

Anxiety in Athletes: Gender and Type of Sport Differences

Ansiiedad en deportistas: género y tipo de diferencias deportivas

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Abstract

The study of anxiety, specifically its relations with sociodemographic variables, has been fruitful in sport psychology research. This study aimed to investigate athletes' sport anxiety regarding differences in gender and sport played. An application of structural equation modeling was made, with 601 Portuguese athletes. From them 172 (28.6%) were female and 429 (71.4%) were male. They competed in a variety of individual (e.g., athletics, climbing, orienteering, surfing, swimming, tennis; 42.6%) and team sports (e.g., basketball, handball, rugby, soccer, volleyball; 57.4%). Participants' age ranged from 12 to 47 years ($M = 17.44$ years; $SD = 4.99$). After testing the measurement invariance of the first and second-order models, across gender and type of sport (individual vs. team), latent mean comparisons were investigated and Cohen's d (1988) statistic was computed to obtain the corresponding effect sizes (Kline, 2016). Significant differences were detected between male and female athletes and between individual and team sports. Female and individual sports athletes presented higher levels of general sports anxiety. The results of this research provided evidence that anxiety is appraised differently by athletes based on their gender and type of sport.

Resumen

El estudio de la ansiedad, ha sido fructífero en la investigación en Psicología del Deporte. El objetivo de este estudio fue investigar la ansiedad deportiva de los atletas, con respecto a su género y el tipo de deporte. Se aplicó un modelo de ecuaciones estructurales con 601 atletas portugueses. De ellos, 172 (28.6%) eran mujeres y 429 (71.4%) eran hombres. Competían en modalidades individuales (por ejemplo, atletismo, escalada, orientación, surf, natación, tenis; 42.6%) y deportes de equipo (por ejemplo, baloncesto, balonmano, rugby, fútbol, voleibol; 57.4%). La edad de los participantes osciló entre 12 y 47 años ($M = 17.44$ años; $SD = 4.99$). Se investigaron la invariancia de medición y las comparaciones de medias latentes. Se detectaron diferencias significativas entre los atletas masculinos y femeninos y entre los deportes individuales y de equipo. Las atletas femininas y los atletas de deportes individuales presentaron niveles más altos de ansiedad deportiva general. Los resultados de esta investigación proporcionaron evidencia de que la ansiedad es apreciada de manera diferente por los atletas, con respecto a su género y tipo de deporte.

Keywords:

Anxiety, Athletes, Measurement Invariance, Sports.

Palabras Claves:

Ansiiedad, deportistas, invarianza de medida, deportes.

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Introduction

Anxiety in sport has been largely documented in several studies as the focus of research on important psychological variables (Correia & Rosado, 2018; Hamidi & Besharat, 2010; Koehn, 2013) and theory development in sport psychology (Gill, Williams, & Reifsteck, 2017; Stenling, Hassmén, & Holmstrom, 2014). Similarly, several research projects have turned an extensive history of theoretical and empirical attention on anxiety within the field of sport psychology, including its antecedents, its relations with other psychological variables, and its consequences (Smith, Smoll, Cumming, & Grossbard, 2006).

In order to create an instrument to study anxiety in the context of sports, Smith, Smoll, and Schutz (1990) developed and validated a 21-item Sport Anxiety Scale (SAS). This scale was developed to measure somatic anxiety and two aspects of cognitive anxiety: worry and concentration disruption (Smith et al., 1990). Although it has been found to be useful for researchers and practitioners in various sport contexts, psychometric properties of the SAS have been questioned (e.g., Dunn, Dunn, Wilson, & Syrotuik, 2000; Prapavessis, Maddison, & Fletcher, 2005), especially among younger participants (Smith et al., 2006). In order to provide an answer to these limitations, Smith et al. (2006) revised SAS, through a series of exploratory and confirmatory factor analyses, in a sample of 1038 child athletes (571 males and 467 females) with a mean age of 11.5 years ($SD=1.51$) and 1294 college students with a mean age of 18.36 ($SD=3.17$). Their main goal was to provide researchers with a reliable and valid multidimensional measure of sport performance anxiety that would mirror the factor structure of the original SAS. This new measure allowed researchers to measure individual differences in somatic anxiety, worry, and concentration disruption; to study the antecedents and consequences of cognitive and somatic performance anxiety in children and adults; and to measure multidimensional anxiety in longitudinal studies that begin in childhood (Smith et al., 2006). This revised measure, untitled SAS-2, contained 15 items, representing the three dimensions of trait anxiety among these young athletes: (1) worry, which assesses concerns associated with poor performance; (2) somatic anxiety, which evaluates the physiological elements of hyper-activation, such as muscle tension or stomach uneasiness; and (3) concentration disruption, which detects difficulties in focusing on relevant aspects of the competitive activity (Smith et al., 2006).

