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This document is the Accepted Version [AM]

### **Citation:**

DUNN, John G.H., CORMIER, Danielle L., KONO, Shintaro, CAUSGROVE DUNN, Janice and RUMBOLD, James (2021). Perfectionism and Grit in Competitive Sport. Journal of Sport Behavior, 44 (2). [Article]

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## **Perfectionism and Grit in Competitive Sport**

by

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**Accepted for publication: 25<sup>th</sup> January, 2021**

PERFECTIONISM AND GRIT

**Abstract**

This study investigated the degree to which perfectionistic strivings and perfectionistic concerns were associated with two dimensions of grit—namely, consistency of interests and perseverance of effort—in a sample of 251 intercollegiate varsity athletes ( $M_{age} = 20.34$  years,  $SD = 2.0$ ). Perfectionism and grit were both conceptualized and measured as multidimensional domain-specific constructs. Results of structural equation modeling (SEM) analyses revealed that perfectionistic strivings was positively associated with consistency of interests ( $\beta = .49, p < .001$ ) and perseverance of effort ( $\beta = .92, p < .001$ ). In contrast, perfectionistic concerns was negatively associated with both consistency of interests ( $\beta = -.47, p < .001$ ) and perseverance of effort ( $\beta = -.66, p < .001$ ). Results highlight the importance of differentiating between athletes' perfectionistic strivings and perfectionistic concerns in sport, as well as the importance of treating consistency of interests and perseverance of effort as separate components of grit. The results indicate that perfectionistic strivings more closely align with adaptive correlates for athletes in sport whereas perfectionistic concerns more closely align with maladaptive correlates in sport. Future research that examines the combined effects of perfectionism and grit on the achievement-striving process in competitive sport is recommended.

**Keywords:** Motivation; Nomological network; Personality; Validity

## Perfectionism and Grit in Competitive Sport

Perfectionism is commonly recognized by sport scientists as a personality disposition that plays an important role in the achievement-striving process for athletes in sport (e.g., Hill, 2016; Hodges et al., 2017; Lizmore et al., 2019; MacNamara & Collins, 2015).<sup>1</sup> Although perfectionism has been studied extensively in the context of sport over the last 20 years (for reviews see Gotwals et al., 2012; Hill, Mallinson-Howard, et al., 2018; Jowett, Mallinson, et al., 2016), researchers and theorists have continued to debate whether perfectionism (and its constituent dimensions/facets) play adaptive and/or maladaptive roles for athletes in sport. This study attempts to shed some light on this issue by exploring relationships between dimensions of perfectionism and a personality disposition that researchers typically associate with adaptive functioning in sport—namely, grit (Gilchrist et al., 2018; Hodges et al., 2017; Newland et al., 2020; Tedesqui & Young, 2018). Given that perfectionism and grit are both linked to the achievement-striving process in sport (Hodges et al., 2017; Jordet, 2015; Martin, 2018), identifying theoretically interpretable relationships between the two constructs also serves to accomplish the important scientific goal of developing/linking the nomological networks that surround both constructs (Cronbach & Meehl, 1955; Preckel & Brunner, 2020).

### Perfectionism

Perfectionism can be conceptualized as a higher-order multidimensional domain-specific achievement motivation disposition (Dunn et al., 2016). Although many facets (or sub-dimensions) of perfectionism have been proposed in the literature, these facets are generally captured under two higher-order dimensions labelled perfectionistic strivings and perfectionistic concerns. *Perfectionistic strivings* represent the degree to which athletes set and strive for the

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<sup>1</sup> We broadly use the term personality as it “refers to individual differences in characteristic patterns of thinking, feeling, and behaving” (American Psychological Association, n.d.).

accomplishment of very high personal performance standards in sport (Gotwals et al., 2012). *Perfectionistic concerns* represent the degree to which athletes become overly concerned with the possibility and/or consequences of failing to meet these high standards in sport (Gotwals et al., 2012). Research indicates that heightened perfectionistic strivings are often associated with adaptive correlates in sport including superior performance, heightened intrinsic motivation, reduced burnout, enhanced body image, heightened perceived ability, enhanced concentration, and the use of problem-focused coping strategies (Gotwals et al., 2012; Hill, Mallinson-Howard, et al., 2018; Jowett, Mallinson, et al., 2016). In contrast, research indicates that heightened perfectionistic concerns are predominantly associated with maladaptive correlates including reduced performance, heightened amotivation, lower confidence, heightened cognitive anxiety, lower optimism, heightened anger/dejection, lower self-esteem, and heightened rumination (Gotwals et al., 2012; Hill, Mallinson-Howard, et al., 2018; Jowett, Mallinson, et al., 2016). The fact that strivings and concerns tend to show quite different patterns of relationships with adaptive and maladaptive correlates in sport has led some researchers to refer to perfectionism as a dual-effect characteristic (MacNamara & Collins, 2015) or a double-edged sword (Stoeber, 2014).

Although there is a high degree of agreement among researchers that heightened perfectionistic concerns are predominantly maladaptive in sport (see Gotwals et al., 2012; Hill, Mallinson-Howard, et al., 2018; Jowett, Mallinson, et al., 2016), theorists continue to debate whether perfectionistic strivings should be viewed as having adaptive or maladaptive qualities. Some researchers have consistently espoused the view that heightened perfectionistic strivings play adaptive roles in sport (Stoeber, 2011, 2012, 2014)—particularly when the overlap with perfectionistic concerns is controlled (Gotwals et al., 2012) or when high strivings are accompanied by low concerns (Dunn et al., 2020; Lizmore et al., 2016). In contrast, other

researchers have consistently adopted the position that heightened strivings are largely destructive or harmful to athletes in sport (Flett & Hewitt, 2005, 2014; Hall, 2006, 2016).

This adaptive versus maladaptive debate among perfectionism researchers has been fueled, in part, by the fact that positive relationships have also been found between facets of perfectionistic strivings and criterion variables that are viewed as having largely maladaptive consequences for athletes in sport. These correlates have included mastery-avoidance goals, external regulation, fear of failure, and self-criticism (Gotwals et al., 2012; Hill, Mallinson-Howard, et al., 2018). Such findings have led some theorists to propose that the role of perfectionistic strivings in sport is, at best, “ambiguous: perhaps beneficial [for the athlete] ...some of the time, but most likely bad for the athlete most of the time” (Hill, Madigan, Smith, et al., 2020, p. 411). To shed more light on this debate, the present study examined associations between perfectionistic strivings (and perfectionistic concerns) and grit—a construct that has received little attention from perfectionism researchers but has been predominantly linked to adaptive functioning in sport and non-sport settings.

## **Grit**

Grit is conceptualized as a multidimensional personality disposition that captures the degree to which people maintain interest and focus on an important goal (or goals) over long periods of time—labelled *consistency of interests*—and the degree to which people persevere towards accomplishing these goals despite adversity, failure, and boredom—labelled *perseverance of effort* (Duckworth et al., 2007). With very few exceptions (see Anestis & Selby, 2015; Lucas et al., 2015), research indicates that grit is predominantly associated with adaptive characteristics and outcomes in a variety of achievement contexts. For example, heightened grit has been associated with heightened self-regulation and achievement in military cadets (Kelly et al., 2014), heightened academic achievement in high school students (Muenks et al., 2017),

increased use of deliberate practice in children competing in national spelling competitions (Duckworth et al., 2011), heightened emotional intelligence in undergraduate students (Maddi et al., 2013), higher optimism in school teachers (Duckworth et al., 2009), reduced procrastination in university students (Wolters & Hussain, 2015), and lower burnout levels in medical residents (Salles et al., 2014).

Studies with athletes also show that grit is predominantly associated with a range of adaptive characteristics and behaviors in sport. For example, Toering and Jordet (2015) reported that grit was positively associated with self-restraint and impulse control in elite Norwegian soccer players. Significant positive correlations between grit and sport engagement were found in competitive wheelchair basketball players (Atkinson & Martin, 2020; Martin et al., 2015), and between grit and perceived readiness for competition, self-efficacy, and optimism in competitive male swimmers (Olefir, 2018). Larkin et al. (2016) reported that elite youth soccer players with higher levels of grit spent significantly more time engaged in soccer-related activities than players who had lower levels of grit. Furthermore, in a study of high-performance adult athletes, Poczwardowski et al. (2014) attributed the successful transition of athletes into a residential Olympic training centre in the United States to heightened levels of grit.

Tedesqui and Young (2018) examined links between dimensions of grit (i.e., consistency of interests and perseverance of effort) and deliberate practice (DP) in athletes who competed in a variety of individual and team sports. Results indicated that perseverance of effort was a significant positive predictor of deliberate practice, prompting the authors to conclude that athletes who have higher perseverance of effort may have a “personality advantage to persevere through the highly effortful conditions of DP” (p. 110) that can lead to athletic success. Tedesqui and Young (2018) also demonstrated that higher consistency of interests corresponded with a reduced tendency for athletes to contemplate changing sports or quitting their sport entirely.

Gilchrist et al. (2018) proposed that grit should primarily be viewed as an adaptive personality characteristic in sport because it has the potential to “facilitate [athletes’] achievement, retention, and maintenance of effortful behaviors...[underpinning] the number of hours that must be spent developing sport-specific skills” (p. 1).

### **The Current Study**

Why would we expect perfectionistic strivings and perfectionistic concerns to be associated with consistency of interests and perseverance of effort? As noted by Stoeber et al. (2018), “perfectionistic strivings and concerns have different motivational qualities...[and] distinctive motivational footprints” (p. 36); perfectionistic strivings reflect predominantly approach-oriented motivational tendencies whereas perfectionistic concerns reflect predominantly avoidance-oriented motivational tendencies (Stoeber et al., 2018). In the same way, at the heart of grit (i.e., consistency of interests and perseverance of effort) lies approach-oriented motivational and action tendencies that sustain and drive individuals in their efforts towards accomplishing valued long-term goals despite setbacks and adversity (Chen et al., 2018; Duckworth & Gross, 2014).

