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Development and Initial Validation of the Performance Perfectionism Scale for Sport (PPS-S)

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Abstract

Valid and reliable instruments are required in order to appropriately study perfectionism. With this in mind, three studies are presented that describe the development and initial validation of a new instrument designed to measure multidimensional performance perfectionism for use in sport (Performance Perfectionism Scale-Sport, PPS-S). The instrument is based on Hewitt and Flett's (1991) model of perfectionism and includes self-oriented, socially prescribed, and other-oriented performance perfectionism. These dimensions encapsulate the features of Hewitt and Flett's dimensions but are focused on athletic performance, rather than life generally. The three studies outline item generation and refinement, exploratory, confirmatory, and exploratory-confirmatory examination of factor structure, and initial assessment of construct validity in multiple samples of adolescent and young adult athletes. Findings suggest that the PPS-S is likely to be reliable and valid measure of performance perfectionism in youth sport. As validation continues, we expect the instrument to have wider applicability for use in adults and other performance contexts (e.g., education and work).

Key Words: Perfectionism, Questionnaire, Survey, Psychometrics

Research examining perfectionism in sport extends across 25 years and includes over 150 studies (see Hill, 2016). This research has revealed perfectionism to be a complex, multidimensional, personality characteristic with important implications for athletes. On one hand, some dimensions of perfectionism (typically labelled perfectionistic strivings) are associated with desirable correlates, processes, and consequences (e.g., self-confidence, problem-focussed coping, and performance). On the other hand, other dimensions of perfectionism (typically labelled perfectionistic concerns) are associated with undesirable desirable correlates, processes, and consequences (e.g., anxiety, avoidant coping, and burnout). As evidenced by this research, perfectionism has much to say regarding the experiences of athletes.

A number of instruments have been used to assess perfectionism in sport (e.g., Frost, Marten, Lahart, & Rosenblate, 1990; Gotwals & Dunn, 2009; Stoeber, Otto, & Stoll, 2006). One popular instrument/model is that developed by Hewitt and Flett (Multidimensional Perfectionism Scale, HF-MPS, 1991, 2004). Hewitt and Flett define perfectionism as a marked need for absolute perfection from self and others. According to their model, trait perfectionism has self-oriented, socially prescribed, and other-oriented dimensions. Self-oriented perfectionism (SOP) is the tendency to set excessively high personal standards, to focus on flaws in personal performance and to respond to substandard performance with harsh self-criticism. Socially prescribed perfectionism (SPP), by contrast, is the belief that significant others impose unrealistic standards on the self and that approval is contingent on their achievement. Finally, other-oriented perfectionism (OOP) is the tendency to impose perfectionistic standards on others.

Hewitt and Flett's (1991) model has a number of notable strengths. In particular, the model is grounded in the work of classic clinicians and theorists and arguably offers the most complete theoretical model of perfectionism currently available. Unlike other models, for

example, it includes an explanation of the developmental origins of perfectionism, identifies moderating and mediating factors, and outlines the tenets of effective treatment/management of perfectionism. Importantly for us here, research has also found strong support for the predictive ability of this model in a wide range of domains including sport (see Jowett, Mallinson, & Hill, 2016, for a recent review). Research in sport suggests that SOP includes both desirable and undesirable features while SPP is uniformly problematic. Less is known about OOP in sport as studies have typically excluded this dimension in favor of examining the personal (as opposed to interpersonal) influence of perfectionism but recent research suggests it is also likely to be important, particularly in terms of team performance (e.g., Hill, Stoeber, Brown, & Appleton, 2014).

When using the instrument developed by Hewitt and Flett (1991) in sport, researchers have typically adapted it in various ways. Most commonly, the instructions given to respondents have been changed to focus their attention on sport when completing the items (e.g., "…in relation to your sport participation…") and/or items have been amended so to focus on sport (e.g., changing "my life" to "my sport"). Adapting instruments in this manner is a common strategy in research and can ensure close correspondence between concepts when measured in different domains. However, even after amending items it is unclear whether all items are best suited, applicable, or readily interpretable in context of sport or whether the instrument captures perfectionism fully in sport. This is because the instrument was not developed with sport, or specific aspects of sport, in mind (see Stoeber & Madigan, 2016, for a further discussion of these and other issues pertaining to the measurement of perfectionism in sport).

Researchers have sought to address such drawbacks by developing domain-specific measures of perfectionism in sport (e.g., Sport-Multidimensional Perfectionism Scale-2, S-MPS-2, Gotwals & Dunn, 2009). There is strong support for the assessment of personality

characteristics when anchored in a specific context or frame-of-reference (e.g., Bing, Whanger, Davison & VanHook, 2004; Hunthausen, Truxillo, Bauer, & Hammer, 2003; Lievens, De Corte & Schollaert, 2008). In addition, in regards to perfectionism in particular, it is also common for individuals to report being more or less perfectionistic depending on the domain. This has been illustrated across multiple life domains (e.g., Stoeber & Stoeber, 2009) and has been illustrated in relation to sport specifically. For example, in comparing the scores of successful intercollegiate athletes in terms of perfectionism in sport, school, and in life in general, Dunn, Gotwals, and Causgrove Dunn (2005) found that the athletes typically reported significantly higher perfectionism in sport than in other domains. One consequence is that domain-specific measurement of perfectionism has been found to have greater predictive ability when compared to general measures of perfectionism in sport (e.g., Dunn, Craft, Causgrove Dunn, & Gotwals, 2011). Therefore, there is a strong case for the availability of instruments that measure domain-specific perfectionism.