The dimensions of competitive anxiety tend to be influenced by numerous variables, such as gender or type of sport (Martens, Vealey, & Burton, 1990). Several research projects in the field of competitive anxiety have focused on identifying interpersonal

differences to design individualized interventions for athletes. However, incongruent results have been found regarding these variables.

Female athletes reported higher levels of competitive trait anxiety (Kristjánsdóttir, Erlingsdóttir, Sveinsson, & Saavedra, 2018) and higher levels of worries (O'Donoghue & Neil, 2015), whereas males indicated greater concentration disruption (Grossbard, Smith, Smoll, & Cumming, 2009). This is according to some previous studies regarding gender effects on competitive anxiety (Jones & Cale, 1989; Martens et al., 1990) but disagrees with other studies (Perry & Williams, 1989; Hanton, Neil, Melallieu, & Fletcher, 2008).

A study with Portuguese athletes reported that female athletes presented higher levels of cognitive and somatic anxiety than male athletes (Dias, Cruz, & Fonseca, 2010). In line with the previous research Ramis, Viladrich, Sousa and Jannes (2015) found only a significant effect for worry, with females exhibiting slightly higher means than males.

Regarding the type of sport differences, athletes from individual sports tend to report higher scores of cognitive anxiety in comparison to athletes in team sports (Martens et al. 1990). Consistent with this research, Dias et al. (2010) found that athletes from individual sports reported higher levels of worry and somatic anxiety. However, a study conducted by O'Donoghue and Neil (2015) found no differences in competitive anxiety between participants in individual and team sports. This is in line with previous research where the type of sport does not have a significant influence on competitive anxiety (e.g., Hanton et al., 2008).

Further research on anxiety in the Portuguese sport domain is greatly needed to provide empirical findings and theoretical clarity. Therefore, our main goal in this research was to study athletes' sport anxiety compared with their gender and sport, through structural equation modeling using a multigroup analysis. Additionally, a review of the psychometric properties was also made by examining its internal consistency, convergent validity and discriminant validity, since the validation of an instrument is a continuing process, not an end point (Nunnally & Bernstein, 1994).

Method

Participants

A convenience sample composed of 601 athletes was used in this study. From them 172 (28.6%) were female and 429 (71.4%) were male. 256 of the athletes practiced individual sports (e.g., athletics, climbing, orienteering, surfing, swimming, tennis; 42.6%), while 345 of the athletes practiced team sports

(e.g., basketball, handball, rugby, football, volleyball; 57.4%). Participants' ages ranged from 12 to 47 years ($M = 17.44$ years; $SD = 4.99$). All participants met the inclusion criteria of regularly practicing and competing in organized sports.

Measures

Participants completed the Portuguese version of the Sport Anxiety Scale-SAS-2 (Smith et al., 2006), translated and adapted by Cruz and Gomes (2007). The 15 items of the SAS-2 were designed to reflect possible responses that young athletes may have before or while they compete in sports (e.g., "My body feels tense", "I worry that I will not play my best", "I lose focus on the game"). For each item, children indicated how they typically felt based on a 5-point Likert scale, ranging from not at all (1) to very much (5). The SAS-2 is a multidimensional measure of sport performance anxiety which assesses both cognitive (in terms of worry and concentration disruption in competition) and somatic trait anxiety (physical reactions of anxiety). It comprises three subscales: i) Somatic anxiety (five items; $\alpha = .85$), involving indices of autonomic arousal centered in the stomach and muscles; ii) Worry (five items; $\alpha = .88$), concerning performing poorly and the resulting negative consequences; and iii) Concentration disruption (five items; $\alpha = .82$), reflecting problems in concentrating on task-relevant activities (Cruz & Gomes, 2007).