Given that the pursuit of high performance standards is a defining characteristic of perfectionistic strivings, and the degree to which people stay focused on the pursuit of personally meaningful goals is an essential feature of grit, it seems reasonable to anticipate that higher perfectionistic strivings would correspond with higher levels of grit (see Houston et al., 2020). On theoretical and practical grounds, it would be both counterintuitive and counterproductive for athletes who are driven to attain very high standards of personal performance in sport (i.e., high perfectionistic strivings) to have an accompanying motivational disposition that would likely impede their efforts to attain these lofty performance goals (i.e., low grit). We hypothesized that perfectionistic strivings would be positively associated with consistency of interests and



137 perseverance of effort in sport. If results confirm these hypotheses, support for the adaptive  
138 potential of perfectionistic strivings would be evident.

139         The tendency to worry about the possibility and consequences of personal failure is a  
140 defining characteristic of heightened perfectionistic concerns. Any display of personal failure is  
141 particularly threatening to athletes who have high perfectionistic concerns, because failure in  
142 competition (or training) publicly conveys a lack of personal competence that, in turn, can  
143 threaten athletes' identity and self-worth (Flett & Hewitt, 2016). Research has also shown that  
144 athletes with heightened perfectionistic concerns have a tendency to use avoidance-coping  
145 strategies when performance difficulties are encountered (Dunn et al., 2014). Avoiding  
146 engagement (or re-engagement) with a stressor that poses the threat of failure can serve to  
147 protect the athlete's self-worth by ensuring that more failure and negative social evaluation  
148 cannot occur, but may ultimately impede the athlete's ability to function effectively in the  
149 presence of the stressor if it is re-encountered.

150         Given that competitive sport is replete with moments where athletes experience personal  
151 failure and performance difficulties in practice and competition (Anshel, 2016), and grit  
152 represents an individual's propensity for sustained engagement in activities over long periods of  
153 time despite obstacles and setbacks (Duckworth et al., 2007), the motivational underpinnings of  
154 heightened perfectionistic concerns are theoretically at odds with heightened grit. Moreover, on  
155 both theoretical and practical grounds, athletes who are not overly concerned about failure and  
156 who are not driven by the need to avoid failure (i.e., low perfectionistic concerns) would almost  
157 certainly benefit from a motivational disposition (i.e., high grit) that sustains engagement in the  
158 achievement domain over long periods of time (Kelly et al., 2014). We hypothesized that  
159 perfectionistic concerns would be negatively associated with consistency of interests and  
160 perseverance of effort in sport. If results confirm these hypotheses, support for the maladaptive

potential of perfectionistic concerns would be evident.

We are aware of only one study that has provided evidence linking perfectionism and grit in athletes. Fawver et al. (2020) examined perfectionism and grit in a sample of 169 youth alpine skiers. Perfectionism was assessed with an established self-report measure of perfectionism in sport—the Sport-Multidimensional Perfectionism Scale-2 (Sport-MPS-2; Gotwals & Dunn, 2009)—and grit was assessed using Duckworth et al.’s (2007) Grit Scale. Small-to-medium positive correlations were found between the *personal standards* (PS) and *organization* (ORG) subscales of the Sport-MPS-2 and a composite grit score ( $r_s = .15$  and  $.32$  respectively). In contrast, small-to-medium negative correlations were found between the *concern over mistakes* (COM), *doubts about actions* (DAA), *perceived parental pressure* (PPP), and *perceived coach pressure* (PCP) subscales of the Sport-MPS-2 and a composite grit score ( $r_s = -.17, -.27, -.15$ , and  $-.17$  respectively). The directions of these correlations are in line with our hypotheses given that PS and ORG represent facets of perfectionistic strivings and COM, DAA, PPP, and PCP represent facets of perfectionistic concerns (Dunn et al., 2016).

Fawver et al.’s (2020) study is the first to provide valuable insight into the relationships between perfectionism and grit in athletes. However, we note that the authors summed all 12 items contained within Duckworth et al.’s (2007) Grit Scale to create a composite grit score. The appropriateness of creating a composite grit score has recently been challenged in the literature (e.g., Credé et al., 2017; Newland et al., 2020; Tedesqui & Young, 2019) and limits the degree to which a more nuanced understanding of the relationships between perfectionism and dimensions of grit (i.e., consistency of interests and perseverance of effort) can be attained.

We also note that Fawver et al. treated grit as a global/generic personality disposition. This approach is in keeping with Duckworth et al.’s (2007) original conceptualization of grit and is consistent with methods employed in many studies that have examined grit in athletes (e.g.,

185 Tedesqui & Young, 2017, 2018). However, Duckworth has also acknowledged the possibility  
186 that people could show vastly different levels of grit in different areas of their lives (see  
187 Duckworth & Quinn, 2009, p. 173)—a position that aligns with a domain-specific  
188 conceptualization of grit. Indeed, a number of researchers have recently provided evidence that a  
189 greater understanding of grit can be attained when conceptualized and measured as a domain-  
190 specific construct. For example, Cormier et al. (2019) found that grit levels among intercollegiate  
191 student-athletes differed as a function of the achievement domain within which grit responses  
192 were considered (i.e., sport, school, and “life-in-general”). Researchers have also demonstrated  
193 that domain-specific measures of grit have stronger predictive validity than domain-general  
194 measures of grit in a variety of performance settings (see Cormier et al., 2019; Mondak, 2020;  
195 Schmidt et al., 2019). These findings have led some researchers to advocate for the domain-  
196 specific measurement of grit in achievement contexts.

197 Finally, Fawver et al. examined perfectionism at the facet/subscale level and reported  
198 bivariate correlations between the six subscales of the Sport-MPS-2 and grit. Although the Sport-  
199 MPS-2 is an established measure of perfectionism in sport, theorists have argued that  
200 perfectionistic strivings and perfectionistic concerns are broad higher-order dimensions of  
201 perfectionism that are best captured when multiple indicators of both constructs are employed  
202 (Stoeber & Madigan, 2016). By utilizing items and subscales from different instruments,  
203 researchers are able to alleviate concerns that corresponding results may be “model specific” to  
204 single instruments or subscales that might be used to measure each higher-order dimension of  
205 perfectionism (Hall et al., 2012; Hill, Madigan, & Jowett, 2020; Stoeber & Madigan, 2016).  
206 Consequently, many perfectionism researchers have adopted the approach where subscales from  
207 more than one instrument are utilized in an effort to obtain a more comprehensive assessment of  
208 perfectionistic strivings and perfectionistic concerns in athletes (e.g., Lizmore et al., 2017, 2019;

Madigan et al., 2015; Rasquinha et al., 2014; Stoeber et al., 2009). Thus, the degree to which the associations between Sport-MPS-2 subscales and grit (reported by Fawver et al., 2020) may reflect “model-specific aspects of perfectionistic strivings and concerns” (Stoeber & Madigan, 2016, p. 48) remains largely unknown.

The present study builds upon Fawver et al.’s research in three ways. First, we treat grit as a multidimensional construct that distinguishes between consistency of interests and perseverance of effort. Second, we treat grit as a domain-specific construct. Third, we examine the degree to which higher-order dimensions of perfectionism (i.e., perfectionistic strivings and concerns)—as measured by multiple indicators of each construct—are associated with consistency of interests and perseverance of effort in sport.

## Methods

### Participants

A total of 251 intercollegiate varsity student-athletes ( $M$  age = 20.34 years,  $SD$  = 2.0) from six team sports (basketball [14 female], football [84 male], ice hockey [25 female, 26 male], rugby [29 female], soccer [23 female, 24 male], volleyball [11 female, 15 male]) participated in the study.<sup>2</sup> Athletes reported an average of 2.39 years ( $SD$  = 1.32) competitive experience at the intercollegiate level, and 11.17 years ( $SD$  = 4.52) of competitive experience in their primary sport.

### Measures

Participants completed a demographic questionnaire, a domain-specific measure of perfectionism in sport, and a domain-specific measure of grit in sport. The demographic

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<sup>2</sup> The current sample was used in a previous study conducted by Cormier et al. (2019). The grit data reported in this study were used by Cormier et al. to (a) assess the psychometric properties of the Grit Scale, and (b) compare levels of domain-specific grit in three achievement settings (i.e., sport, academe, and life in general). None of the perfectionism data in this study have been used or reported in any previous publication.

questionnaire asked athletes to provide information about their age, gender, and sport experience.

### ***Perfectionism***

Perfectionism was measured by a self-report instrument containing 52 items taken from two established measures of perfectionism in sport—the *Sport-MPS-2* (Gotwals & Dunn, 2009) and the *Multidimensional Inventory of Perfectionism in Sport* (MIPS; Stoeber et al., 2006). All 42 items from the Sport-MPS-2 were included in the inventory to measure *Personal Standards* (PS [7 items]; e.g., “I set higher achievement goals than most athletes who play my sport”), *Concern Over Mistakes* (COM [8 items]; e.g., “If I play well but only make one obvious mistake in the entire game, I still feel disappointed with my performance.”), *Perceived Parental Pressure* (PPP [9 items]; e.g., “My parents want me to be better than all other players who play my sport”), *Perceived Coach Pressure* (PCP [6 items]; e.g., “My coach expects excellence from me at all times: both in training and competition”), *Doubts About Actions* (DAA [6 items]; e.g., “I rarely feel that I have trained enough in preparation for a competition”), and *Organization* (ORG [6 items]; e.g., “I follow pre-planned steps to prepare myself for competition”). Ten items were taken from the MIPS to measure *Striving for Perfection* (SP [5 items]; e.g., “In sport, it is important to me to be perfect in everything I attempt”) and *Negative Reactions to Imperfection* (NRI [5 items]; e.g., “In sport, I become furious if I make mistakes”). Dunn et al. (2016) provided factorial validity evidence in a sample of intercollegiate student-athletes supporting the combination of the PS, ORG, and SP subscales to represent the higher-order dimension of perfectionistic strivings and the combination of the COM, PPP, PCP, DAA, and NRI subscales to represent the higher-order dimension of perfectionistic concerns.