Against this backdrop, in the current study we sought to develop an instrument to measure the dimensions of perfectionism in Hewitt and Flett's (1991) model as they apply to a specific aspect of sport, namely performance. Performance is one of the defining features of the sport domain and is perhaps the single most important aspect of an athlete's life. In focusing on performance, we provide a domain-specific measure of self-oriented performance perfectionism (SOPP), socially prescribed performance perfectionism (SPPP), and other-oriented performance perfectionism (OOPP). We conceive these dimensions of performance perfectionism to be subordinate to Hewitt and Flett's (1991) trait dimensions and to operate at a more specific, contextual level (i.e., "I expect my performances to be perfect") than the original three traits that one would expect to be evident at multiple levels including a general level (e.g., "I expect to be perfect in everything I do") and a dispositional level (e.g., "I expect to be perfect in sport"). In this sense, dimensions of performance

perfectionism are similar to dimensions of perfectionism that manifest in other specific contexts such as in practice and in competition (e.g., Stoeber et al., 2006).

Present Research

In summary, the purpose of this research was to develop and begin to validate a domain-specific measure of multidimensional performance perfectionism for use in sport (Performance Perfectionism Scale-Sport, PPS-S). To this end, we provide three studies. The first study describes the process through which items were generated and refined to capture the three performance perfectionism dimensions. The second study provides an exploratory examination of factor structure of the items. The third study provides a further examination of the factor structure of the instrument using confirmatory and exploratory-confirmatory analyses, as well as an initial test of the construct validity of the PPS-S. As much of the research in this area (and much of our own research) has examined perfectionism among youth athletes, we choose to begin the validation of the PPS-S in adolescent and young adult athletes.

Study 1

The purpose of study one was to develop items that assessed the three dimensions of performance perfectionism and were applicable to sport. In addition, items were also assessed in terms of whether they were understandable to adolescent and young adult athletes.

Initial item generation and item refinement

Definitions of SOP, SPP, and OOP provided by Hewitt and Flett (1991, 2004) were adapted to incorporate a focus on perfect athletic performance ("…the demand of *perfect athletic performance* from oneself, the tendency to evaluate one's performance stringently and engage in harsh self-criticism," "…the perception that others are demanding *perfect athletic performance* from the self and that others evaluate one's attempts to meet these prescribed standards stringently and critically," and "…the demand of *perfect athletic*

performance from others and tendency to evaluate other people's performances stringently and criticise others."). The authors then used these definitions along with a list of core characteristics to independently generate items which were thought to capture these dimensions. Following the recommendations of DeVellis (1991), items were generated with the aim of representing all of the core features of each dimension and developing unidimensional subscales. The items were also developed so that they were consistent with the original response format of the HF-MPS (7-point agreement Likert scale) and were appropriate in terms of readability for adolescents and young adults.

A number of conceptual issues were also taken into account when constructing items. Firstly, care was taken to refer to flawlessness and perfection, rather than high or exceptionally high standards. This was because there is currently debate regarding the difference between the pursuit of high standards and perfectionistic standards (see Flett & Hewitt, 2006). Secondly, based on the recommendation of Flett and Hewitt (2002), no items made reference to the degree to which standards were attained or unattained and items did not refer to emotional reactions to the failure to meet important standards. In this regards, the intention was to create items that capture perfectionism independent of ability and its consequences. Finally, when constructing items for SPPP and OOPP, no specific other was identified (e.g., coaches, parents, and teammates etc.). Instead, instructions were created so to direct respondents to think of individuals whose "opinions they valued." This decision was made so to balance the desire to capture the concepts as described by Hewitt and Flett (1991, 2004) with the need to provide guidance to participants ("Below are statements that reflect beliefs that athletes hold when taking part in sport. Some of the beliefs refer to other people. For these, think about the people involved in your sport participation whose opinion you value. Please read each statement, and then select a number from 1 to 7 to show how much you agree or disagree. There are no right or wrong answers.").

This process yielded an initial pool of 196 items. These items were then assessed by the authors for their clarity, readability (assessed using Flesch-Kincaid grade level score; Kincaid, Fishburne, Rogers, & Chissom, 1975), relevance, similarity to other items, and the degree to which they adhered to the criteria outlined above. This review led to a revised pool of 90 items.

External review of items and item refinement

The 90 items were subject to a review conducted by an external panel of five academics with experience of conducting research in the area perfectionism. Each member of this panel had published research in international peer-reviewed journals in this area (2008-onwards). The panel was presented with a definition of each dimension of perfectionism as they manifest in sport, a list of their core features and the proposed items. The expert panel was asked to identify the dimension of perfectionism that each item corresponded with, the content suitability of each item (high, moderate, and low) and the clarity of each item (high, moderate, and low). The external panel were also invited to provide alternative wording and additional items. Based on the feedback from this panel, a second revised pool of 57 items was developed (22 SPPP, 20 SOPP, and 15 OOPP).

The revised pool of items was then subject to a second external review by a panel of 13 sport coaches (9 males, 4 females, *M* age = 38.42, *s* = 8.77 yrs, range 27 to 52 yrs). These coaches were recruited from sport organisations and represented a wide range of sports (football = 3, rugby union = 1, rugby league = 2, netball = 1, cricket = 2, swimming = 1, tennis = 2 and basketball = 1). They had considerable coaching experience (*M* = 14.31, *s* = 7.04, range 4 to 25 yrs) and coached at a range of levels (recreational = 3, regional = 2, national = 2, international = 3, semi-professional = 1, professional = 2). These coaches were asked to indicate whether they considered the content of each item to be applicable to the sport they coach (applicable versus not applicable) and whether the item was clear (high,

moderate, and low clarity). Based on the feedback from this panel, the pool of items was revised further and a set of 61 items was developed (24 SPPP, 20SOPP, and 17 OOPP).

