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Original Research

Examining the Effect of Perceived Stress on Flow State of Female University Athletes: Mediated by Mental Toughness

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Abstract

This study was objectified to examine the effect of perceived stress on flow state among female athletes at university. level through the lens of mental toughness. For the purpose a cross-sectional research design was conducted in which 187 female athletes were recruited from three public sector universities of Punjab purposefully. The sample was justified through a-priori sample size calculator for Structural Equation Modeling (SEM). The perceived stress, flow state and mental toughness were measured by Perceived Stress Scale-PSS, Flow Short Scale- FSS and Sports Mental Toughness Questionnaire-SMTQ respectively. Resultantly, the partial least square-structural equation modeling showed greater levels of perceived stress associated with lower levels of flow state and greater levels of sports mental toughness associated with greater levels of flow state in female athletes. Importantly, the results of the mediation analysis showed that mental toughness partially mediated the relationship between perceived stress and flow state among the female university athletes. The study findings shed light on the fact the experiences of flow during physical activities needs to be monitored to reduce the stress perceived by female athletes, whereas this also showed an important finding that female athletes with greater mental toughness does experience better flow during their sports related activities.

Keywords: *perceived stress, flow state, mental toughness, females, athletes, SEM*

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Introduction and Literature Review

Positive psychology is always concerned with the flourishing and optimal functioning of the human beings in terms of institutional or individual experiences (Seligman, & Csikszentmihalyi, 2000). Considering the optimal functioning in sports, a number of studies have been conducted earlier to investigate the psychological skills of athletes from the perspective of flow, sports performances, hardiness and goal achievement motivations (Jackman et al., 2016; Swann et al., 2016; Crust et al., 2015; Wu et al., 2021). Flow, in sports psychology is described as the state of experiencing and involving into the tasks with complete absorption and creating the sense of consciousness where optimal level of functioning usually occurs (Csikszentmihalyi, & Csikszentmihalyi, 1990; Swann et al., 2016). During the athletic performances, the it is often considered important by athletes, coach and sport psychologists to

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understand the factors which may influence the flow state either positive or negative (Arora et al., 2022). Further, it is also believed that among negative factors, stress is the most perceived one among the athletes. In competitive sports, stress is a common phenomenon and athletes encounter a variety of different stressors (Luthar et al., 2006). Researchers have argued that athletes are at particular risk of high perceived stress due to high level of training loads or performance pressure from sports institute and academic institutions and selection processes (Mousavi et al., 2021).

The cognitive-transactional model of stress states that when an individual is faced with harm, loss, threat or challenge several transactions occur between the person and the environment. In line with this stress model, previous studies have shown that individual appraisal processes impact on athletes' response to particular stressors (Gucciardi et al., 2009; Jones et al., 2007). Negative events, crises, and challenges in life are unavoidable, evoking a plethora of human responses. Some individuals adapt while others fail to cope with stressful experiences (Swann et al., 2012). Maintaining personal wellbeing requires skills and resources to overcome negative events. Hence mental toughness is usually seen as a strong positive factor in athletes to overcome their life challenges and stressors with effecting their sports performance. Here mental toughness is a trait like construct which is quite similar with the hardiness (Clough et al., 2002).

Mental toughness is related to success and progression in sport and is described as a personal capacity to consistently produce good performances despite varying situational demand levels (Gucciardi et al., 2015). While the debate concerning the nature of the construct continues, most researchers argue that mental toughness is a reasonably stable and enduring disposition that is unlikely to change rapidly (Hardy et al., 2014). A range of mental toughness models have been proposed (Clough et al., 2002; Cook et al., 2014; Gucciardi et al., 2008). Further, Lin et al. (2017) recently defined mental toughness as a multidimensional personality construct, which helps people successfully cope with stressors and to strive when faced with challenging situations.

Mental toughness is generally referred to as an important psychological characteristic related to successful outcomes in elite sports (Kristjánsdóttir et al., 2018; Ponnusamy et al., 2018). With regard to personal factors, Gucciardi (2016), recently showed among junior athletes that high mental toughness predicted decreased in perceived stress acquired by athletes in sports. Several studies have shown that young athletes who report higher mental toughness are more likely to have lower anxiety and more effective responses to dealing with stressful situations (Kristjánsdóttir et al., 2018; Ponnusamy et al., 2018).

In terms of flow, the mental toughness is regarded as personal attribute supporting the process of performance excellence and sustained achievement in sport (Csikszentmihalyi, 2002; Gucciardi et al., 2015). The common intersection between flow and mental toughness concerning optimal functioning highlights the importance of understanding the Mental toughness-flow relationship. Although flow is often considered to be elusive (Aherne et al., 2011), it is further stated that some athletes are "better psychologically equipped, whatever the situation, to experience flow" Indeed, researchers have proposed the idea of a personality which encompasses psychological attributes that increase the propensity to experience flow states (Nakamura & Csikszentmihalyi, 2009). As a result, there have been calls for a more refined understanding of the influence of individual differences on flow experiences in sport (Jackson, 2016; Swann et al., 2012).