Procedures

The study was reviewed and approved by the University Ethics Board. Clubs, sport associations and schools were contacted by e-mail or by telephone and were invited to participate. After clubs and schools' authorizations, letters and parental consent forms (to parents for participants under the age of 18) were sent home informing them of the nature of the study. All participants (and their parents when appropriate) filled out an informed consent. The questionnaires were self-administered before training and all athletes were assured that information gathered would remain confidential and would only be used for research purposes.

Data Analysis

To analyse the data, a confirmatory factor analysis was used with AMOS 22.0 (SPSS an IBM Company, Chicago, IL).

The first step of the study was intended to assess the psychometric proprieties of the SAS-2 instrument.

Assessment of model fit was based on multiple indicators (Hu & Bentler, 1999; Marsh, Hau, & Grayson, 2005), namely: chi-square (χ^2) statistical test, the ratio of chi-square to its degrees of freedom (χ^2/df), comparative- fit-index (CFI), goodness-of-fit

index (GFI), parsimony comparative- fit-index (PCFI), parsimony goodness-of-fit index (PGFI), and root mean square error of approximation (RMSEA). In order to represent a good fit, these indices should have state values of less than 3 for the χ^2/df , above 0.60 for the PCFI and PGFI, above 0.90 for the CFI and GFI, and below 0.06 for the RMSEA (Arbuckle, 2008; Bentler, 1990; Blunch, 2008).

Internal consistency (reliability) of the constructs was assessed through composite reliability and we followed the recommendations of Nunnally and Bernstein (1994) and Vaughn, Lee and Kamata (2012) to calculate composite reliability (CR), in which it is recommended that values ≥ 0.7 indicates a proper value of CR.

Convergent validity was evaluated through the average variance extracted (AVE), whereby the values of $AVE \geq 0.5$ are appropriate indicators of convergent validity (Hair, Anderson, Tatham, & Black, 2009).

Discriminant validity was established when the AVE for each construct went beyond the squared correlations between that construct and any other (Hair et al., 2009).

The second step was to verify if the instrument (e.g., SAS-2) measured the same psychological construct in all groups (i.e., measurement invariance testing). To do so, a multigroup confirmatory factor analysis (MG-CFA) was performed, since the establishment of measurement invariance is a prerequisite for meaningful comparisons across groups (Kline, 2016). The models' invariance was tested for both the first and second-order factors (Chen, Sousa, & West, 2005; Loehlin, 2003). Factorial invariance tests were evaluated by examining the values of comparative- fit-index (CFI). A CFI increment of change (ΔCFI) of 0.01 or less between a more restricted model and the preceding one indicates that the invariance hypothesis should not be rejected (Cheung & Rensvold, 2002).

After testing the measurement invariance of the first and second-order models across gender and type of sport (individual vs. team), latent mean comparisons were investigated and Cohen's d (1988) statistic was computed to obtain the correspondent effect sizes following Kline's (2016) recommendations.

Latent Mean Differences

One of the groups was chosen to serve as a reference group and its mean on the construct was fixed to zero, while the mean of the other group(s) were freely estimated (Marôco, 2010). In this study, male athletes and team sports were chosen as reference groups. The comparison between latent means was based on the critical ratio (CR) index, which represents the parameter estimate divided by its standard error. It operates as a z-statistic in testing whether the estimate is statistically different from zero (Marôco, 2010). The

test statistic needs to be $> \pm 1.96$ to reject the null hypothesis. Moreover, in case these values are negative, we interpret them as indicating that the comparison group has lower latent mean values than the reference group (Deng, & Yuan, 2016; Guillén, & Laborde, 2014, Liu et al., 2015, Tsaousis, & Kasi, 2013).