The final phase of item refinement was the completion of three focus groups. The aim of the focus groups was to assess the readability, comprehension, and clarity of the items. The focus groups also provided a means of assessing if respondents understood questions in the same manner and whether respondents were willing and able to answer the questions (Collins, 2003). The participants were all adolescent athletes (5 males, 11 females, *M* age = 14.15, *s* = 1.31 yrs, range 12 to 16 yrs) from a range of sports (netball = 7, swimming = 2, football = 3, rugby union = 2, gymnastics = 1) and varying levels (club = 8, county = 6, regional = 2). The focus groups were conducted following the recommendations of Morgan (1992). All focus groups included same-sex participants, 5 or 6 members, and lasted between 60 and 90 minutes. In each session participants were presented with a written set of the items. A "think-aloud" method was followed whereby athletes were asked to comment on what they believed to be the meaning of each item (Ericsson & Simon, 1998). This procedure was supplemented by the use of predetermined probes that were aimed at exploring comprehension (e.g., "What did you understand by this word/question?" "What/who are you thinking about when answering this question?" and "How would you explain this question to someone else?"; Collins, 2003). Following the focus groups, a final revised pool of 75 items was developed (29 SPPP, 25 SOPP, and 21 OOPP).

Study 2

The purpose of Study 2 was to reduce the number of items and explore items and factor structure in relation to the original HF-MPS three-factor model. This included examination of the initial pool of items generated in Study 1 in a first sample and a subsequent examination of factor structure in a second sample. The final set of items was also assessed in terms of internal reliability and readability.

Methods

Participants

Sample one. Three-hundred and twenty-one sports participants completed the pool of items (196 males, 125 females; *M* age = 14.30 yrs, *s* = 1.50, range 11 to 18). Participants were recruited from a range of individual and teams sports (e.g., swimming, football, and rugby) and included representatives of a range of competitive levels (recreational/fun = 27, club = 101, county/district = 72, region = 99, country = 20, unspecified = 2). On average, athletes trained and competed 4.17 hrs per week (*s* = 3.02) and considered participation in their sport very important in comparison to other things in their life (*M* = 7.85, *s* = 1.18, range 1 to 9).

Sample two. Two hundred and twenty-nine sports participants completed items derived from the analyses of sample one (102 males, 125 females, 2 non-respondents; *M* age = 14.96, *s* = 1.58, range 12 to 18). Again, participants were recruited from a range of individual and team sports and included representatives of a range of competitive levels (recreational/fun = 29, club = 49, county/district = 26, region = 38, country = 40, unspecified = 47). On average, athletes trained and competed 6.21 hrs per week (*s* = 3.44) and considered participation in their sport very important in comparison to other things in their life (*M* = 7.63, *s* = 1.58, range 1 to 9).

Data analysis

Items were assessed in terms of content along with general characteristics (means, variances, and distribution). Following the removal of items based on this assessment, exploratory factor analysis (EFA) was conducted in accordance with common recommendations (e.g., Child, 2006; Tabachnick & Fidell, 2001; Worthington & Whittaker, 2006). Factor solutions/retention was explored using principal components analysis (PCA) and assessed using three common strategies: eigenvalues, screeplot, and parallel analysis

(using O'Connor, 2000, with PCA and assessment of 95% percentiles). This was followed by common factor analysis using principal axis factoring extraction (PAF) with oblique rotation (delta 0) in which items were constrained to load on the number of retained factors. Factor solutions were then assessed based upon interpretability, structural/pattern coefficients (> .30 was considered meaningful), degree of cross-loading (i.e., the presence of loadings above .30 on more than one factor), and communalities (> .20 was considered meaningful). Internal reliability was assessed using Cronbach's α, inter-item correlations and corrected item-total correlations (Cronbach's α > .70, inter-item correlations between .20 and .70, and item-total correlations > .30 were used to guide assessment; Kidder & Judd, 1986). Readability was assessed using Flesch-Kincaid grade level score (Kincaid et al., 1975).

Results

Exploratory factor analysis and internal reliability

The analyses described above revealed that the most robust and interpretable solution in sample one consisted of 12-items loading on three factors. In arriving at this solution, it is noteworthy that the final PCA on all items provided two eigenvalues (rather than three) that exceeded one and the scree plot and parallel analysis supported the retention of only two factors (actual $\lambda_1 = 5.30$, $\lambda_2 = 1.79$, $\lambda_3 = 0.94$ versus $\lambda_1 = 1.40$, $\lambda_2 = 1.30$, $\lambda_3 = 1.22$ from parallel analysis). However, a three factor solution was retained for a number of reasons. Firstly, in addition to data-derived strategies, factor analysts recommend that relevant theory should also guide decisions regarding the number of factors to retain (Fabrigar, Wegener, MacCallum, & Strahan, 1999). Secondly, the three factor solution provided pattern coefficients that were more interpretable (i.e., all items loaded on the intended subscales). Finally, unlike the two factor solution, the three factor solution displayed simple structure (i.e., there were no cross-loadings that exceeded .30).

To verify the 12-item three factor solution, the EFA procedure described earlier was also conducted using sample two. On this occasion eigenvalues and parallel analysis supported the three-factor solution (actual $\lambda_1 = 3.78$, $\lambda_2 = 2.02$, $\lambda_3 = 1.32$ versus $\lambda_1 = 1.49$, $\lambda_2 = 1.36$, $\lambda_3 = 1.26$ from parallel analysis). Based on this replication, we concluded that the 12-item three factor solution offered the most robust item/factor structure on which validation of the instrument should proceed. The PAFs for both sample one and two are displayed in Table 1 and provide strong support for the 12-item three-factor solution with all items loading meaningfully on factors reflective of the HF-MPS (i.e., the three factors are discernible in terms of being self-oriented, socially prescribed, and other-oriented), minimal cross-loading (only two instances), and all communalities exceeding the minimum threshold.

In terms of internal reliability, all subscales displayed acceptable Cronbach's α: SOPP α = .83/.70, SPPP α = .75/.73 and OOPP α = .87/.79 (sample one left and sample two right). In addition, all inter-item correlations were within recommended limits and all corrected item-total correlations were acceptable (i.e., exceeded .30).