Items were randomly ordered throughout the instrument. Participants responded to items using a 5-point scale (1 = *strongly disagree*; 5 = *strongly agree*) with higher subscale scores representing higher levels of perfectionism. Validity and reliability evidence supporting the use

of the aforementioned items/subscales to measure perfectionism in sport can be found in the literature (e.g., Dunn et al., 2016; Gotwals & Dunn, 2009; Lizmore et al., 2017; Rasquinha et al., 2014).

### **Grit**

Grit was measured using a domain/sport-specific version of Duckworth et al.'s (2007) *Grit Scale*. The domain-specific measure (see Cormier et al., 2019) contains five items that measure *Consistency of Interests* in sport (CI; e.g., "I often set a goal but later choose to pursue a different one") and six items that measure *Perseverance of Effort* in sport (PE; e.g., "I have overcome setbacks to conquer an important challenge"). The domain-specificity of the instrument is created by including the phrase, "*As an athlete in sport...*" before each item along with some minor wording changes to several items (i.e., the word "project" is replaced with the word "goal"). Participants responded to items using a 7-point scale (i.e., 1 = *not at all like me*; 7 = *exactly like me*). All consistency of interests items were reverse-scored whereupon higher composite scores on each subscale represented higher levels of grit. Adequate levels of internal reliability ( $\alpha \geq .68$ ) for the consistency of interests and perseverance of effort subscales of the Grit Scale have been reported in studies involving athletes (e.g., Tedesqui & Young, 2017, 2018, 2019). Cormier et al. (2019) provided evidence supporting the two-factor structure of this domain-specific version of the Grit Scale using data provided by the current sample of athletes as well as adequate levels of internal consistency for the consistency of interests subscale ( $\alpha = .82$ ) and the perseverance of effort subscale ( $\alpha = .79$ ).

### **Procedure**

After receiving institutional ethics approval, data collection episodes were scheduled with each team. Data collection (using a paper-and-pencil format) took place at least 48 hours before or after competition in classroom settings. Participants provided written voluntary consent and

were treated in accordance with the ethical guidelines of the American Psychological Association. Coaches and training staff were not present at the time of test administration.

### **Data Analysis**

We initially conducted a MANOVA to screen for gender differences across the perfectionism and grit subscales (Fawver et al., 2020). This step was conducted to determine if it was appropriate to combine male and female responses into a single data set to enhance the power of subsequent analyses. Gender was entered as the independent variable and the perfectionism and grit subscales were entered as the dependent variables in the analysis.

We employed a two-step approach to conduct a structural equation modeling (SEM) analysis (Anderson & Gerbing, 1988). In the first step, we conducted a confirmatory factor analysis (CFA) to ensure that our measurement models had an acceptable fit with our data (Anderson & Gerbing, 1988; McDonald & Ho, 2002). This precursory use of CFA has been adopted in previous SEM studies that have examined perfectionism in sport (e.g., Jowett, Hill, et al., 2013, 2016). In the CFA, all four latent variables (i.e., perfectionistic strivings, perfectionistic concerns, consistency of interests, and perseverance of effort) were modeled together and correlated with one another (Jowett, Hill, et al., 2013, 2016). The analysis was conducted using IBM SPSS Amos 26 with maximum likelihood (ML) estimation. For model identification, we scaled one loading per latent variable. Figure 1 shows the original CFA model that we tested.

After establishing an adequate fit in the CFA (following the removal of two grit items), we employed SEM (using Amos 26 and ML estimation) to assess our hypotheses and determine whether higher-order dimensions of perfectionism (i.e., perfectionistic strivings and perfectionistic concerns) were associated with consistency of interests and perseverance of effort. The effect of gender was controlled in the analysis (i.e., all exogenous variables were correlated with gender and all endogenous variables were regressed on gender). Figure 2 contains the

model that we tested in the second step of the SEM analysis.

For both CFA and SEM, model fit was evaluated using a combination of fit indices (Kline, 2016). Specifically, we used the  $\chi^2$  goodness-of-fit statistic, comparative fit index (CFI), Tucker-Lewis index (TLI), root mean square error of approximation (RMSEA; 90% confidence interval), and standardized root mean squared residual (SRMR). In accordance with guidelines proposed by Marsh et al. (2004), and adopting the same cut-off criteria that have been used in previous SEM studies examining relationships between higher-order dimensions of perfectionism and various criterion variables (e.g., Jowett, Hill et al., 2013, 2016; Madigan et al., 2015) we employed the following cut-off values to indicate an acceptable model fit: CFI close to or greater than .90, TLI close to or greater than .90, RMSEA close to or less than .10, and SRMR close to or less than .10. Cut-off values for a good model fit were set in accordance with guidelines provided by Hu and Bentler (1999): CFI close to or greater than .95, TLI close to or greater than .95, RMSEA close to or less than .06, and SRMR close to or less than .08.

## Results

### Preliminary Analyses

Fourteen missing data points (out of a possible 15,813 item responses) existed within the data set; no systematic pattern was evident among the missing data. Each missing data point was replaced by computing an intra-individual mean item score from the remaining items in the corresponding subscale to which the missing data point belonged (see Graham et al., 2003).

The multivariate test statistic from the MANOVA that we conducted to screen for gender differences was significant: Wilks'  $\Lambda = .85$ ,  $F(10, 240) = 4.10$ ,  $p < .001$ , partial  $\eta^2 = .15$ . Follow-up univariate  $F$ -tests (see Table 1) revealed significant differences on three of the ten dependent variables. Male athletes had significantly higher mean personal standards and striving for perfection scores than female athletes, whereas female athletes had significantly higher mean



perceived coach pressure scores than male athletes. However, corresponding effect sizes (partial  $\eta^2$ ) for all univariate contrasts were  $\leq .04$ , and therefore failed to meet the criterion value of .06 that is indicative of a medium effect size (Cohen, 1988). We concluded that meaningful or practically significant gender differences were not present within the data.

We also conducted a Box's M test to examine the homogeneity/heterogeneity of the variance-covariance matrices for male and female participants. Results indicated that the variance-covariance matrices were not sufficiently heterogeneous across gender to cause concern: Box's M = 90.28,  $F(55, 153210.65) = 1.53$ ,  $p > .001$  (see Tabachnick & Fidell, 1996). In light of the MANOVA and Box's M results, scores for men and women were combined into a single data set for all remaining analyses. Means, standard deviations, correlations, and internal consistency coefficients for the combined data set ( $N = 251$ ) are contained in Table 2.

### **Bivariate Correlations**

With the exception of the personal standards and striving for perfection subscales, perfectionism subscales were significantly correlated with consistency of interests. Specifically, concern over mistakes, negative reactions to imperfection, perceived parental pressure, perceived coach pressure, and doubts about actions were negatively correlated with consistency of interests, whereas organization was positively correlated with consistency of interests. Six perfectionism subscales were significantly correlated with perseverance of effort. The concern over mistakes, negative reactions to imperfection, and doubts about actions subscales were negatively correlated with perseverance of effort, whereas personal standards, striving for perfection, and organization were positively correlated with perseverance of effort. The overall pattern of the bivariate correlations indicates that higher scores on subscales measuring facets of perfectionistic concerns (i.e., concern over mistakes, negative reactions to imperfection, perceived parental pressure, perceived coach pressure, and doubts about actions) were generally

associated with lower levels of grit. In contrast, higher scores on subscales measuring facets of perfectionistic strivings (i.e., personal standards, striving for perfection, and organization) were generally associated with higher levels of grit.

Given that some researchers continue to treat grit as a composite/unidimensional construct in studies involving athletes (e.g., Albert et al., 2019; Atkinson, & Martin, 2020; Fawver et al., 2020; Meyer et al., 2017; Rhodes et al., 2018), we sought to determine if a more nuanced understanding of grit could be attained when consistency of interests and perseverance of effort were treated as separate constructs. To this end, we examined the differences in the size of relations between each perfectionism subscale and the consistency of interests and perseverance of effort subscales.<sup>3</sup> Using Glass and Hopkins' (1984) formula for testing differences between dependent correlations (see Formula 15.7, p. 311), we found statistically significant differences on four of the eight perfectionism subscales. Specifically, personal standards was more strongly correlated with perseverance of effort than with consistency of interests ( $t [248] = 3.54, p < .001$ ), organization was more strongly correlated with perseverance of effort than with consistency of interests ( $t [248] = 4.86, p < .001$ ), doubts about actions was more strongly correlated with perseverance of effort than with consistency of interests ( $t [248] = 2.25, p < .01$ ), and perceived coach pressure was more strongly correlated with consistency of interests than with perseverance of effort ( $t [248] = 2.25, p < .05$ ). These results indicate that in many instances, the strength of relationships between facets of perfectionism and dimensions of grit are different, supporting the position that a more nuanced understanding of relationships between perfectionism and grit is achieved when grit is treated as a multidimensional construct.

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<sup>3</sup> Goodness of fit indices obtained from an initial maximum likelihood confirmatory factor analysis that was conducted upon the 11 items of the Grit Scale indicated that the latent dimensionality of the instrument was better captured by two factors representing consistency of interest and perseverance of effort ( $\chi^2 [43] = 97.358, p < .001$ ; CFI = .942; TLI = .926; RMSEA = .071 [90% CI: .053, .09]; SRMR = .059) than a single composite grit factor ( $\chi^2 [44] = 337.139, p < .001$ ; CFI = .689; TLI = .611; RMSEA = .164 [90% CI: .148, .180]; SRMR = .119).