Results

Preliminary analysis

Preliminary analyses obtained confirmed that the data was approximately univariately normal (Kline, 2016). Since Mardia's test presented violation of the multivariate normality (Bentler & Wu, 1993; Newsom, 2005), bootstrapping techniques were employed based on the recommendation of Bollen and Stine (1993) in order to adjust the p value of the chi-square statistic. The model in study presented an acceptable fit [$\chi^2 = 396.25$, B-S $p < 0.001$; $\chi^2/df = 2.830$, PCFI = 0.71, PGFI = 0.61, CFI = 0.93, RMSEA = 0.055 (CI = 0.049 - 0.062)]. With composite reliability values of 0.81 (Somatic Anxiety), 0.87 (Worry), and 0.81 (Concentration Disruption), all scales displayed acceptable reliability (Nunnally & Bernstein, 1994), and the AVE values provided evidence of convergent validity. Furthermore, all constructs were considered to exhibit discriminant validity because all AVE values exceeded the appropriate square factor correlations

(Table 1). Overall, the measurement model was within the required criteria and showed good psychometric proprieties.

Table 1.
Reliability, convergent validity and discriminant validity for SAS-2

| | | | CP | W | SA |
|----|------|------|------|------|----|
| | CR | AVE | | | |
| CP | 0.81 | 0.52 | 1 | | |
| W | 0.87 | 0.57 | 0.13 | 1 | |
| SA | 0.81 | 0.50 | 0.39 | 0.22 | 1 |

Note. CP=concentration disruption; W=worry; SA=somatic anxiety; CR=composite reliability; AVE=average variance extracted.

The second-order measurement model showed an overall acceptable fit to the data ($\chi^2 = 401.021$, B-S $p < 0.01$; $\chi^2/df = 2.864$, PCFI = 0.70, PGFI = 0.60, CFI = 0.92, RMSEA = 0.060 [CI = 0.053 - 0.067]). To assess the psychometric properties of the measures for each of the group comparisons, first and second-order models were examined separately for each group. The results of the first and second-order models showed acceptable fit to the data in all groups (Table 2).

Table 2.
Fit Results of the 1st and 2nd Order Sport Anxiety Model

| Groups | χ^2 | df | χ^2/df | B-S p | CFI | GFI | PCFI | RMSEA (CI) |
|-------------------------------|----------|-----|-------------|---------|-----|-----|------|------------------|
| 1 st Order Model | | | | | | | | |
| Male Athletes | 234.331 | 70 | 3.348 | < 0.001 | .94 | .93 | .72 | .074 [.064-.085] |
| Female Athletes | 204.690 | 70 | 2.924 | < 0.001 | .90 | .89 | .68 | .090 [.084-.095] |
| Boys-Girls | 439.299 | 140 | 3.138 | < 0.001 | .92 | .91 | .61 | .060 [.053-.066] |
| Individual Sports | 190.083 | 70 | 2.715 | < 0.001 | .93 | .91 | .72 | .082 [.068-.096] |
| Team Sports | 206.141 | 70 | 2.945 | < 0.001 | .93 | .92 | .71 | .075 [.063-.087] |
| Individual-Team Sports Sports | 346.246 | 140 | 2.830 | < 0.001 | .93 | .92 | .72 | .055 [.062-.085] |
| 2 nd Order Model | | | | | | | | |
| Male Athletes | 229.938 | 70 | 3.285 | < 0.001 | .94 | .93 | .72 | .073 [.063-.084] |
| Female Athletes | 199.206 | 70 | 2.846 | < 0.001 | .89 | .86 | .69 | .090 [.085-.094] |
| Boys-Girls | 429.413 | 140 | 3.067 | < 0.001 | .92 | .91 | .71 | .059 [.052-.065] |
| Individual Sports | 184.803 | 70 | 2.640 | < 0.001 | .93 | .91 | .72 | .080 [.066-.094] |
| Team Sports | 201.621 | 70 | 2.880 | < 0.001 | .93 | .93 | .72 | .074 [.062-.086] |
| Individual-Team Sports Sports | 401.021 | 140 | 2.864 | < 0.001 | .92 | .90 | .71 | .060 [.054-.068] |

Note. χ^2 = chi-square; df = degrees of freedom; $\Delta\chi^2$ = chi-square difference; Δdf = degrees of freedom difference; B-S p = Bolen-Stine p-value; CFI = comparative fit index; PCFI = parsimony comparative fit index; GFI = goodness of fit index; RMSEA = root mean square error of approximation.