Assessment of readability

Flesch-Kincaid grade level scores for the items ranged from 4.7 (4^{th} grade, typically suitable for 9 to 10 year olds) to 10.7 (10^{th} grade, typically suitable for 15 to 16 year olds). Nine of the 12 items scores were within 6^{th} grade to 8^{th} grade reading ability range (i.e., typically suitable for 11 to 14 year olds). One other item was associated with 4th grade and two items scored higher than 8^{th} grade, both of which were associated with a 10^{th} grade reading ability (SOPP10 and SPPP9). Overall, based on these scores we concluded that the instrument is likely to be appropriate for use among adolescents and young adults (with the caveat that the two items identified above may need further revision to improve readability for younger participants).

Study 3

The first purpose of Study 3 was to further examine the factor structure of the new instrument using both confirmatory and exploratory-confirmatory analyses. Typically confirmatory factor analysis (CFA) is adopted at this phase of the validation process. CFA is a popular analysis because it allows researchers to test a specified factor structure between indicators (e.g., items) and latent factors (e.g., dimensions of perfectionism), it provides standard errors for parameter estimates, and allows for a vigorous test of factor structure in terms of fit with observed data. As such, it is a valuable analysis when validating psychometric instruments. However, despite its utility, a number of criticisms of CFA have recently emerged. In particular, in CFA each item is permitted to load on only one factor with zero cross-loadings on all others (i.e., perfect simple structure). This specification is considered to be too restrictive and unrealistic for many multidimensional models with more complex structures (i.e., at least one item cross-loads on more than one factor) (Marsh et al., 2009). As a result, this (mis)specification is associated with a number of undesirable consequences including failure to replicate structures using CFA even when based on multiple EFA (Marsh et al., 2009), inflated factor correlations (Marsh, Nagengast, & Morin, 2013), and biased estimates in the non-measurement part of a structural equation model (SEM) (Asparouhov & Muthén, 2009).

To overcome these limitations, exploratory structural equation modelling (ESEM) can be used. ESEM combines the strengths of CFA and EFA within a SEM framework (Asparouhov & Muthén, 2009). Consistent with EFA, ESEM allows for a complex structure where all indicators are permitted to load on all factors and, consistent with CFA, ESEM provides robust means of evaluating model adequacy (e.g., standard errors for parameter estimates and goodness-of-fit indexes). In summarising the relative strengths (and weaknesses) of CFA and ESEM, Myers, Chase, Pierce, and Martin (2011) suggested that CFA is the preferred technique when a prior measurement theory exists and ESEM is the

preferred technique when a prior measurement theory does not exist. In initial validation studies, when it is difficult to conclude that adequate a prior measurement theory exists, Myers et al. (2011) argued that it is advantageous to use both CFA and ESEM. We therefore did so here using three independent samples.

The second purpose of Study 3 was to examine the construct validity of the new instrument (i.e., "the degree to which a test measures what it claims, or purports, to be measuring", Brown, 1996, pp. 231). This is tested here by examining correlations between dimensions of the PPS-S and an established domain-specific measure of perfectionism (i.e., criterion-related or concurrent validity). The instrument used was the S-MPS-2 (Gotwals & Dunn, 2009). In terms of instruments available to researchers in sport, there is strong evidence to support the S-MPS-2 in terms of its reliability and validity among athletes (see Dunn et al., 2002; Dunn et al., 2006; Gotwals & Dunn, 2009). It is also the most widely used domain-specific measure of multidimensional perfectionism in sport (Stoeber & Madigan, 2016). Indeed, when recently reviewing instruments available to researchers in sport, Stoeber and Madigan concluded that the S-MPS-2 is an excellent domain-specific measure of perfectionism and recommended its use when examining perfectionism in athletes.

Support for the construct validity of the PPS-S is provided if its subscales demonstrated meaningful relationships with subscales of the S-MPS-2 in a theoretically expected manner. In this case, in keeping with previous research examining the relationships between different measures of multidimensional perfectionism (e.g., Cox, Enns, & Clara, 2002; Dunn et al., 2006; Frost, Heimberg, Holt, Mattia, & Neubauer, 1993), it was hypothesised that (i) SOPP would be positively correlated with all dimensions of the S-MPS-2 but most strongly with personal standards and organisation, (ii) SPPP would be positively correlated with all dimensions of the S-MPS-2 but most strongly with concern over mistakes along with perceived coach and parental pressure, and (iii) OOOP would be positively

correlated with all dimensions of the S-MPS-2 but to a lesser degree than the two other dimensions and most strongly with personal standards.

Methods

Participants

Sample three. Two-hundred and forty-one athletes were recruited to sample three (98 males, 143 females; *M* age = 15.11, *s* = 2.03, range 11 to 19). Participants were recruited from a range of individual and team sports (e.g., netball, football, and tennis) and included representatives of a range of competitive levels (recreational = 27, club = 107, county/district = 65, region = 28, country = 14). On average, athletes trained and competed 4.12 hrs per week (*s* = 3.62) and considered participation in their sport very important in comparison to other things in their life (mean =6.93, *s* = 1.73, range 1 to 9).[1]

Sample four. Two-hundred and twenty-two athletes were recruited to sample four (65 males, 157 females; *M* age = 13.51, *s* = 1.53, range 11 to 18). Participants were recruited from a range of individual and team sports (e.g., netball, football, and hockey) and included representatives of a range of competitive levels (recreational/fun = 38, club = 105, county/district = 62, region = 11, country = 4). On average, athletes trained and competed 5.09 hrs per week (*s* = 5.08) and considered participation in their sport very important in comparison to other things in their life (*M* = 7.27, *s* = 1.64, range 1 to 9).

Sample five. Two-hundred and fifty-two athletes were recruited to sample five (20 males, 232 females; *M* age = 13.65, *s* = 1.14, range 11 to 16 yrs). Participants were recruited from a range of individual and teams sports (e.g., netball, football, and hockey) and included representatives of a range of competitive levels (recreational/fun = 37, club = 107, county/district = 81, region = 22, country = 2, unspecified = 3). On average, athletes trained

[1] This sample is the same as reported in Mallinson, Hill, Hall, and Gotwals (2014). However, the PPS-S was not examined in Mallinson et al.'s study.

and competed 3.00 hrs per week (*s* = 2.14) and considered participation in their sport very important in comparison to other things in their life (*M* = 7.22, *s* = 1.69, range 1 to 9).