Notably, the majority of commonly reported mental toughness attributes have emerged as antecedents or characteristics of flow, demonstrating the theoretical overlaps between mental toughness and flow (Koehn et al., 2013). In past, mental toughness and flow is studied

on male athletes, but a gap is identified in literature on female athletes with respect to the variables understudied (Ajilchi et al., 2021; Mousavi et al., 2021).

Studies conducted with male cohorts reported that, while some activities incorporate predefined challenges, there are occasions when the challenge provided by the situation is ambiguous or insufficient for flow, such as any stressors perceived by the athletes might make them feel pressurized (Cook et al., 2014) which will ultimately affect the state of flow they have been experiencing. As well as theoretical intersections, empirical studies reported significant and associations between mental toughness and flow in sport (Crust & Swann, 2013), whereas the effect of stress on the experiences of flow during physical activity is not directly studied among female athletes (Ajilchi et al., 2021).

However, we aimed to purposefully sample the female athletes with perceived stress related to sports performance to quantify the effect on their experiences of flow in sports. In addition, we also proposed that higher/lower level of mental toughness among the female athletes will serve as a mediatory variable in inquiring the indirect effect of perceived stress on flow state experiences (See Figure 1 for Conceptual Diagram)

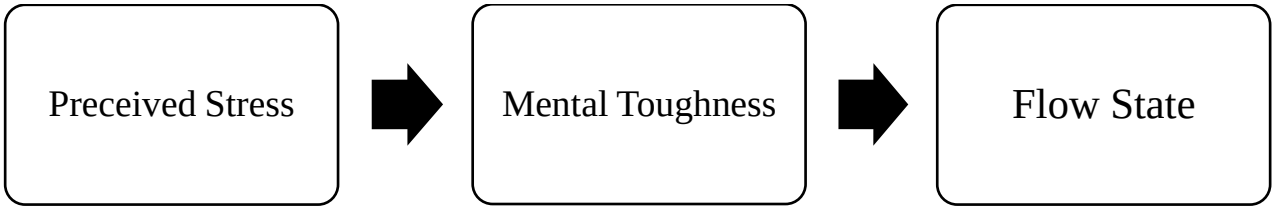

Figure:1 Conceptual Diagram

Objectives of the study

1. To investigate the effect of perceived stress on flow state of female university athletes.
2. To gauge the mediating role of mental toughness between perceived stress and flow state among female university athletes

Hypotheses of the study

1. It was anticipated that there would be significant impact of perceived stress on flow state of female university athletes.
2. Mental Toughness would be a significant mediator between perceived stress and flow state among female university students.

Method

Research Design and Sampling Strategy

A cross-sectional research design was employed in this study and sample was selected purposefully justified by a-priori online sample size calculator for Structural Equation Modeling (Soper, 2021). The total sample size needed for minimum effect size was 187 with 0.8 power level and 0.05 probability level.

Participants Characteristics

The participants of this study were female athletes aged between 18 to32 years with experience in their sport ranging from 10 to 20 years enrolled in three public sector universities of Punjab at sports quota. The athletes competed at national (n = 18), provincial (n = 88), club/university (n = 62), and beginner (n = 19) levels. Additionally, the sample consisted of team sport (n = 131) and individual sport athletes (n = 56). (See Table 1).

Table 1:

Characteristics of Participants (N=187)

Sports Oriented Demographics	***Groups***	***f (%)***
Age	18-25	97(51.8)
	25-32	90(48.2)
Sports Experience	10 Years	82 (43.8)
	10-15 Years	70(37.4)
	15-20 Years	35 (18.8)
Levels Competed	National	18(9.6)
	Provincial	88 (47.1)
	Club/College/University	62 (33.2)
	Beginner	19 (10.1)
Category of Sport	Individual	56 (29.9)
	Team	131 (70.1)

The above table shows the sports oriented demographic characteristics of female athletes.

Instruments

Participants completed informed consent and a form consisting of sports oriented demographic details such as age, sports experience, competition levels and category of sports.

Perceived Stress Scale-PSS. Perceived stress during the past month was assessed with the widely used 10-item Perceived Stress Scale-PSS developed by Cohen, et al. in 1994. This scale has response format on five-point Likert-type scale (0 = Never to 4 = Very often). The total scores range from 10 to 40, with higher scores indicating higher levels of perceived stress. The Cronbach's alpha for this measure was 0.81 for original scales whereas for current study reliability of this scale was 0.83.

