Madigan, Daniel J. ORCID logoORCID: https://orcid.org/0000-0002-9937-1818 (2016) Confirmatory factor analysis of the Multidimensional Inventory of Perfectionism in Sport. Psychology of Sport and Exercise, 26. pp. 48-51.

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Confirmatory Factor Analysis of the Multidimensional Inventory of Perfectionism in Sport

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— Brief report —

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Abstract

Objectives and Method: The Multidimensional Inventory of Perfectionism in Sport (MIPS; Stoeber, Otto, & Stoll, 2006) is a commonly used measure of perfectionism in sport. However, there is limited empirical evidence supporting its subscale structure and composition. Therefore, the present study investigated the factor structure of the MIPS in a sample of 470 athletes (mean age 20.0 years).

Results: Confirmatory factor analysis showed that the data supported the hypothesized four-factor structure of the MIPS, differentiating: striving for perfection, negative reactions to imperfection, parental pressure to be perfect, and coach pressure to be perfect.

Conclusions: The findings suggest that the MIPS has acceptable factorial validity and therefore may be a useful measure to explore individual differences in perfectionism in sport.

Keywords: athletes; factor analysis; psychometrics; coach; parents

Introduction

Perfectionism is a multidimensional personality disposition characterized by striving for flawlessness and setting exceedingly high standards of performance accompanied by overly critical evaluations of one's behavior (Flett & Hewitt, 2002). Factor analytic studies comparing various measures of multidimensional perfectionism have provided evidence for two higher-order dimensions: perfectionistic strivings and perfectionistic concerns (cf. Stoeber & Otto, 2006). Perfectionistic strivings reflect individuals' self-oriented striving for perfection and setting of exceedingly high personal standards of performance. In contrast, perfectionistic concerns reflect individuals' concerns over making mistakes, feelings of discrepancy between one's expectations and performance, and negative reactions to imperfection. Importantly, perfectionism has been shown to be domain-specific: An individual can show higher levels of perfectionism in one domain of life than in other domains (cf. McArdle, 2010).

Competitive sport is a specific domain of life where the nature and function of perfectionism has been examined (e.g., Dunn, Causgrove Dunn, & Syrotuik, 2002). In sport, perfectionism is conceptualized as being comprised of perfectionistic strivings, perfectionistic concerns, and two additional dimensions: parental pressure to be perfect and coach pressure to be perfect (Anshel & Eom, 2003; Dunn, Causgrove Dunn, et al., 2006). Parental pressure to be perfect reflects athletes' perceptions that their parents expect them to be perfect and criticize them if they fail to achieve. Coach pressure to be perfect is the same as parental pressure, except that it is the coach who is perceived as expecting perfection and being critical. There is evidence to suggest that athletes have higher levels of perfectionism in sports than in other areas of life (Dunn, Gotwals, & Causgrove Dunn, 2005). Consequently, several sport-specific measures of perfectionism have been created (see Stoeber & Madigan, 2016 for a review). These measures are important because they have been shown to explain more variance in various outcomes in sport

than global measures of perfectionism (Dunn et al., 2005).

Multidimensional Inventory of Perfectionism in Sport (MIPS)

One commonly used measure of perfectionism in sport is the Multidimensional Inventory of Perfectionism in Sport (MIPS; Stoeber, Otto, & Stoll, 2006). The MIPS is based on a combination of different models of multidimensional perfectionism and is comprised of four subscales (capturing the key dimensions of perfectionism in sport): striving for perfection, negative reactions to imperfection, parental pressure to be perfect, and coach pressure to be perfect. Studies have shown that striving for perfection and negative reactions to imperfection are valid and reliable indicators of perfectionistic strivings and perfectionistic concerns (see Stoeber & Madigan, 2016). As such, the MIPS has been used to investigate the relationships between perfectionism and various outcomes in sport. For example, Stoeber, Otto, Pescheck, Becker, and Stoll (2007) used the MIPS to investigate individual differences in perfectionism and competitive anxiety in sport. Furthermore, studies have used the MIPS in composite measures of perfectionistic strivings and perfectionistic concerns (see Hill, Hall, & Appleton, 2010; Madigan, Stoeber, & Passfield, in press; Rasquinha, Dunn, & Causgrove Dunn, 2014). In addition, studies are beginning to utilize the two pressure subscales to investigate the role of parental and coach pressure to be perfect in sport (e.g., Madigan, Stoeber, & Passfield, 2016).