Data Analysis

CFA and ESEM were conducted using M*plus* 5.0 (Muthén & Muthén, 2007) with robust maximum likelihood estimator (MLR). Oblique target rotation was implemented in the ESEM. The same guidelines as presented in study two were followed in terms of interpreting factor loadings (supplemented by tests of statistical significance provided in both CFA and ESEM). Multiple indexes were used to assess model fit in the confirmatory and exploratory-confirmatory analyses: chi-square statistic (χ^2), comparative fit index (CFI), root mean square error of approximation (RMSEA), 90% confidence intervals of the RMSEA, and the standardized root-mean-square residual (SRMR). Conventional criteria were used when interpreting these indexes with values >.90 CFI, < .08 RMSEA (90% CI <.05 to <.08) and <.08 SRMR providing evidence of adequate model fit (Marsh, Hau, & Wen, 2004). It should be noted that while the use of these indexes are well established in CFA, there adequacy in ESEM is less clear (Marsh, et al., 2010). Therefore, as advised by Morin and Maïano (2011), the criteria for the indexes identified above were used as part of an overall assessment of the features of the models. Cohen's (1992) guidelines of small (.10), medium (.30), and large (.50) were used when interpreting factor correlations and bivariate correlations.

Results

Assessment of factorial structure

Fit indexes, factor loadings, uniquenesses, and factor correlations for CFAs and ESEMs are reported in Tables 2, 3, and 4. CFAs revealed that the hypothesized model provided an adequate fit, or approached adequate fit, in samples three and four. However, the hypothesized model provided inadequate fit in sample five. Examination of the standardized parameter estimates from the CFAs indicated that all loadings were significant and large.

ESEMs provided clearer support for the model in that fit was typically better when using this analysis. Sample four was however an exception in this regard. Across all the samples, almost all items loaded significantly and meaningfully on the expected factors. The only exceptions were SOPP10 in samples three and five. There were a small number of cross-loadings but these were typically not meaningful (i.e., <.30). The notable exceptions were SOPP10 (sample five only) and SPPP7 (sample three and four). In the case of SPPP7, cross-loadings were smaller than loadings on the expected factor. Factor correlations in CFAs and ESEMs were typically medium (SOPP-OOPP) and large (SPPP-SOPP and SPPP-OOPP). Collectively, the results from CFAs and ESEMs provided support for the hypothesised three-factor model of the PPS-S.

Construct validity

Bivariate correlations between the subscales of the PPS-S and the S-MPS-2 are reported in Table 5. Across the three samples, athletes reported moderate levels of SOPP, moderate-to-low levels of SPPP, and low levels of OOPP and moderate levels of perfectionism as captured by the S-MPS-2 (based on Likert scales). Examination of the bivariate correlations between subscales of the PPS-S revealed that SOPP had a significant positive relationship with all subscales of the S-MPS-2. These were typically medium and medium-to-large in size with the largest relationship evident with personal standards. SPPP also had a significant positive relationship with all subscales of the S-MPS-2. These were typically medium-to-large or large in size. Notably, its relationships with perceived coach and parental pressure were among its largest relationships and exceeded those associated with the other dimensions of the PPS-S. Finally, OOPP had a significant positive relationship with all subscales. The relationships were typically medium and medium-to-large in size. The relationships were largely consistent across the three samples.

Multiple regressions are reported in Table 6. The S-MPS-2 was a significant predictor of all dimensions of the PSS-S in all three samples. For SOPP, 43%, 39%, and 44% of variance was explained (p <.001). For SPPP, 43%, 33%, and 33% of variance was explained (p <.001). For OOPP, 21%, 21%, and 24% of variance was explained (p <.001). SOPP was significantly predicted by personal standards (all samples) and concern over mistakes (samples three and five), and, to a lesser degree, by perceived coach pressure (sample four) and doubts about action (sample five). SPPP was significantly predicted by perceived coach pressure (all samples), concern over mistakes (samples three and five), and perceived parental pressure (sample three). Finally, OOPP was significantly predicted by concern over mistakes (samples four, five, and, marginally, in sample three, p =.051), personal standards (sample five), perceived parental pressure (sample four), and perceived coach pressure (sample five).

Discussion

The purpose of this research was to develop and begin to validate an instrument designed to measure of multidimensional performance perfectionism for use in sport (PPS-S). Three studies were reported here that described item generation and refinement, exploratory, confirmatory, and exploratory-confirmatory analysis of factor structure, and an initial test of construct validity.

Item development and refinement was used to provide items that measured performance perfectionism and were interpretable and meaningful in context of sport. The relevance of the items was confirmed by both coaches and athletes. Readability analyses also indicated that generally the items are likely to be suitable for adolescents and young adults. We therefore consider the PPS-S to offer a good means of assessing performance perfectionism in these groups plus, subject to confirmation by future research, in all likelihood adult athletes. Our analyses suggested that two items (SOPP10 and SPPP9) may be more difficult for younger participants. While these two items were not identified as

problematic in the focus groups or when assessing internal reliability, these items may therefore need minor revision to improve readability as validation of the PPS-S continues. In the meantime, we recommend that when distributing the instrument to younger athletes, particular attention is given to these items as part of standard procedures for assessing the properties of psychometric instruments (e.g., assessing internal reliability and factor structure).