## Confirmatory Factor Analysis

Prior to conducting the SEM analysis, data were screened for the presence of univariate and multivariate outliers. No univariate outliers were detected (i.e., all standardized  $z$ -scores for each variable were  $< 4.0$ ; see Bors, 2018; Pituch & Stevens, 2016). However, two multivariate outliers were identified (Mahalanobis distances = 34.079 and 31.172;  $\chi^2 [10]_{\text{critical}} = 27.877$ ,  $p < .001$ ; see Tabachnick & Fidell, 1996) and subsequently removed from the data set. Skewness values for all observed variables in the SEM analysis ranged from 0.79 to -1.50, and kurtosis values ranged from 2.58 to -0.79, indicating that there were no concerns with the distributional characteristics of the observed variables (Kline, 2016). All variance inflation factors (VIFs) among the observed variables ranged from 1.16 to 3.06, indicating that there were no concerns with multicollinearity (Kline, 2016).

Following our initial CFA, the collective values for the model fit indices indicated that an adequate model fit had not been obtained:  $\chi^2 (146) = 350.871$ ,  $p < .001$ ; CFI = .893; TLI = .875; RMSEA = .070, 90% CI [.060, .081]; SRMR = .088; AIC = 412.92; and BIC = 420.64. To determine if a better fitting model could be attained (while heeding Marsh et al.'s [2004] cautions that better fitting models must nonetheless make theoretical sense), we examined modification indices and conducted a local fit assessment (Kline, 2016) by inspecting the residual covariance matrix. No theoretically meaningful changes to the model (based on modification indices) were apparent, and none of the corresponding changes would have led to substantial improvements in model fit. However, the local fit assessment revealed one consistency of interests item (i.e., CI5; "*As an athlete in sport, I become interested in new pursuits/goals every few months*") and one perseverance of effort item (i.e., PE8; "*As an athlete in sport, setbacks don't discourage me*") that had disproportionately high numbers of inflated residuals. These items also had the lowest loadings on their respective factors (CI5 = .58; PE8 =

.32). We subsequently removed these items and conducted another CFA.

Although removing items can increase the risk of capitalizing on chance (Marsh et al., 2004), it is worth noting that in a previous study examining the factor structure of the Grit Scale with athletes, Tedesqui and Young (2017) also dropped PE8 due to a low negative factor loading (-.27) on the perseverance of effort factor. Moreover, inspection of Tedesqui and Young's factor analytic results (p. 171) reveals that item CI5 had the lowest factor loading of any consistency of interests item in the final exploratory factor analytic solution (.46) and confirmatory factor analytic solution (.43) that were retained by the authors. Given Tedesqui and Young's findings, and our current findings, it is possible that there are some systematic issues with the two items (i.e., CI5 and PE8) in the context of measuring grit in athletes. We therefore felt more confident that we were not simply capitalizing on chance when removing the two items.

Following the removal of CI5 and PE8, the CFA provided an acceptable fit:  $\chi^2(113) = 234.111, p < .001$ ; CFI = .920; TLI = .904; RMSEA = .066, 90% CI [.054, .078]; SRMR = .084; AIC = 314.11; and BIC = 320.37. Given that the initial model and the revised model were not nested within each other, we used AIC and BIC to compare the results of the two CFAs (Kline, 2016). These information theory metrics integrate model fit and complexity, favoring simpler models for their replicability. Although AIC and BIC are data-specific and no absolute criteria are available, we deemed the nearly 100-point decreases in the two indices as evidence of a better model. Figure 3 shows the final CFA solution following the removal of CI5 and PE8.

#### **Relationships Between Perfectionistic Strivings, Perfectionistic Concerns and Grit**

We applied SEM to the (revised) model with items CI5 and PE8 removed; results are shown in Figure 4.<sup>4</sup> An acceptable model fit was obtained:  $\chi^2(126) = 260.482, p < .001$ ; CFI = .914; TLI = .896; RMSEA = .066, 90% CI [.054, .077]; and SRMR = .082. Perfectionistic

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<sup>4</sup> A copy of the covariance matrix for this model is available upon request from the authors.

strivings was positively correlated with perfectionistic concerns ( $r = .51, p < .001$ ), and consistency of interests was positively correlated with perseverance of effort through their disturbances ( $r = .38, p < .01$ ). In accordance with our hypotheses, perfectionistic strivings was positively associated with consistency of interests ( $\beta = .49, p < .001$ ) and perseverance of effort ( $\beta = .92, p < .001$ ), whereas perfectionistic concerns was negatively associated with consistency of interests ( $\beta = -.47, p < .001$ ) and perseverance of effort ( $\beta = -.66, p < .001$ ). These results indicate that higher perfectionistic strivings correspond with higher levels of grit, and higher perfectionistic concerns correspond with lower levels of grit. Collectively, perfectionistic strivings and perfectionistic concerns (while controlling for gender) accounted for 21% of the variance in consistency of interests and 57% of the variance in perseverance of effort.

### Discussion

The current study sought to examine the degree to which perfectionistic strivings and perfectionistic concerns were associated with athletes' consistency of interests and perseverance of effort in sport. We hypothesized that perfectionistic strivings would be positively associated with both dimensions of grit, and perfectionistic concerns would be negatively associated with both dimensions of grit. Bivariate correlations (Table 2) and SEM results (Figure 4) largely supported our hypotheses.

All three perfectionism subscales that measure facets of perfectionistic strivings (i.e., personal standards, striving for perfection, and organization) had small-to-medium positive correlations with consistency of interests and perseverance of effort (see Table 2). All five perfectionism subscales that measure facets of perfectionistic concerns (i.e., concern over mistakes, negative reactions to imperfection, doubts about actions, perceived parental pressure, and perceived coach pressure) had small-to-medium negative correlations with consistency of interests. Three subscales measuring facets of perfectionistic concerns (i.e., concern over

mistakes, negative reactions to imperfection, and doubts about actions) had small-to-medium negative correlations with perseverance of effort, while the two remaining subscales that measure facets of perfectionistic concerns—namely, perceived parental pressure and perceived coach pressure—were unrelated to perseverance of effort.

The magnitude of the bivariate correlations between the eight perfectionism subscales and the two grit subscales were generally quite small, suggesting that the relationships between specific facets of perfectionism (i.e., at the subscale level) and consistency of interests and perseverance of effort are not particularly strong. Similar findings were reported by Houston et al. (2020) who asked a sample of 132 undergraduate students to complete Hewitt and Flett's (1991) domain-general measure of perfectionism (i.e., the Multidimensional Perfectionism Scale [MPS]) and the 12-item domain-general Grit Scale. None of the three MPS subscales were significantly correlated with consistency of interests, and the socially prescribed perfectionism subscale was also unrelated to perseverance of effort. However, the self-oriented perfectionism and other-oriented perfectionism subscales of the MPS had small-to-medium significant correlations with perseverance of effort ( $r_s = .29$  and  $.19$  respectively).

The size of the correlations we obtained are also quite similar to the size of the correlations between Sport-MPS-2 subscales and a composite measure of grit reported by Fawver et al.'s (2020) in their study of youth alpine skiers ( $r_s$  ranged from  $-.15$  to  $.32$ ). However, it is worth noting that the direction of 15 of the 16 correlations between perfectionism subscales and grit subscales in this study, and the direction of all six correlations reported in Fawver et al.'s study between Sport-MPS-2 subscales and grit were in the theorized directions. Specifically, higher scores on facets of perfectionistic strivings were typically associated with higher levels of grit, and higher scores on facets of perfectionistic concerns were typically associated with lower levels of grit. Collectively, these results support the position held by many perfectionism

researchers that heightened perfectionistic strivings are associated with adaptive characteristics and outcomes in sport (e.g., Dunn et al., 2020; Lizmore et al., 2017; Stoeber, 2011, 2102, 2014), whereas perfectionistic concerns are associated with maladaptive characteristics and outcomes in sport (Gotwals et al., 2012; Hill, Mallinson-Howard, et al., 2018).

The SEM results (Figure 4) shed further light on the debate surrounding the adaptive qualities of perfectionistic strivings in sport because the SEM analysis accounts for the overlap/correlation between perfectionistic strivings and perfectionistic concerns. In other words, the paths between perfectionistic strivings and consistency of interests ( $\beta = .49$ ) and perseverance of effort ( $\beta = .92$ ) capture the associations between the constructs after the correlation between perfectionistic strivings and perfectionistic concerns is controlled ( $r = .51$ : see Figure 4). As such, the SEM results support Hill, Mallinson-Howard, and colleagues' (2020) contention that perfectionistic strivings "are likely to contribute to more adaptive outcomes" (p. 126) for athletes in sport when the overlap between strivings and concerns is controlled (also see Gotwals et al., 2012). When the overlap between perfectionistic strivings and perfectionistic concerns is controlled, some perfectionism theorists have suggested that it may be more appropriate to talk about *pure* perfectionistic strivings and *pure* perfectionistic concerns (see Jowett, Mallinson, et al., 2016; Stoeber, 2014) rather than perfectionistic strivings and perfectionistic concerns.

Our examination of the differences in the strength of the correlations between each perfectionism subscale and the two grit subscales enabled us to determine if there is value in differentiating between consistency of interests and perseverance of effort when studying grit in athletes (Tedesqui & Young, 2018, 2019). In the case of four (out of eight) perfectionism subscales, the size of the correlation with consistency of interests was significantly different than the corresponding correlation with perseverance of effort. Personal standards, organization, and

doubts about actions all had significantly stronger correlations with perseverance of effort than consistency of interests, whereas perceived coach pressure was more strongly correlated with consistency of interests than perseverance of effort. These differences would have remained undetected had we treated grit as a composite/unidimensional construct. This is an important issue because, as noted previously, many sport psychology researchers continue to combine athletes' consistency of interests and perseverance of effort responses into a single composite scale score when studying grit in sport (e.g., Albert et al., 2019; Atkinson & Martin, 2020; Fawver et al., 2020; Sigmundsson et al., 2020).