Flow Short Scale-FSS. The flow state was measured with the Flow Short Scale-FSS (Rheinberg et al., 2003) which evaluates the flow experiences during physical activity. This scale has 10 items having response format on 7-point scale ranging from a minimum of 1 (not at all) to maximum of 7 (very much). The internal consistency of original scale was $\alpha = 0.92$ and for this study it was reported as 0.86.

Sports Mental Toughness Questionnaire-SMTQ. This scale was developed by Sheard, et al. (2009) to assess the mental toughness of sports athletes. It is a 14-item inventory which was anchored on 4-point Likert-type scale i.e., 1= not at all true to 4= very true. The total score of this questionnaire ranges from 14 to 56. The internal consistency of this scale was $\alpha = 0.78$ whereas for the current study Cronbach's alpha was 0.85.

Statistical Analysis

After collecting the data on above mentioned research instruments, the data were analyzed using Smart PLS (3.0). The partial least square was chosen because it is suitable to analyze the proposed model with small sample size, has less sensitivity to data normality and is very efficient for determining complex path models.

Ethical Consideration

The formal permission was taken from the institutional review board for the approval of study. Participants were informed about the purpose of study and their consent was obtained. The participants were ensured about their privacy and confidentiality of information they provided in this research. Considering the tough schedule of sports and academic related

engagements, the researcher was flexible about the time athletes took for completing the questionnaires.

Results

Measurement Models

At the stage of measurement models, the convergent validity, reliability and discriminant validity were estimated by following the guidelines of (Hair et al., 2014).

Table 2

Values of Cronbach's Alpha, Composite Reliability (CR), Average Variance Extracted (AVE), Heterotrait–monotrait ratio (HTMT) (N=187)

Variables	α	CR	AVE	HTMT
Perceived Stress	0.83	0.84	0.52	0.76
Flow State	0.86	0.87	0.61	0.78
Mental Toughness	0.85	0.83	0.58	0.73

The values of average variance extracted (AVE), composite reliability (CR) and Cronbach's alpha were considered for convergent validity and reliability. The results showed that no items were eliminated through factor loadings (>0.50) and the convergent validity was in acceptable ranges with respect to each variable. Further the values of AVE, CR and Cronbach's alpha was also greater than 0.80 respectively which also indicated the acceptable convergent validity. The discriminant validity was measured by the heterotrait–monotrait ratio (HTMT) If the value of the HTMT was less than 0.85, this signifies acceptable discriminant validity (Henseler, et al., 2015).

Structural Model

At this stage, the research hypotheses were tested through coefficient of determination (R2), effect size (f2), and Stone–Geisser (Q2) values.

Table 3

Indirect Effects of Perceived Stress on Flow State through Mental Toughness on Female Athletes (N=187)

Relationship	Path coefficient	t-value	p value	R^2	Ad. R^2	f^2	Q^2
PS > FS	-0.445	4.327***	0.000	-	-	0.262	-
PS >MT	-0.788	13.737***	0.000	0.622	0.617	1.643	0.317
MT > FS	0.448	4.413***	0.000	-	-	0.264	-
PS >MT > FS	-	-	-	0.713	0.705	-	0.204

PS= Perceived Stress, FS=Flow State, MT= Mental Toughness, ***Significance at 1%

The structural model results showed a significant negative correlation between perceived stress and flow state ($\beta = -0.445$, $t = 4.327$, $p < 0.001$), significant negative correlation between perceived stress and mental toughness ($\beta = -0.788$, $t = 13.737$, $p < 0.001$), and a significant positive correlation between mental toughness and flow state among female athletes ($\beta = 0.448$, $t = 4.413$, $p < 0.001$). R^2 was calculated to evaluate the value of variance in flow state explained by perceived stress and mental toughness. R^2 for flow state was 0.713,

which indicated that perceived stress and mental toughness explained 71.3% variance in flow state of female athletes. Whereas, the f^2 was calculated as 0.26 as the lowest and 1.643 as the highest value, showing large effect size on flow state of female athletes predicted by perceived stress and mental toughness. The above table also showed that the Q^2 values ranged from 0.204 to 0.317 which indicated medium predictive relevance of flow state of female athletes with partial mediation.