After initial exploratory work, the factor structure of the new instrument was revealed to be sound and in keeping with Hewitt and Flett's (1991) original model. In terms of possible improvement, there were seven (of 72 possible) instances of cross-loading when using ESEM. Three of the cross-loading were large enough to be considered meaningful (SPPP7 on SPPP and SOPP, twice, and SOPP10 on SOPP and SPPP) and, of these three, in the last instance the size of the cross-loading was larger than the loadings of items on expected factors. In considering these instances, we note that Dunn et al (2006) similarly found personal standards items to load on both personal standards and perceived coach and parental pressure factors (it was the most common cross-loading observed in their study). Dunn et al suggested that this may be because some respondents did not differentiate between their own standards/expectations and those set by others. This may also be an issue for the two items involved in the cross-loading here. As such, as validation work continues the cross-loading of items SPPP7 and SOPP10 is another issue that may require scrutiny.

Evidence of the construct validity of the PPS-S was provided by correlations and regression analyses using the S-MPS-2. As expected, SOPP was best characterised by personal standards. In two of the three samples, concern over mistakes was also a significant predictor. We consider this to indicate that SOPP adequately captures the duality of the dimension when manifested more generally. That is, SOP is considered to be highly motivating but also a vulnerability factor for motivation, performance, and psychological

difficulties (Flett & Hewitt, 2005, 2006). Examining whether demanding perfect performance from oneself does indeed render athletes vulnerable to difficulties is an important avenue for future research in terms of testing the construct validity of this dimension of the PPS-S. Given the specificity of SOPP, we speculate that our narrower conceptualisation of SOP may even be a more potent and proximal predictor of such difficulties in performance contexts.

SPPP was revealed to be characterised by concerns over mistakes and a sense of external pressure. Again, this was as expected and can be considered to provide support for the notion that SPPP encapsulates the core features of SPP generally. It is notable that the regressions indicated that across the three samples SPPP was better predicted by perceived coach pressure than parental pressure. The items of SPPP do not direct athletes to either coaches or parents. We did, however, direct athletes to individuals whose "opinions they valued" via the instructions to the items. The finding here suggest that respondents were thinking of coaches more so than parents when responding to the items. We note, however, that SPPP was not so highly correlated with perceptions of coach (or parental) pressure to suggest that SPPP is redundant with these existing measures. Rather, overall, the findings suggest that SPPP in part reflects perceptions of these important others but is sufficiently independent so to reflect others (e.g., friends and family members) and neurotic tendencies indicative of SPP generally.

The findings regarding OOPP were a little more mixed. In research outside of sport, OOP tends to be positively correlated to most dimensions of the S-MPS-2 and its predecessor (the Frost Multidimensional Perfectionism Scale, Frost et al., 1990), and is typically most closely related to personal standards (e.g., Cox et al., 2002; Frost et al., 1993; Slaney et al., 2001). There is little research to draw upon in sport regarding OOP. However, in a similar manner, Dunn et al (2006) found OOP to be positively related to all subscales of the S-MPS in one sample of athletes and related to only personal standards in another. The findings

regarding OOPP here were similar to previous research in that it was positively associated with all dimensions of perfectionism. However, the prominence of personal standards in relation to other dimensions was not evident. Instead, OOPP appeared to be characterised by a broader array of dimensions and more clearly included perfectionistic concerns (i.e., concern over mistakes and perceived pressures). This was most apparent in the regressions where concern over mistakes was the only consistent predictor of OOPP. In comparison to OOP then, OOPP may be somewhat more distinct. In this regard, it may be noteworthy that OOPP items focus more on denigration associated with imperfect performance (e.g., "I criticise…" and "I have a lower opinion…") whereas the original OOP items include a mix of denigration and high standards or expectations (e.g., "I have high expectations for the people who are important to me."). Further insight into features of OOPP is clearly required and might be provided by focusing on the issue of standards/expectations versus denigration.

Conclusion

The validation of a new instrument designed to measure multidimensional performance perfectionism has begun in earnest. Here, we have reported on the first stage of its validation across three studies involving multiple samples. Following its initial development, exploratory and exploratory-confirmatory examination of its factor structure and initial assessment of construct validity provided support for the instrument. Therefore, early indication is that the PPS-S offers a reliable and valid measure of performance perfectionism that due to its brevity can be easily included in future research. Here we examined the PPS for use in adolescent and young adult athletes. We believe, however, that as validation continues the PPS is likely to prove suitable for use in adults and in other performance contexts (e.g., education and work).

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Table 1. *Factor Solution for Final Exploratory Factor Analyses (Sample One and Two)*

Pattern coefficients from Oblmin (delta 0) Rotation	F1	F2	F3	h^2
1. I am tough on myself when I do not perform perfectly.	.053 / -.057	.060 / -.003	**.745 / .650**	.573 / .398
4. I put pressure on myself to perform perfectly.	-.070 / .001	-.033 / .004	**.874 / .822**	.719 /.676
10. I only think positively about myself when I perform perfectly.[1]	-.071 / .070	-.141 / -.084	**.529 / .432**	.414 / .234
11. To achieve the standards I have for myself I need to perform perfectly.	.136 / .433	-.065 / .060	**.641 / .395**	.577 / .455
2. People always expect more, no matter how well I perform.	**.576 / .650**	.105 / .167	.236 / .087	.482 / .430
7. People always expect my performances to be perfect.	**.622 / .631**	.006 / -.120	.171 / .146	.538 / .556
9. People view even my best performances negatively.	**.539 / .566**	-.169 / -.060	-.089 / -.110	.351 / .308
12. People criticise me if I do not perform perfectly.	**.308 / .565**	-.249 / -.324	.290 / -.026	.477 / .527
3. I have a lower opinion of others when they do not perform perfectly.	-.114 / -.061	**-.864 / -.676**	.074 / .118	.712 / .463
6. I am never satisfied with the performances of others.	.151 / -.005	**-.765 / -.621**	-.009 / -.129	.716 / .382
8. I criticise people if they do not perform perfectly.	.150 / .032	**-.729 / -.744**	-.101 / .096	.601 / .599
5. I think negatively of people when they do not perform perfectly.	-.066 / .096	**-.737 / -.681**	.123 / .030	.570 / .522
Eigenvalue	3.64 / 2.42	3.62 / 2.39	3.36 / 2.02	
Inter-factor correlation F1		-.367 / -.316	.593 / .382	
F2			-.499 / -.123	

Note. Sample one (n=321) to left. Sample two (n=229) to the right. Bold typeface denotes loadings above .30 on expected factors. Underlined typeface denotes cross-loadings above .30. [1]In sample one this item was "I only think positively about myself when I meet the standards I have set for myself as an athlete."