The Present Study

Whereas several studies have employed the MIPS in sport, there is limited empirical evidence supporting its subscale structure and composition. For example, the study providing initial factor validity evidence for the striving for perfection and negative reactions to imperfection subscales (Stoeber et al., 2007) used exploratory factor analysis instead of confirmatory factor analysis procedures to identify the underlying factor structure. The MIPS is, however, a theory-driven scale with a hypothesized factor structure underlying the items (see

Stöber, Otto, & Stoll, 2004). Consequently, it is more appropriate to determine whether the data are consistent with the hypothesized relationships among factors and observed variables using confirmatory factor analysis, instead of adopting a data-driven approach based on exploratory factor analysis (Thompson, 1997, 2004). Moreover, no study has explored the factor structure of the parental and coach pressure subscales by means of either exploratory or confirmatory analyses. Therefore, the present study aimed to investigate the hypothesized factor structure of the MIPS using confirmatory factor analysis.

Method

Participants and procedure

A sample of 470 athletes (71% male, 29% female) was recruited from sports academies, university teams, and local sports clubs in the south-east of England. Participants' mean age was 20.0 years ($SD = 4.7$; range: 16-35 years). Participants were involved in different sports (155 soccer, 86 rugby, 82 basketball, 62 athletics, 41 cycling, and 44 other sports [e.g., tennis, squash]) and trained on average 9.5 hours a week ($SD = 6.0$). Questionnaires were distributed during training in the presence of the first author (62%), or athletes completed an online version of the questionnaire (38%).

Measure

The Multidimensional Inventory of Perfectionism in Sport (MIPS; Stoeber et al., 2006) is comprised of four subscales: Striving for Perfection (5 items; "I strive to be as perfect as possible")[1], Negative Reactions to Imperfection (5 items; "I feel extremely stressed if everything

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[1]The original striving for perfection and negative reactions to imperfection subscales contain 8 items, however, I followed Stoeber et al. (2007) who found that the 5-item versions had better factorial validity. Moreover, nearly all studies using these subscales in and outside sport

does not go perfectly"), Parental Pressure to be Perfect (8 items; "My parents expect my performance to be perfect"), and Coach Pressure to be Perfect (8 items; "My coach expects my performance to be perfect"). Participants indicated to what degree each statement characterized their attitudes in their sport on a scale from 1 (*strongly disagree*) to 5 (*strongly agree*).

Results

The four-factor structure of the MIPS was assessed using confirmatory factor analysis (CFA) in Mplus (Muthén & Muthén, 1998-2012). I additionally compared this model to a one-factor model (where all items were forced to load on one factor; cf. Stoeber, Kobori, & Tanno, 2013). To account for missing data the models were tested using full information maximum likelihood estimation (cf. Graham, 2009). To evaluate model fit, I examined a range of incremental and absolute fit indices, including the χ^2 statistic, comparative fit index (CFI), Tucker–Lewis Index (TLI [also known as non-normed fit index, NNFI]), root mean square error of approximation (RMSEA), and standardised root mean square residual (SRMR) (Hu & Bentler, 1999; MacCallum & Austin, 2000). The following criteria were indicative of acceptable model fit: CFI > 0.90, TLI > 0.90, RMSEA < 0.08, SRMR < 0.10 (Marsh et al., 2004).

The results of the CFA suggest that the four-factor model provided an adequate fit to the data (χ^2 = 1159.761, df = 293, CFI = 0.912, TLI = 0.902, RMSEA = 0.079, SRMR = 0.049). Moreover, the one-factor model provided a poor fit to the data (χ^2 = 5322.179, df = 299, CFI = 0.488, TLI = 0.443, RMSEA = 0.189, SRMR = 0.188). Consequently, I accepted the four-factor model as the final model. Standardized factor loadings for the CFA are shown in Table 1. Factor correlations and estimates of reliability (Cronbach's alpha) are shown in Table 2. All items loaded significantly on their respective factors (see Comrey & Lee, 1992) and all factors showed

have used the 5-item versions (e.g., Madigan et al., in press).

acceptable reliability (see Cronbach's alphas in Table 2). Furthermore, the four factors showed significant intercorrelations (see Table 2).

Discussion

The present study explored the factor structure of the MIPS using confirmatory factor analysis in a large sample of athletes and found that the hypothesized four-factor structure provided an adequate fit to the data. Confirming the findings of previous exploratory research (e.g., Stoeber et al., 2007), the present findings suggest that the MIPS has acceptable factorial validity and therefore may be used as a measure of perfectionism in sport, differentiating four factors: striving for perfection, negative reactions to imperfection, parental pressure to be perfect, and coach pressure to be perfect.