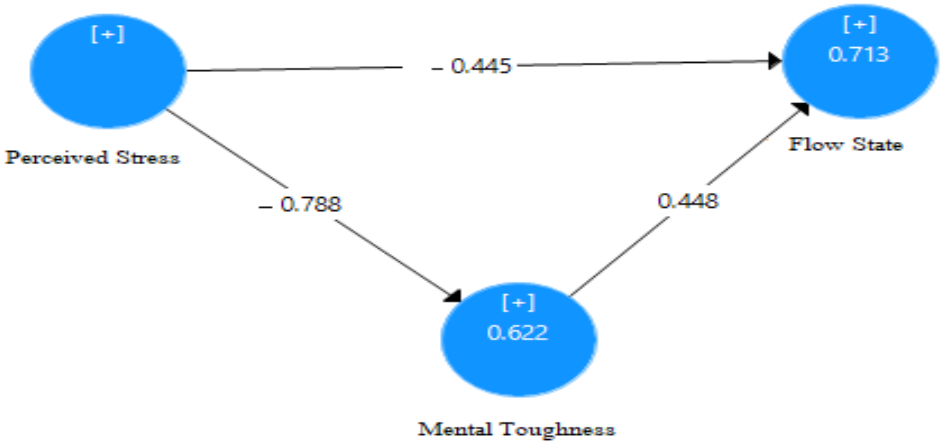

Figure 2: Structural Model of Flow State for Female Athletes

Discussion

The result of the analysis by the PLS-SEM is in line with prior study (Gucciardi et al., 2015) that showed higher levels of perceived stress were associated with lower levels of flow state among athletes. The present study also supports the previous result among female athletes which stated that during any kind of competition related to the sports, the stress is quite common phenomenon and it is accompanied by variety of other stressors which ultimately effects the concentration and goal orientation in other words it impacts on the flow state during sports (Luthar et al., 2006; Masten, 2004). The cognitive-transactional stress theory also provides a descriptive interpretation for this finding, which means that if the female athletes have stressful believes about the situation or they perceive any competitive situation as terrifying, uncontrollable or unchangeable, the flow state of athletes will experience negative stressors (Koehn et al., 2013; Swann et al., 2012). The above cites literature and results of this study provides supports for the acceptance of first hypothesis.

The next finding showed that higher levels of mental toughness were associated with higher levels of flow states among the female athletes, which was in line with past studies (Kristjánsdóttir et al., 2018; Lin et al., 2017; Ponnusamy et al., 2018). A descriptive clarification of this finding is that individuals with high levels of mental toughness as a personality attribute are more likely to have strong, challenging responses to stressful situations. They are also quite able to overcome irrational thoughts related to performance stress and selection processes which may affect the tendency of athletes to maintain the optimal level of flow. It is also seen that higher level of perceived stress may also influence the mental toughness of female athletes.

In line with this stress model, previous studies have shown that individual appraisal processes impact on athletes' response to particular stressors (Gucciardi et al., 2009; Jones et al., 2007) and mental toughness can help to cope with negative life stressors efficiently (Mousavi et al., 2021).

The mediation analysis demonstrated that mental toughness facilitated the effect of perceived stress on flow state in nurses. A potential clarification in this regard is carried out by the researchers in previous studies that mental toughness has the traits related to personality, so the lower or higher level of this trait can sustain the flow state of athletes even after they face any kind of stressful challenges during their sports. As the most commonly considered attributes of mental toughness have been seen as the characteristics of flow (Cook et al., 2014; Koehn et al., 2013).

A number of perceived challenges can be catered off due to the potential and capacity of an athlete to overcome the stressors. It was also reported earlier that high achiever female players from possess more magnitude of mental toughness than the low achiever female players from thereby reestablishing the scientific linkage between mental toughness and achievement in indigenous sports competitions (Nayak, 2022; Zarić et al., 2021). Therefore, the valuable attributes of mental toughness could be a protective factor against perceived stress and increase the likelihood of flow state experiences during sports face by female athletes.

Conclusion

The study concluded that flow state of female athletes is prone to get affected due to the stressors perceived during sports performances. Hence, mental toughness of the female athletes would be an intervening factor to sustain the flow states in stressful situations.

Limitations and Suggestion of the Study

This study was limited to the female athletes only, the author focused on females due to certain daily life barriers faced while pursuing their career or interest as an athlete. The researcher suggests extending the study for other genders too. The sample was collected purposefully for sports quota students only, it is further suggested to take students of physical education and training as research participants to reach upon more generalizable findings. It is also suggested further to take game wise separate sample for example athletes of cricket, football, badminton to get comparable findings. The results based on sports oriented demographic comparison can also be analyzed in future researches.

Implications of the Study

Further research will assist understanding of these findings and could help to inform applied recommendations for coaches, athletes and practitioners, with respect to the initiation, maintenance and restoration of flow states along with mental toughness endurances and other psychological skills required for mental and physical wellness of athletes.

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Author's Contribution: Muhammad Wajid (conceptualization, literature review and report writing), Alejandra Ramirez Rodriguez (methodology and final review), Aroosa Awan (data collection and data curation) and Asadullah Malik (data analysis).

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