Table 2. *Goodness of Fit Statistics and Information Criteria for CFA and ESEM (Samples Three, Four and Five)*

	χ^2	*df*	CFI	RMSEA	RMSEA 90% CI	SRMR	AIC	BIC	ABIC
Sample three									
CFA	114.987***	51	0.910	0.074	[.056, .092]	0.062	9679.282	9813.536	9689.928
ESEM	64.835***	33	0.955	0.065	[.041, .088]	0.031	9654.515	9850.733	9670.075
Sample four									
CFA	110.591***	51	0.899	0.075	[.056, .094]	0.058	8878.201	9008.177	8884.608
ESEM	95.909***	33	0.893	0.096	[.074, .119]	0.042	8877.823	9067.788	8887.187
Samples five									
CFA	127.805***	51	0.871	0.082	[.064, .100]	.070	9496.094	9629.148	9505.551
ESEM	72.546***	33	0.934	0.073	[.050, .096]	.037	9454.935	9659.399	9468.757

Note. CFA= Confirmatory factor analysis; ESEM = Exploratory structural equation modeling; *df* = Degrees of freedom; CFI = comparative fit index; RMSEA = root mean square error of approximation; CI = confidence interval; SRMR = Standardised Root Mean Square Residual; AIC = Akaike information criterion; BIC = Bayesian information criterion; ABIC = Sample size adjusted BIC; ESEM were estimated with target oblique rotation; * $p < .001$. ** $p < .01$. *** $p < .05$.

Table 3. *Standardized Factor Loadings for CFA and ESEM Solutions (Samples Three, Four, and Five)*

	CFA		ESEM			
Item	Factor Loading	Uniquenesses	SOPP Factor Loading	SPPP Factor Loading	OOPP Factor Loading	Uniquenesses
1	.520*** / .512*** / .552***	.729*** / .738*** / .695***	.691*** / .512*** / .623***	-.143 / -.048 / -.117	.009 / .007 / .026	.591*** / .757*** / .649***
4	.661*** / .627*** / .833***	.563*** / .606*** / .306**	.754*** / .605*** / .909**	.029 / -.040 / -.016	-.056 / .107 / .007	.430*** / .603* / .181*
10	.540*** / .586*** / .514***	.708*** / .657*** / .736***	.285*** / .490*** / .277***	.212 / .146 / .332**	.136 / .021 / .069	.749*** / .660*** / .697***
11	.737*** / .826*** / .668***	.456*** / .317*** / .553***	.543*** / .855*** / .555***	.189 / .055 / .194	.027 / -.068 / -.051	.562*** / .260 / .595***
2	.710*** / .577*** / .474***	.496*** / .667*** / .775***	.202 / -.045 / .255**	.646*** / .632*** / .322***	-.079 / -.061 / -.016	.480*** / .656*** / .774***
7	.757*** / .648*** / .717***	.427*** / .581*** / .485***	.255 / .336** / .320***	.491*** / .372*** / .354***	.123 / .085 / .188	.481*** / .573*** / .535***
9	.524*** / .599*** / .536***	.725*** / .641*** / .712***	-.197* / -.166 / -.116	.765*** / .692*** / .669***	-.060 /.046 / .053	.556*** / .556*** / .561**
12	.611*** / .720*** / .666***	.626*** / .481*** / .557***	-.034 / .021 / .017	.562*** / .734*** / .681***	.170 / .007 / .065	.569*** / .440*** / .471***
3	.725*** / .789*** / .768***	.475*** / .378*** / .411***	.049 / .036 / .062	-.102 / .101 / -.215*	.634*** / .853*** / .945***	.494*** / .325*** / .267
6	.705*** / .657*** / .660***	.503*** / .569*** / .565***	-.023 / -.023 / .003	.125 / .098 / .083	.613*** / .608*** / .595***	.533*** / .576*** / .581***
8	.782*** / .777*** / .771***	.389*** / .396*** / .406***	.054 / -.009 / .010	-.181 /.071 / .194	.918*** / .728*** / .617***	.290*** / .420** / .438***
5	.745*** / .620*** / .591***	.444*** / .616*** / .651***	-.094 / -.041 / -.172*	.049 / -.009 / .090	.743*** / .641*** / .596***	.435*** / .611*** / .620***

Note. Sample three (n= 241) left. Sample four (n= 222) middle. Sample five (n = 252) right. Underlined typeface denotes meaningful cross-loadings (>.30).

SOPP = Self-oriented performance perfectionism; SPPP = Socially prescribed performance perfectionism; OOPP = Other-oriented performance perfectionism.

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

Table 4. *Standardized Factor Correlations for the CFA and ESEM (Samples Three, Four, and Five)*

	SOPP	SPPP	OOPP
SOPP		.679*** / .597*** / .660***	.326*** / .361*** / .364***
SPPP	.458*** / .478** / .395***		.605*** / .522*** / .704***
OOPP	.242*** / .349*** / .300***	.555*** / .475*** / .578***	

Note. Confirmatory Factor Analysis (CFA) correlations (above the diagonal) and Exploratory Structural Equation Modeling (ESEM) correlations (below the diagonal). Correlations for Sample three (n= 241) left, Sample four (n= 222) middle, and Sample five (n = 252) right. SOPP = Self-oriented performance perfectionism; SPPP = Socially prescribed performance perfectionism; OOPP = Other-oriented performance perfectionism. *** $p < .001$. ** $p < .01$. * $p < .05$.