Measurement Invariance

The results of the multi-group invariance testing strongly suggests that the factor structure underlying the SAS-2 is consistent across male and female athletes, and individual sports and team sports (see [Appendix](#) for detailed information about measurement invariance concerning the first and second order models of sport anxiety across gender and type of sport groups). Therefore, a much stronger foundation was set for examining the latent mean differences between these specific groups, allowing appropriate and meaningful comparisons ([Vandenberg & Lance, 2000](#)).

Comparison between male and female athletes

The latent mean analysis presented in [Table 3](#) demonstrated that there were significant differences between male and female athletes regarding the sport anxiety construct (i.e., second-order model).

In addition, significant differences were observed when considering each of the dimensions integrated with the higher-order construct of sport anxiety. The positive z-values presented in [Table 3](#) suggest that the comparison group (i.e., girls) has higher latent mean

Table 3.

Latent mean comparison of General Sport Anxiety and Sport Anxiety dimensions between male and female athletes and individual and team sports.

| Group Comparison | Δ LM | Z | D Cohen |
|-----------------------------------|-------------|-----------------------|---------|
| Male and female athletes | | | |
| General Sport Anxiety | .38 | 4.85* | 0.59 |
| Somatic Anxiety | .40 | 5.07* | 0.57 |
| Worry | .11 | 1.15 ^{n.s.} | 0.10 |
| Concentration Disruption | -.21 | 3.54* | 0.36 |
| Individual and Team Sports | | | |
| General Sport Anxiety | .45 | 5.87* | 0.73 |
| Somatic Anxiety | .47 | 6.72* | 0.68 |
| Worry | -.32 | -3.63 ^{n.s.} | 0.32 |
| Concentration Disruption | -.29 | 5.17* | 0.51 |

Note. n.s. = non-significant; * $p < 0.001$. LM = Latent mean.

values than the reference group (i.e., male athletes) regarding somatic anxiety and concentration disruption subscales. In addition, [Cohen's d \(1988\)](#) statistic for the sport anxiety dimensions, where significant differences were observed between the two groups, revealed the following effect sizes: somatic anxiety ($d = 0.57$) and concentration disruption ($d = 0.36$).

Comparison between individual and team sports

The comparison between individual and team sports, presented in [Table 3](#), also revealed statistical

significant differences in sport anxiety construct (second-order model).

Furthermore, significant differences in all dimensions were detected. The negative z-values suggest that the reference group (i.e., team sports) has higher latent mean values than the comparison group (i.e., individual sports). Moreover, [Cohen's d \(1988\)](#) statistic for the sport anxiety dimensions, where significant differences were observed between the two groups, revealed the following effect sizes: somatic anxiety ($d = 0.68$), Worry ($d = 0.32$) and concentration disruption ($d = 0.51$).

Discussion

The main aim of this study was to examine the psychometric properties of the SAS-2 and whether athletes with different personal and contextual factors such as gender and type of sport differed regarding their sport anxiety appraisals. The higher-order sport anxiety construct was investigated, as well as its three specific dimensions. The present study contributes to the sport psychology literature in two main ways. The first contribution provides evidence of fair to good psychometric properties of the sport anxiety scale (SAS-2), being a valid and reliable tool to use in Portuguese sport contexts. Internal consistency and convergent and discriminant validity were all achieved. The results of this CFA provided evidence in support of the notion that the measurement model exhibits a good global data fit to the empirical data, supporting the original factor structure proposed by [Smith and colleagues \(1990\)](#). Measurement invariance was accepted from all groups in comparison (e.g., configural, metric, scalar, and partial strong), providing evidence that the instrument of measurement is operating exactly in the same way, and that the underlying construct has the same theoretical structure for each group under study. Only after this critically important assumption is tested statistically is it possible to attain meaningful group comparisons ([Byrne, 2010; Chen et al., 2005](#)).