Having established that four of the eight perfectionism subscales were more strongly associated with one dimension of grit than the other, we offer some tentative theoretical explanations as to why these differences may have occurred. Consistency of interests capture the degree to which people maintain interest and focus on important goals over long periods. However, as noted by Duckworth in an interview with Perkins-Gough (2013), consistency of interests has little to do with responding to adversity or failure. In contrast, perseverance of effort captures the degree to which people persevere in the face of personal adversity, setbacks, and failure in pursuit of important goals (Duckworth et al., 2007). Given that athletes frequently encounter personal failure and adversity in sport (Anshel, 2016), it is conceivable that personal standards and organization are more strongly associated with perseverance of effort (than consistency of interests) because these variables share similar approach-oriented motivational underpinnings that enable athletes to react positively when personal failure is encountered (see Lizmore et al., 2017). Doubts about actions—a facet of perfectionistic concerns—may also be more strongly correlated with perseverance of effort because doubts about actions is more strongly linked to avoidance-oriented motivational/action tendencies when personal failure and adversity are encountered in sport (Dunn et al., 2014; Lizmore et al., 2017). We are unsure why



perceived coach pressure was more strongly correlated with consistency of interests than perseverance of effort and therefore do not offer any tentative explanation for this finding. More research is required to determine if similar differences in the magnitude of correlations would emerge with an independent sample of athletes or if the present results are a function of some unknown idiosyncratic characteristics of the current sample.

The bivariate correlation analyses provide valuable insight into relationships between perfectionism and grit at the facet/subscale level. However, when multiple subscales from different measures of perfectionism are combined to create higher-order dimensions of perfectionism—i.e., perfectionistic strivings and perfectionistic concerns—researchers are afforded greater confidence that their results (at the facet/subscale level) do not simply represent “model-specific aspects of perfectionistic strivings and concerns” (Stoeber & Madigan, 2016, p. 48). In this context, “model-specific aspects” refer to variations in item/subscale content that exist between different measures of perfectionism (Hall et al., 2012; Stoeber & Madigan, 2016). Creating higher-order dimensions of perfectionism (and using multiple subscales from different measures of perfectionism) through the SEM analysis enabled us to alleviate much of these concerns.

Results of the SEM analysis (Figure 4) indicate that perfectionistic strivings was positively associated with consistency of interests and perseverance of effort in sport (after controlling for gender and the overlap with perfectionistic concerns). This finding supports our initial contention that the motivational underpinnings of perfectionistic strivings (i.e., setting and striving for the attainment of very high performance standards) are theoretically at odds with a motivational disposition that would likely undermine athletes’ efforts to achieve their lofty performance goals in sport (i.e., low grit). The likelihood of achieving the high standards of performance that are integral to high perfectionistic strivings will almost certainly be enhanced if

athletes engage in a long-term commitment to accomplishing their performance goals in sport (i.e., high consistency of interests) and persevere towards accomplishing these goals despite setbacks, adversity, and failure (i.e., high perseverance of effort). Unfortunately, the cross-sectional design of this study makes it impossible to determine if higher strivings actually lead to higher grit, and/or if higher grit may lead to higher strivings. It is possible that increases in perfectionistic strivings in sport lead athletes to develop heightened grit as they come to the realization that heightened consistency of interests and perseverance of effort can enhance their chances of achieving high performance standards. However, it is also plausible that increased grit in sport may lead athletes to develop higher perfectionistic strivings as they come to the realization that their consistent focus and perseverance of effort under conditions of failure can enhance their ability to achieve higher performance standards. Future research is required to determine if there is a causal/directional process at work underlying the associations between perfectionistic strivings, consistency of interests, and perseverance of effort in sport, and to understand the mechanisms by which perfectionistic strivings and grit may influence each other (if they influence each other at all).

SEM results also supported our hypothesis that perfectionistic concerns would be negatively associated with consistency of interests and perseverance of effort. Research has shown that heightened perfectionistic concerns are typically associated with avoidance-oriented goals (Eum & Rice, 2011) and grit is primarily associated with approach-oriented goals (Muenks et al., 2017). Research has also shown that heightened perfectionistic concerns correspond with lower levels of engagement (Fawver et al., 2020), and grit provides the impetus for people to stay engaged with the pursuit of personally meaningful goals over long periods of time (Kelly et al., 2014). Consequently, it makes theoretical sense that higher perfectionistic concerns would correspond with lower consistency of interests and perseverance of effort. Athletes who have

high perfectionistic concerns are motivated to avoid displaying personal incompetence (Flett & Hewitt, 2016) therefore persevering in the face of setbacks, failure, and adversity may heighten the threat of negative social evaluation if further failure was to be encountered (Dunn et al., 2014). It is possible that high perfectionistic concerns motivate athletes to avoid public displays of failure to such an extent that the development of grit in sport is hindered. However, it is also conceivable that the constant engagement and re-engagement with the achievement-striving process in sport that comes with heightened consistency of interests and perseverance of effort (Tedesqui & Young, 2018) may reduce athletes' perfectionistic concerns. In other words, athletes may come to the realization that making progress towards their long-term achievement goals is a mechanism by which they can protect their self-concept. Future research is obviously required to assess the validity of these speculative hypotheses.

The combination of high perfectionistic strivings with low perfectionistic concerns has been labeled as an "adaptive profile" of perfectionism in sport (Dunn et al., 2020; Vaartstra et al., 2018), and higher levels of grit are generally viewed as having adaptive roles in the achievement-striving process for athletes (Fawver et al., 2020; Gilchrist et al., 2018; Tedesqui & Young, 2018, 2019). It therefore seems reasonable to suggest that the combination of high perfectionistic strivings, low perfectionistic concerns, high consistency of interests, and high perseverance of effort in athletes might be a particularly adaptive personality profile that facilitates talent development and the pursuit of high achievement in sport. Future research would be valuable in determining if and how different combinations of perfectionistic strivings, perfectionistic concerns, consistency of interests, and perseverance of effort might impact the achievement-striving process of athletes in the competitive sport domain. This seems like an important line of inquiry given that sport psychologists associate elements of heightened perfectionism and grit with elite performance in sport (Hardy et al., 2017; Hodges et al., 2017), yet no studies have

determined if or how different combinations of perfectionism and grit might influence the achievement striving process in sport for athletes.

Perseverance of effort helps athletes sustain effort despite personal failure, adversity, and setbacks. Consequently, it is possible that perseverance of effort could moderate relationships between higher-order dimensions of perfectionism and the way that athletes cope when faced with prolonged drops in performance. For example, research has previously shown that athletes with higher perfectionistic concerns are inclined to use avoidance or disengagement coping strategies (as opposed to problem-focused strategies) when faced with a performance slump (Dunn et al., 2014). It is conceivable that athletes with high perfectionistic concerns might be less inclined to use avoidance/disengagement coping strategies (and more inclined to use problem-focused coping strategies) in the face of prolonged failure if they had higher (as opposed to lower) perseverance of effort. The search for moderator variables in perfectionism research has been identified as a key research endeavor by numerous theorists because determining “whether perfectionism is desirable or debilitating will depend upon the degree to which a particular dimension [of perfectionism] is exhibited...and what other *individual differences* [emphasis added] and contextual factors are evident” in the achievement setting (Hill, Jowett, et al., 2018, p. 170; also see Stoeber, 2018, p. 342). We suggest that a worthwhile line of inquiry in future research would be to explore the degree to which grit might moderate perfectionism-outcome relationships, particularly when athletes are struggling to attain desired performance levels over prolonged periods of time.

Researchers and theorists regard perfectionism (see Arana et al., 2017) and grit (see Park et al., 2018) as malleable or changeable personality dispositions. Consequently, practitioners and researchers in sport have developed interventions to alter athletes’ perfectionism levels (e.g., Lizmore et al., 2018) and grit in sport (e.g., Rhodes et al., 2018). One approach (from cognitive-

behavioral therapy) that has been used to reduce individuals' perfectionistic concerns focuses upon teaching people how to cognitively-restructure the meaning of personal failure (Egan & Shafran, 2018). In the sport setting, athletes could be taught to reframe a debilitating view of failure (i.e., failure is to be avoided at all costs to protect one's self image), to a more facilitative perspective (i.e., failure is a natural/necessary part of the performance process that provides opportunities for personal growth and improvement; Lizmore et al., 2018). Similarly, interventions to enhance grit have focused upon developing a growth mindset in individuals where people are taught to view failure as a natural part of the performance process that presents opportunities to learn and grow (Duckworth, 2017; Dweck, 2006). From an applied perspective, it would be valuable for practitioners and researchers to know if mental-training interventions that target one construct (i.e., perfectionism or grit) might simultaneously create changes in the other construct. An illustration of such an outcome is evident in a mental-training intervention that targeted self-compassion in athletes. Mosewich et al. (2013) conducted a study in which intercollegiate female athletes underwent a 7-day intervention to enhance self-compassion. Not only was the intervention successful in improving athlete self-compassion, the intervention had the added benefit of reducing athletes' concern over mistakes. It is conceivable that interventions aimed at reducing perfectionistic concerns by teaching athletes how to cognitively restructure the meaning of failure in a facilitative manner may also enhance athlete grit (or vice-versa). Future research is necessary to assess the validity of this proposal.

### **Limitations and Future Directions**

The current study has a number of limitations. First, as noted previously, the study employed a cross-sectional correlational design that limits the degree to which causal inferences can be made about how perfectionism and grit might influence each other. Moreover, given that we did not take any measures of athlete performance, we cannot determine if or how

perfectionism and grit might collectively influence performance and achievement striving over time. Another potential limitation relates to the fact that we used a domain-specific approach to measure perfectionism and grit. Although such an approach can actually be viewed as a methodological strength of the study (see Cormier et al., 2019; Dunn et al., 2005; Mondak, 2020), it does limit the degree to which results can be generalized to other achievement contexts beyond the domain of sport (e.g., academic settings, vocational settings, performing arts, etc.). Future research that examines perfectionism and grit using both domain-general and domain-specific measures in different achievement settings seems warranted.