Table 5. *Descriptive Statistics and Bivariate Correlations for PPS-S and S-MPS-2 (Samples Three, Four, and Five)*

	Sample three											Sample four											Sample five										
Subscale	*M*	*SD*	1	2	3	4	5	6	7	8	9	*M*	*SD*	1	2	3	4	5	6	7	8	9	*M*	*SD*	1	2	3	4	5	6	7	8	9
1 SOPP	4.61	1.16	.70									4.63	1.25	.75									4.58	1.23	.77								
2 SPPP	3.47	1.22	.46	.75								3.27	1.25	.45	.75								3.23	1.23	.44	.73							
3 OOPP	2.56	1.26	.28	.50	.83							2.34	1.24	.35	.43	.84							2.20	1.12	.29	.51	.81						
4 PS	3.02	0.82	.62	.42	.33	.84						2.92	0.87	.58	.49	.40	.87						2.80	0.75	.63	.27	.26	.79					
5 COM	2.73	0.86	.54	.57	.43	.66	.87					2.59	0.88	.48	.45	.42	.70	.86					2.49	0.80	.56	.45	.40	.66	.85				
6 PPP	2.38	0.95	.33	.54	.42	.55	.61	.92				2.19	0.88	.39	.46	.30	.61	.61	.92				2.05	0.79	.36	.37	.36	.58	.59	.89			
7 PCP	2.68	0.81	.38	.56	.34	.57	.65	.65	.82			2.42	0.92	.32	.51	.38	.65	.66	.68	.88			2.42	0.77	.33	.48	.37	.48	.54	.54	.82		
8 DAA	2.67	0.79	.28	.42	.35	.42	.60	.52	.57	.84		2.47	0.83	.35	.42	.27	.52	.63	.57	.66	.83		2.37	0.80	.31	.38	.35	.49	.59	.46	.48	.84	
9 ORG	2.89	0.99	.39	.25	.21	.59	.42	.39	.39	.32	.92	2.59	1.02	.36	.33	<u>.18</u>	.56	.41	.39	.43	.35	.91	2.49	0.97	.34	<u>.14</u>	<u>.14</u>	.50	.41	.46	.30	.35	.92

Note. All bivariate correlations were significant, $p < .01$, except those underlined which were significant at $p < .05$; internal reliability (α) is displayed on the diagonal; SOPP = self-oriented performance perfectionism; SPPP = socially prescribed performance perfectionism; OOPP = other-oriented performance perfectionism; PS = personal standards; COM = concern over mistakes; PPP = perceived parental pressure; PCP = perceived coach pressure; DAA = doubts about actions; ORG = organisation.

Table 6. *Multiple Regressions of PPS-S Subscales on S-MPS-2 Subscales*

PPS-S	S-MPS-2 subscale	Sample three				Sample four				Sample five			
		β	*B*	*S.E*	*p*	β	*B*	*S.E*	*p*	β	*B*	*S.E*	*p*
SOPP		F (6, 200) = 25.16, $p < .001$, $R^2 = .43$				F (6, 171) = 17.85, $p < .001$; $R^2 = .39$				F (6, 195) = 25.52, $p < .001$; $R^2 = .44$			
	Personal standards	.466***	.678	.121	.000	.493***	.688	.137	.000	.443***	.716	.127	.000
	Concern over mistakes	.360***	.493	.117	.000	.122	.170	.138	.222	.346***	.518	.124	.000
	Perceived parental pressure	-.074	-.093	.095	.329	.114	.160	.122	.193	-.058	-.091	.118	.443
	Perceived coach pressure	-.042	-.060	.118	.609	-.206*	-.273	.130	.036	.078	.122	.109	.265
	Doubts about action	-.074	-.111	.106	.299	.073	.108	.127	.397	-.145*	-.219	.104	.037
	Organisation	.013	.015	.078	.845	.074	.090	.090	.317	.018	.023	.079	.775
SPPP		F (6, 198) = 24.43, $p < .001$; $R^2 = .43$				F (6, 169) = 13.96, $p < .001$; $R^2 = .33$				F (6, 192) = 15.96, $p < .001$; $R^2 = .33$			
	Personal standards	-.026	-.039	.125	.756	.185	.256	.141	.072	-.225	-.225	.143	.117
	Concern over mistakes	.295**	.416	.123	.001	.015	.021	.143	.882	.390**	.390	.136	.005
	Perceived parental pressure	.242**	.313	.100	.002	.106	.147	.126	.246	.163	.163	.134	.225
	Perceived coach pressure	.261**	.387	.125	.002	.246*	.322	.133	.017	.591***	.591	.123	.000

	Doubts about action	-.003	-.005	.111	.963	.087	.126	.132	.342	.137	.137	.116	.241
	Organisation	-.059	-.073	.084	.387	.053	.063	.093	.495	-.143	-.143	.088	.106
OOPP		F (6, 196) = 8.45, p < .001; R^2 = .21				F (6, 171) = 7.75, p < .001; R^2 = .21				F (6, 187) = 9.74, p < .001; R^2 = .24			
	Personal standards	.057	.087	.151	.566	.224*	.317	.158	.046	-.048	-.072	.141	.609
	Concern over mistakes	.200	.286	.146	.051	.271*	.384	.160	.017	.229*	.328	.141	.021
	Perceived parental pressure	.235*	.307	.119	.010	-.073	-.104	.141	.464	.160	.236	.132	.076
	Perceived coach pressure	.009	.014	.151	.925	.154	.209	.150	.165	.167*	.244	.123	.048
	Doubts about action	.053	.083	.135	.538	-.034	-.051	.148	.732	.130	.186	.118	.117
	Organisation	-.043	-.053	.098	.589	-.096	-.119	.104	.253	-.118	-.136	.088	.122

Note. SOPP = self-oriented performance perfectionism; SPPP = socially prescribed performance perfectionism; OOPP = other-oriented performance perfectionism;

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