The second contribution is to provide valuable information regarding the distinctive appraisals of sport anxiety among different athletes' gender and type of sport.

The analyses of the latent mean differences between male and female athletes and individual and team sports revealed significant differences for the second-order construct of sport anxiety (i.e., general sport anxiety). Female athletes and individual sports presented significantly higher levels of general sport anxiety. Considering each sport anxiety factor, female athletes presented significant higher levels for somatic anxiety and concentration disruption. Regarding this result, it appears that female athletes are more prone to feel anxious than male athletes, a finding that is in line

with previous research (Martens et al., 1990; Clifton & Gill, 1994).

With respect to type of sport, athletes from individual sports reported significantly higher values of general sport anxiety. Confirming these results, several studies reported that athletes of individual sports tend to be more influenced by competitive anxiety than those in team sports (Terry, Cox, Lane, & Karageorghis, 1996; Ramis, Torgosa, Viladrich, & Cruz, 2010), suggesting that when athletes compete as individuals, the pressure to achieve the desired outcome will be borne by the individual alone, intensifying anxiety symptoms (Kirkby & Liu, 1999; Ramis et al., 2015). However, the worry subscale demonstrated a contradictory result, where team sports presented significantly higher values than individual sports. Accordingly, athletes in team sports experience more worry than athletes in individual sports.

Good performances will enhance the acceptance and approval by team-members leading to positive interpersonal relationships (Turman, 2003). Along with spectators, parents, and coaches, team members are constantly judging and evaluating each other's performance and contribution to the team's success and failure. Thus, this added pressure is likely to prompt feelings of anxiety, particularly worry.

Taken together, these findings represent an important effort to understand how sport anxiety and its dimensions vary between gender and sport type in Portuguese athletes.

There are several limitations to this study that deserve to be mentioned, since they may have influenced the results and should be accounted for in future research. Firstly, the sample has a disproportionate number of male compared with female athletes. This should be expected to have some influence on the accuracy of estimated parameters. Similarly, the large age range of the participants should also be considered a limitation.

Although we have been able to identify specific differences between boys and girls and individual and team sports, researchers may also consider investigating sport anxiety in relation to interpersonal variables (e.g., coach-athlete, parent-athlete, and peer relationships).

Despite the good psychometric properties provided in this study, further work is needed to estimate whether the SAS-2 may be suitable not only for basic research on the cognitive and somatic aspects of anxiety, but also to provide a psychometrically sound tool for assessing the efficacy of interventions designed to reduce anxiety in athletes.

This research provided extensive evidence of the Portuguese anxiety construct in the context of sports, giving valuable information for researchers, coaches and sport practitioners who work daily with athletes. The findings shed light not only on general sport

anxiety, but also on the unique meaning of specific lower order dimensions of anxiety in the sports domain. The consequences of sport anxiety may be appraised differently by athletes depending on their gender and the type of sport practiced. Therefore, a true understanding of sport anxiety among athletes is vital for enhancing their well-being, quality of engagement, sporting performance and social development.

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Appendix. Results of the Multi-Group Analysis of the 1st and 2nd order models of sport anxiety across the Unconstrained Model and the Constrained Models (Gender and Type of Sport Invariance).