Whereas the parental and coach pressure subscales of the MIPS have been used previously in empirical studies (e.g., Madigan et al., in press), no study has explored the factor structure of these subscales by means of either exploratory or confirmatory analyses. The present findings suggest that these subscales, when used in conjunction with the other subscales of the MIPS, have sufficient factorial validity to be used in further research. Moreover, the pressure subscales of the MIPS may have an advantage over other pressure scales in sport (e.g., parental and coach pressure scales of the Sport Multidimensional Perfectionism Scale [SMPS]; Dunn et al., 2002), because both have the same number of items and parallel wording. Consequently, mean scores on each subscale are directly comparable and can be used to test if athletes perceive more pressure from their parents versus their coach. For example, the present sample of athletes reported higher pressure from their coach than their parents (see Table 2, Note a).

It should be noted that whereas striving for perfection and negative reactions to imperfection are valid and reliable indictors of perfectionistic strivings and perfectionistic concerns, perfectionistic strivings and perfectionistic concerns are broad, higher-order

dimensions that cannot be fully captured with single indicators (cf. Stoeber & Otto, 2006). Stoeber and Madigan (2016) suggest that one way to overcome this is by combining the subscales of two different measures of perfectionism in sport to form composite measures of perfectionistic strivings and perfectionistic concerns. For example, by combing the subscales of the MIPS with those of the SMPS (cf. Madigan, Stoeber, & Passfield, 2015). In so doing, researchers can have greater confidence that they capture the higher-order dimensions instead of model-specific aspects of perfectionistic strivings and concerns (cf. Stoeber & Madigan, 2016).

Limitations and future research

The present study has a number of limitations. First, the sample was predominantly male (71%). Consequently, future studies need to replicate the findings with athlete samples that have a greater proportion of female athletes. This would additionally allow for a test of factorial invariance between gender. Second, although the findings of the present study provide evidence of the psychometric integrity of the MIPS, the task of establishing construct validity is an ongoing process. Thus, future studies are required to explore the convergent validity of the MIPS, for example, by comparison to other measures of perfectionism in sport (e.g., SMPS).

Conclusion

The present study makes a significant contribution to research on perfectionism in sport as the first to investigate the psychometric properties of the MIPS by means of confirmatory factor analysis. In this, the present study confirms that the MIPS has acceptable factorial validity and may be adopted to explore individual differences in perfectionism in sport.

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Table 1

Standardized Factor Loadings of the Multidimensional Inventory of Perfectionism in Sport

	SP	NRI	PPP	CPP
Striving for perfection (SP)				
I strive to be as perfect as possible	.79			
It is important to me to be perfect in everything I attempt	.82			
I feel the need to be perfect	.78			
I am a perfectionist as far as my targets are concerned	.79			
I have the wish to do everything perfectly	.79			
Negative reactions to imperfection (NRI)				
I feel extremely stressed if everything does not go perfectly		.80		
I feel depressed if I have not been perfect		.78		
I get completely furious if I make mistakes		.79		
I get frustrated if I do not fulfill my high expectations		.78		
If something does not go perfectly, I am dissatisfied with the whole competition		.79		
Parental pressure to be perfect (PPP)				
My parents expect my performance to be perfect			.83	
My parents criticize everything I do not do perfectly			.85	

My parents are dissatisfied with me if my performance is not top class	.88
My parents expect me to be perfect	.89
My parents demand nothing less than perfection of me	.90
My parents make extremely high demands of me	.88
My parents set extremely high standards for me	.82
My parents are disappointed in me if my performance is not perfect	.85

Coach pressure to be perfect (CPP)

My coach expects my performance to be perfect	.71
My coach criticizes everything I do not do perfectly	.75
My coach is dissatisfied with me if my performance is not top class	.74
My coach expects me to be perfect	.87
My coach demands nothing less than perfection of me	.86
My coach makes extremely high demands of me	.81
My coach sets extremely high standards for me	.74
My coach is disappointed in me if my performance is not perfect	.77

Note. $N = 470$. All factor loadings are significant at $p < .001$.

Table 2

Descriptive Statistics, Cronbach's Alphas, and Factor Correlations

Subscale	1	2	3	4
1. Striving for perfection				
2. Negative reactions to imperfection	.61***			
3. Parental pressure to be perfect	.26***	.27***		
4. Coach pressure to be perfect	.38***	.37***	.52***	
M	3.27	3.00	2.21[a]	2.75
SD	0.90	0.90	1.11	0.95
Cronbach's alpha	.89	.89	.96	.93

Notes. N = 470. Subscale scores were computed by averaging item responses.

[a] = significantly different from coach pressure to be perfect ($t[469] = -11.11$, p < .001).

***p < .001.