.73*	
Concern over mistakes	2	619	.25	.17, .32		0
Socially prescribed perfectionism	1	231	.18	.05, .30		0
Composite/multiple	2	352	.39	.30, .48		0
Residual PC and self-confidence					10.20**	
Concern over mistakes	2	452	-.23	-.33, -.13		62.91
Negative reactions to imperfection	4	535	-.44	-.51, -.36		0
Residual PC and positive affect					11.61**	
Concern over mistakes	2	662	-.08	-.15, .00		0
Socially prescribed perfectionism	2	276	-.07	-.19, .05		0

Composite/multiple	2	593	-.25	-.32, -.17		0
Residual PC and negative affect					9.67**	
Concern over mistakes	2	662	.30	.22, .37		0
Socially prescribed perfectionism	3	485	.17	.07, .26		44.51
Composite/multiple	2	593	.35	.27, .43		0
Residual PC and cognitive anxiety					9.46**	
Concern over mistakes	1	119	.25	.03, .44		0
Negative reactions to imperfection	4	535	.57	.49, .64		34.65
Residual PC and somatic anxiety					6.70*	
Personal standards	2	341	.23	.06, .38		0
Self-oriented perfectionism	2	137	.26	.05, .45		44.66
Striving for perfection	4	535	.45	.34, .54		59.52
Residual PC and depression					4.22*	
Self-critical perfectionism	1	588	.41	.34, .48		0
Socially prescribed perfectionism	3	299	.28	.17, .38		0
Residual PC and enjoyment					8.69**	
Concern over mistakes	1	204	-.04	-.18, .10		0
Socially prescribed perfectionism	2	137	-.20	-.35, -.03		44.10
Composite/multiple	2	493	-28	-.36, -.20		0

Note. PS = Perfectionistic strivings; PC = Perfectionistic concerns; * $p < .05$, ** $p < .01$. Personal standards and concern over mistakes are from F-MPS, F-MPS-Sh, S-MPS, and S-MPS-2. Self-oriented perfectionism and socially prescribed perfectionism is from HF-MPS and HF-MPS-Sh. Striving for perfection and negative reactions to imperfection are from MIPS.