The fit-indices for the model that we retained following the SEM analysis (Figure 4) provided evidence of an adequate fitting model, but fell short of criteria used to identify a good fitting model. Consequently, we recommend a degree of caution when interpreting the results of the SEM analysis. It is possible that our analysis was underpowered, and this impacted model fit: use of a larger sample size (and/or better indicators of each latent variable) may have helped in this regard (Kim, 2005). Moreover, we only obtained an adequate model fit following the removal of two grit items from the model. Whenever researchers remove items from an instrument, threats to content representativeness and internal validity can occur. In this regard, however, we again note that Tedesqui and Young (2017) removed two items from the Grit Scale (one of which was the same item we removed) in order to obtain an acceptable fit when assessing the latent structure of the Grit Scale with athletes. As suggested by Meyer et al. (2017), more research examining the conceptualization and measurement of grit in sport is required.

We further speculate that a better model fit might have been attained had we limited the number of perfectionism subscales in the model. As has been done in a number of studies that have previously employed SEM to examine relationships between higher-order dimensions of perfectionism and various criterion variables in sport, researchers have only used the personal

standards and striving for perfectionism subscales to measure perfectionistic strivings, and the concern over mistakes and negative reactions to imperfection subscales to measure perfectionistic concerns (e.g., Madigan et al., 2015, 2018; Stoeber et al., 2009). Researchers may have adopted this approach because there is a belief among some sport perfectionism theorists that the personal standards, striving for perfectionism, concern over mistakes, and negative reactions to imperfection subscales capture the most central characteristics of perfectionistic strivings and concerns in sport (Hill, Mallinson-Howard, et al., 2020; Stoeber & Madigan, 2016). In regard to this viewpoint, it is interesting to note that these four subscales loaded more strongly on the perfectionistic strivings and perfectionistic concerns variables respectively than any of the other perfectionism subscales we included in the CFA. That being said, had we followed this approach and only included the four perfectionism subscales in the model, we would have run the risk of underrepresenting other relevant aspects of the two higher-order dimensions of perfectionism that have been established in the literature (for a related discussion see Dunn et al., 2016). Nevertheless, we acknowledge the possibility that including subscales that some theorists regard as being less central to perfectionistic strivings (e.g., organization) and perfectionistic concerns (e.g., doubts about actions) may have created error variance that undermined model fit. Future research that replicates our study with independent samples is required to determine whether the current model-fit indices (and the existence of potentially problematic items and subscales) are a function of idiosyncratic sample characteristics or the result of systematic measurement/theoretical issues that require further investigation.

Finally, we note that a number of issues surrounding the conceptualization of grit—as measured by the Grit Scale (Duckworth et al., 2007) or the Short Grit Scale (Duckworth & Quinn, 2009)—have been raised in the literature. For example, results of a meta-analysis conducted by Credé et al. (2017) revealed a strong positive correlation between grit and overall

682 conscientiousness ( $p = .84$ ). Credé et al. concluded that grit might simply represent “a  
683 repackaging of conscientiousness or one of the facets of conscientiousness” (p. 502). Other  
684 theorists have also proposed that grit may be indistinguishable from self-control (Vazsonyi et al.,  
685 2019). In light of these concerns, we point to the results of Tedesqui and Young’s (2018) study  
686 with athletes where subscales of the Grit Scale were stronger predictors of deliberate practice and  
687 sport commitment than either conscientiousness or self-control. Other research conducted with  
688 athletes has reported bivariate correlations between consistency of interests, perseverance of  
689 effort, and self-control ranging in size from .24 to .56 (e.g., Shields et al., 2018; Tedesqui &  
690 Young, 2018; Toering & Jordet, 2015). Although these correlations indicate considerable overlap  
691 between facets of grit and self-control, the magnitude of this overlap does not appear to provide  
692 sufficient evidence to conflate the constructs in athletes.

693         In the context of sport, Meyer et al. (2017) argued that “little if any evidence exists to  
694 support the significance of...[grit] in the sport domain” (p. 363) when grit is conceptualized and  
695 measured by the Grit Scale and Short Grit Scale. We note, however, that since Meyer et al. made  
696 this comment, numerous studies have successfully used the Grit Scale or Short Grit Scale to shed  
697 light upon the role that grit plays for athletes in sport (e.g., Albert et al., 2019; Atkinson &  
698 Martin, 2020; Fawver et al., 2020; Newland et al., 2020; Rhodes et al., 2018; Shields et al., 2018;  
699 Tedesqui & Young, 2017, 2018, 2019). We propose that researchers continue to use the Grit  
700 Scale (or derivatives thereof) to measure consistency of interests and perseverance of effort in  
701 sport until alternative validated measures may be developed. We also recommend that  
702 researchers look to determine when, where, and under what circumstances it may be better to  
703 study grit in athletes using domain-specific or domain-general measures.

## 704 **Conclusion**

705         Although this study will not end the debate among perfectionism researchers regarding



the potential for heightened perfectionistic strivings to play an adaptive role in sport, the results do provide evidence supporting this perspective. Specifically, all three facets of perfectionistic strivings (i.e., personal standards, striving for perfection, organization) had small-to-medium positive correlations with perseverance of effort—a dimension of grit that is frequently associated with adaptive functioning in sport (e.g., Tedeschi & Young, 2017, 2018). Moreover, the associations between perfectionistic strivings and both dimensions of grit (Figure 4) were positive and statistically significant ( $ps < .001$ ). These findings support the position of perfectionism researchers that perfectionistic strivings are likely to be associated with adaptive functioning in sport when the overlap with perfectionistic concerns is controlled (Gotwals et al., 2012; Hill, Mallinson-Howard, et al., 2020; Stoeber, 2011).

The current study also extends the work of Fawver et al. (2020) and enhances our understanding of the relationships between perfectionism and grit in sport. Although we contend that our study has a number of methodological and conceptual strengths over Fawver et al.'s (2020) work (e.g., we treated grit as multidimensional domain-specific construct, and perfectionism was examined at a higher-order level), it is important to acknowledge that the specific purpose of Fawver et al.'s study was not to examine relationships between perfectionism and grit. Rather, Fawver et al. set out to determine whether grit and perfectionism were associated with various performance-related criterion variables including the amount of time youth skiers spent practicing and overall race performance during the competitive season. As such, although the current study is the first to conduct an in-depth examination of the relationships between higher-order dimensions of perfectionism and domain-specific grit in sport, Fawver et al.'s study sheds important light upon the roles that perfectionism and grit have for athlete training-behaviors and performance in a manner that the current study fails to provide.

Finally, it is important to acknowledge that the vast majority of existing studies that have

730 examined grit in sport have employed a domain-general approach using either the Grit Scale or  
731 Short Grit Scale (e.g., Albert et al., 2019; Fawver et al., 2020; Larkin et al., 2016; Newland et al.,  
732 2020; Shields et al., 2018; Tedesqui & Young, 2017, 2018, 2019). This approach has provided  
733 valuable insight into how grit operates in sport. Therefore, it is important that researchers do not  
734 simply abandon the domain-general assessment of grit in athletes. However, we do suggest that  
735 future research is needed to identify when, where, and under what conditions it may be more  
736 valuable to use a domain-specific approach over a domain general approach (or vice versa) when  
737 studying athlete grit in sport.

738         In the concluding chapter of her book on grit, Duckworth (2017) adopted the following  
739 position about how grit operates in a person's life:

740             To be gritty is to keep putting one foot in the front of the other. To be gritty is to hold fast  
741             to an interesting and purposeful goal. To be gritty is to invest, day after week after year,  
742             in challenging practice. To be gritty is to fall down seven times, and rise eight. (p. 275)

743 We support Duckworth's position, and propose that a particularly worthwhile direction for future  
744 research would be to examine if, how, and under what situational conditions perfectionism and  
745 grit interact with each other to impact the way athletes feel, think, behave, and perform in sport.

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Table 1

*Descriptive Statistics, Internal Consistencies, and Univariate Contrasts for Men and Women Across all Subscales*

| Subscales                          | Men      |               |          | Women    |               |          | Univariate test statistics |          |                  |
|------------------------------------|----------|---------------|----------|----------|---------------|----------|----------------------------|----------|------------------|
|                                    | <i>M</i> | ( <i>SD</i> ) | $\alpha$ | <i>M</i> | ( <i>SD</i> ) | $\alpha$ | <i>F</i> (1, 249)          | <i>p</i> | Partial $\eta^2$ |
| Perfectionism <sup>a</sup>         |          |               |          |          |               |          |                            |          |                  |
| Personal standards                 | 3.86     | (0.52)        | .71      | 3.61     | (0.61)        | .80      | 12.17                      | < .001   | .04              |
| Striving for perfection            | 3.97     | (0.69)        | .84      | 3.65     | (0.84)        | .89      | 10.59                      | < .01    | .04              |
| Organization                       | 3.78     | (0.73)        | .89      | 3.61     | (0.80)        | .89      | 3.08                       | n.s.     | .01              |
| Concern over mistakes              | 2.87     | (0.79)        | .83      | 2.94     | (0.82)        | .84      | 0.45                       | n.s.     | .00              |
| Negative reactions to imperfection | 2.98     | (0.70)        | .75      | 2.99     | (0.81)        | .81      | 0.04                       | n.s.     | .00              |
| Doubts about actions               | 2.18     | (0.62)        | .76      | 2.30     | (0.70)        | .82      | 2.17                       | n.s.     | .01              |
| Perceived parental pressure        | 2.14     | (0.69)        | .80      | 2.17     | (0.93)        | .91      | 0.12                       | n.s.     | .00              |
| Perceived coach pressure           | 3.20     | (0.66)        | .72      | 3.39     | (0.68)        | .80      | 5.53                       | < .05    | .02              |
| Grit <sup>b</sup>                  |          |               |          |          |               |          |                            |          |                  |
| Consistency of interests           | 5.17     | (1.05)        | .85      | 4.94     | (0.98)        | .78      | 3.14                       | n.s.     | .01              |
| Perseverance of effort             | 5.67     | (0.87)        | .82      | 5.73     | (0.76)        | .73      | 0.16                       | n.s.     | .00              |

*Note.* *N* = 251 (149 men; 102 women)<sup>a</sup> Items measured on a 5-point scale.<sup>b</sup> Items measured on a 7-point scale.