| Model | χ^2 | <i>df</i> | $\Delta\chi^2$ | Δdf | χ^2/df | B-S <i>p</i> | CFI | GFI | PCFI | RMSEA | ΔCFI |
|---|----------|-----------|----------------|-------------|-------------|--------------|------|------|------|-------|--------------|
| 1st Order Model (Gender) | | | | | | | | | | | |
| <i>Model 1</i> | 448.419 | 142 | - | - | 3.16 | <0.01 | 0.92 | 0.91 | 0.61 | 0.060 | - |
| <i>Model 2 (Measurement Weights)</i> | 446.430 | 156 | 1.989 | 14 | 2.99 | <0.01 | 0.92 | 0.90 | 0.67 | 0.058 | 0.00 |
| <i>Model 3 (Structural Covariances)</i> | 476.565 | 159 | 28.146 | 17 | 2.99 | <0.01 | 0.92 | 0.90 | 0.68 | 0.058 | 0.00 |
| <i>Model 4 (Measurements Residuals)</i> | 523.894 | 176 | 75.475 | 34 | 2.98 | <0.01 | 0.91 | 0.89 | 0.75 | 0.057 | 0.01 |
| 1st Order Model (Type of Sport) | | | | | | | | | | | |
| <i>Model 1</i> | 396.246 | 140 | - | - | 2.83 | <0.01 | 0.93 | 0.92 | 0.71 | 0.055 | - |
| <i>Model 2 (Measurement Weights)</i> | 410.251 | 151 | 14.005 | 11 | 2.72 | <0.01 | 0.93 | 0.91 | 0.77 | 0.054 | 0.00 |
| <i>Model 3 (Structural Covariances)</i> | 458.393 | 157 | 62.147 | 17 | 2.92 | <0.01 | 0.92 | 0.90 | 0.79 | 0.057 | 0.01 |
| <i>Model 4 (Measurement Residuals)</i> | 534.360 | 1175 | 138.114 | 23 | 3.05 | <0.01 | 0.92 | 0.90 | 0.87 | 0.059 | 0.01 |
| 2nd Order Model (Gender) | | | | | | | | | | | |
| <i>Model 1</i> | 467.153 | 164 | - | - | 2.84 | - | 0.92 | 0.91 | 0.71 | 0.059 | - |
| <i>Model 2 (Measurement Weights)</i> | 469.359 | 166 | 2.206 | 2 | 2.83 | <0.01 | 0.92 | 0.91 | 0.77 | 0.057 | 0.00 |
| <i>Model 3 (Structural Weights)</i> | 469.531 | 167 | 2.378 | 3 | 2.81 | <0.01 | 0.92 | 0.91 | 0.78 | 0.056 | 0.00 |
| <i>Model 4 (Structural Residuals)</i> | 483.416 | 170 | 16.263 | 6 | 2.84 | <0.01 | 0.92 | 0.91 | 0.78 | 0.056 | 0.00 |
| <i>Model 5 (Measurement Residuals)</i> | 533.373 | 188 | 66.22 | 24 | 2.84 | <0.01 | 0.91 | 0.90 | 0.79 | 0.057 | 0.01 |
| 2nd Order Model (Type of Sport) | | | | | | | | | | | |
| <i>Model 1</i> | 401.021 | 140 | - | - | 2.86 | - | 0.92 | 0.91 | 0.70 | 0.060 | - |
| <i>Model 2 (Measurement Weights)</i> | 410.228 | 151 | 9.207 | 11 | 2.72 | <0.01 | 0.92 | 0.90 | 0.76 | 0.058 | 0.00 |
| <i>Model 3 (Structural Weights)</i> | 410.923 | 154 | 9.902 | 14 | 2.67 | <0.01 | 0.92 | 0.90 | 0.78 | 0.057 | 0.00 |
| <i>Model 4 (Structural Residuals)</i> | 437.540 | 154 | 36.519 | 14 | 2.67 | <0.01 | 0.92 | 0.90 | 0.78 | 0.057 | 0.00 |
| <i>Model 5 (Measurement Residuals)</i> | 490.881 | 157 | 89.671 | 17 | 2.78 | <0.01 | 0.92 | 0.90 | 0.78 | 0.059 | 0.00 |

Note. χ^2 = chi-square; *df* = degrees of freedom; $\Delta\chi^2$ = chi-square difference; Δdf = degrees of freedom difference; B-S *p* = Bolen-Stine p-value; CFI = comparative fit index; PCFI = parsimony comparative fit index; GFI = goodness of fit index; PGFI = parsimony goodness of fit index; RMSEA = root mean square error of approximation; ΔCFI = comparative fit index difference.