Table 2

*Mean Item Subscale Scores, Standard Deviations, Correlations, and Internal Consistency Values ( $\alpha$ ) for Full Sample*

|             | Perfectionism <sup>a</sup> |        |        |        |        |        |        |        | Grit <sup>b</sup> |         | Gender <sup>c</sup> |
|-------------|----------------------------|--------|--------|--------|--------|--------|--------|--------|-------------------|---------|---------------------|
|             | PS                         | SP     | ORG    | COM    | NRI    | DAA    | PPP    | PCP    | CI                | PE      |                     |
| PS          | (.76)                      | .56*** | .39*** | .31*** | .30*** | -.08   | .21**  | .19**  | .09               | .33***  | -.19**              |
| SP          |                            | (.87)  | .26*** | .44*** | .47*** | .06    | .17**  | .18**  | .11               | .24***  | -.16**              |
| ORG         |                            |        | (.89)  | -.01   | .07    | -.20** | .07    | .09    | .15*              | .46***  | -.10                |
| COM         |                            |        |        | (.83)  | .76*** | .46*** | .28*** | .44*** | -.15*             | -.19*   | .03                 |
| NRI         |                            |        |        |        | (.78)  | .39*** | .23*** | .40*** | -.15*             | -.14*   | .00                 |
| DAA         |                            |        |        |        |        | (.79)  | .16*   | .25**  | -.25**            | -.40*** | .06                 |
| PPP         |                            |        |        |        |        |        | (.88)  | .25*** | -.13*             | -.02    | -.03                |
| PCP         |                            |        |        |        |        |        |        | (.75)  | -.13*             | .03     | .12*                |
| CI          |                            |        |        |        |        |        |        |        | (.82)             | .36***  | -.10                |
| PE          |                            |        |        |        |        |        |        |        |                   | (.74)   | .01                 |
| <i>Mean</i> | 3.76                       | 3.84   | 3.71   | 2.90   | 2.98   | 2.22   | 2.16   | 3.28   | 5.07              | 5.71    | -                   |
| <i>SD</i>   | 0.57                       | 0.77   | 0.76   | 0.81   | 0.75   | 0.65   | 0.79   | 0.68   | 1.03              | 0.82    | -                   |

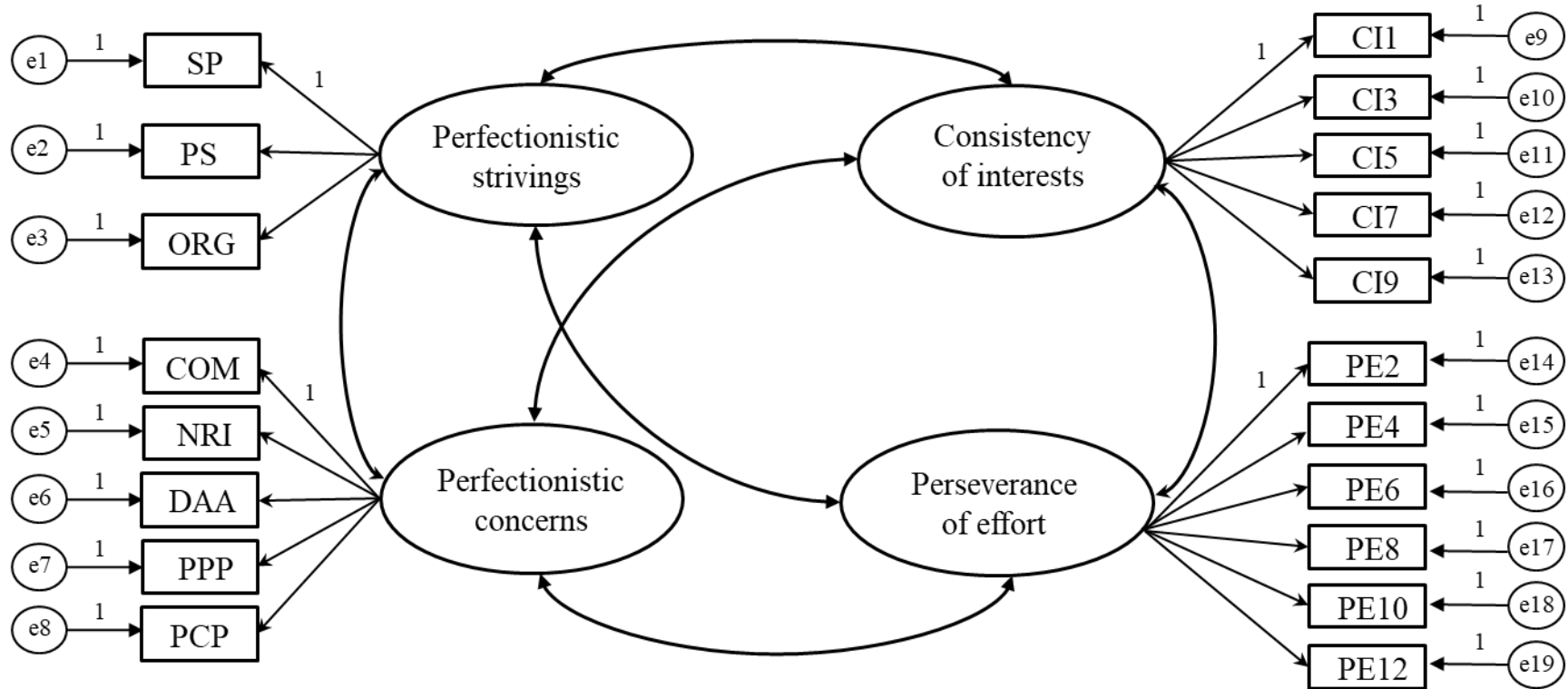
*Note.*  $N = 251$ . Internal consistency values are in parentheses along the main diagonal. Bivariate correlations ( $r$ ) are contained in the upper triangular matrix. Correlations between gender and all variables were computed with Kendal's  $\tau$ . Subscale abbreviations: PS = personal standards; SP = striving for perfection; ORG = organization; COM = concern over mistakes; NRI = negative reactions to imperfection; DAA = doubts about actions; PPP = perceived parental pressure; PCP = perceived coach pressure; CI = consistency of interests; PE = perseverance of effort.

<sup>a</sup> Items measured on a 5-point scale.

<sup>b</sup> Items measured on a 7-point scale.

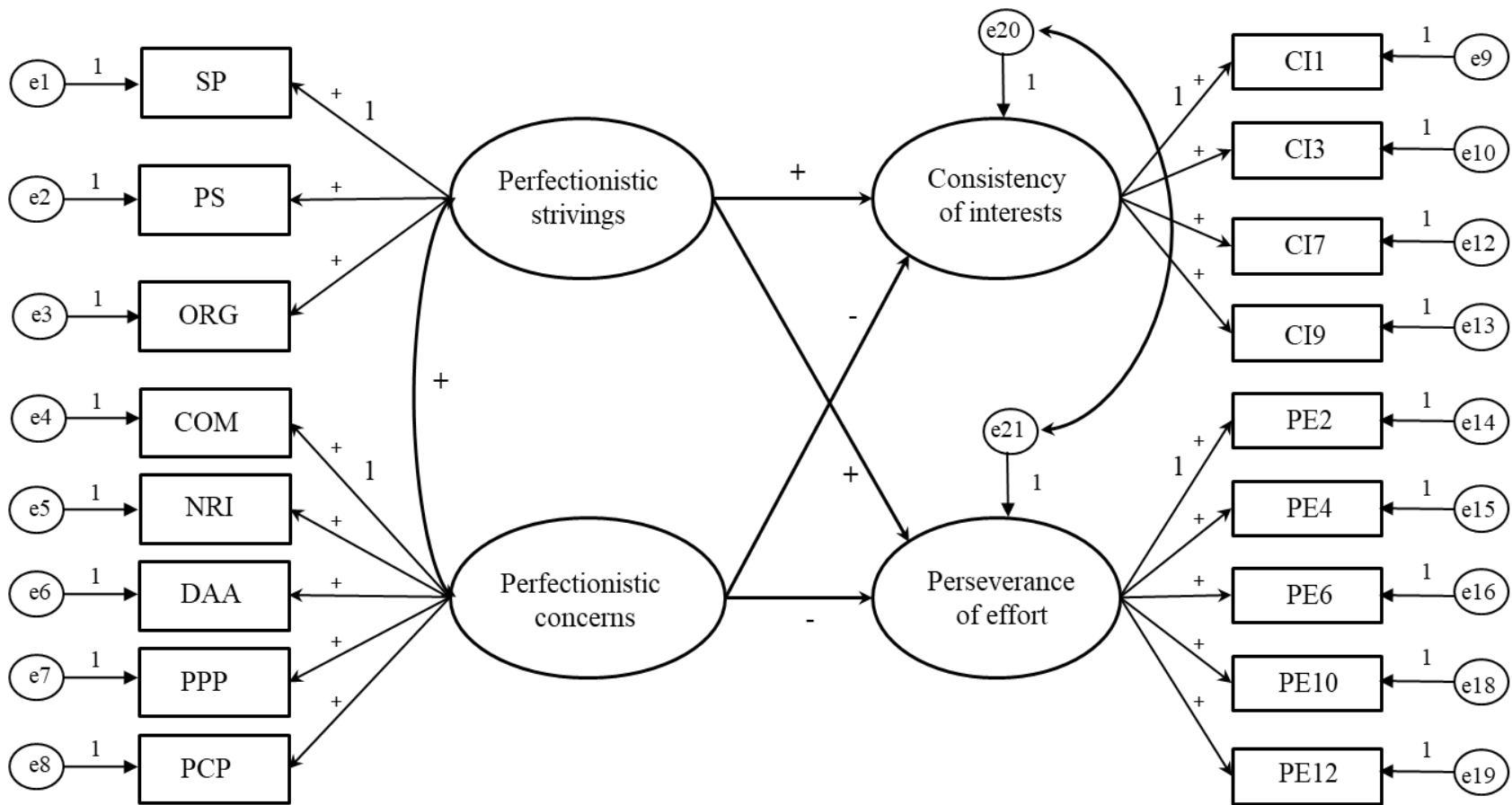
<sup>c</sup> Gender coded: 1 = male, 2 = female.

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



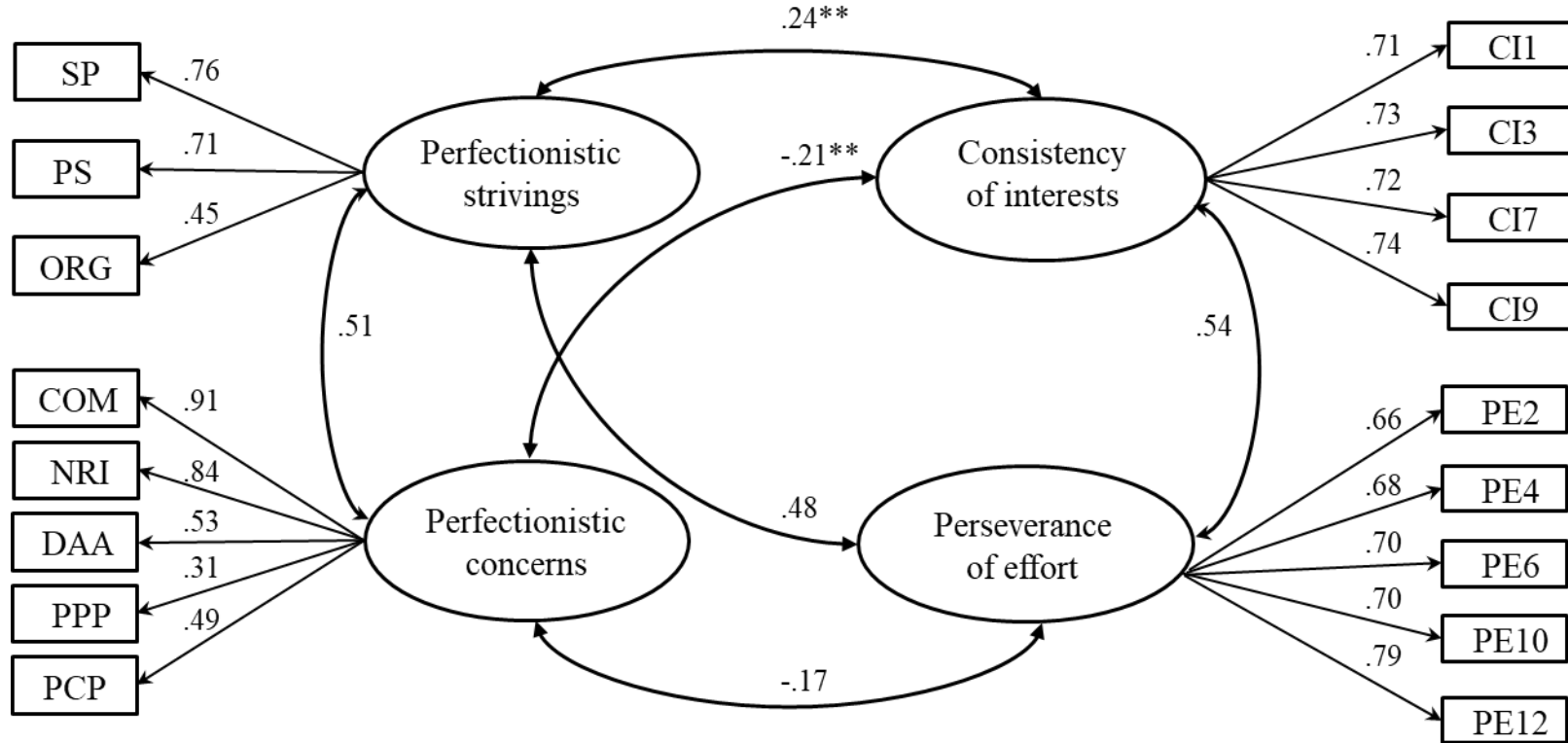
**Figure 1**

*Theoretical model for confirmatory factor analysis. Abbreviations: SP = striving for perfection; PS = personal standards; ORG = organization; COM = concern over mistakes; NRI = negative reactions to imperfection; DAA = doubts about actions; PPP = perceived parental pressure; PCP = perceived coach pressure; CI = consistency of interests items; PE = perseverance of effort items.*

**Figure 2**

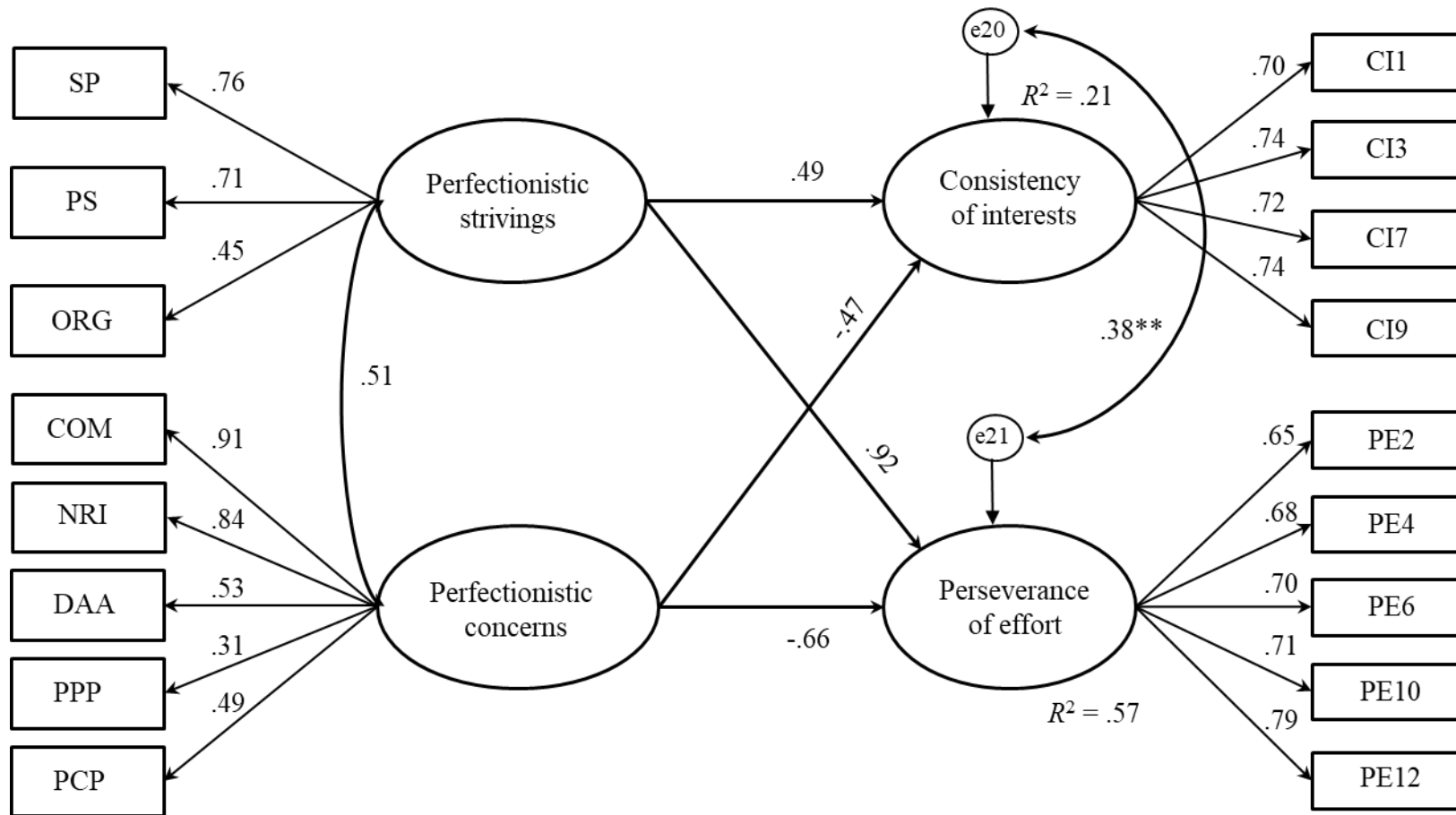
*Theoretical model for structural equation modeling analysis. Plus signs (+) indicate positive paths, correlations, or loadings.*

*Negative signs (-) indicate negative paths, correlations, or loadings. Abbreviations: PS = personal standards; SP = striving for perfection; ORG = organization; COM = concern over mistakes; NRI = negative reactions to imperfection; DAA = doubts about actions; PPP = perceived parental pressure; PCP = perceived coach pressure; CI = consistency of interests items; PE = perseverance of effort items.*

**Figure 3**

*Final confirmatory factor analysis model following the removal of items CI5 and PE8. Errors have been omitted for the sake of brevity. All parameters are standardized, and significant at  $p < .001$  unless otherwise specified. Abbreviations: SP = striving for perfection; PS = personal standards; ORG = organization; COM = concern over mistakes; NRI = negative reactions to imperfection; DAA = doubts about actions; PPP = perceived parental pressure; PCP = perceived coach pressure; CI = consistency of interests items; PE = perseverance of effort items.*

**\*\***  $p < .01$

**Figure 4**

Final model ( $N = 249$ ). Errors have been omitted for the sake of brevity. All parameters are standardized and significant at  $p < .001$  unless otherwise specified. Gender (male = 1, female = 2) was controlled: path from gender to consistency of interest = .35 ( $p < .001$ ), path from gender to perseverance of effort = .05 ( $p = .49$ ). Correlation between gender and strivings =  $-.30$  ( $p < .001$ ); correlation between gender and concerns = .05 ( $p = .47$ ). Abbreviations: SP = striving for perfection; PS = personal standards; ORG = organization; COM = concern over mistakes; NRI = negative reactions to imperfection; DAA = doubts about actions; PPP = perceived parental pressure; PCP = perceived coach pressure; CI = consistency of interests items; PE = perseverance of effort items. \*\* $p < .01$