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A New Structural Equation Modeling of Psychophysiological Measures and Multidimensional State Anxiety Induced by Autogenic Training

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Abstract--- *The effectiveness of Autogenic Training on the stress response is two-fold: Produces a switch from sympathetic (fight/flight) dominance to parasympathetic dominance with increased activity of the rest/digest, relaxation/restorative system. Biofeedback is an evidence-based mind-body technique where individuals learn to consciously control their physiology. Most psychophysiological research investigating the link between anxiety and physiology has been conducted in the laboratory. When anxiety is measured as it occurs naturally in a real-life setting, it is more representative of that experienced by individuals in their day to day lives especially during sport competition.In competitive ten-pin bowling, it is most probable that technical and psychological skills. Thus, by using various psychophysiological measures, we can examine state anxiety level of the ten-pin bowlers. From the existing literature search, no previous studies have investigated the correlations of Autogenic Training on Psychophysiological Measures and Multidimensional State Anxiety with Structural Model with a Reflective Model Constructs with PLS-SEM in sport psychology research. At such, the main aim of this study was to construct a statistical model using SmartPLS to explore the linear relationships of single independent variable (Autogenic Training) on the multiple dependent variables (Psychophysiological Measures & Multidimensional State Anxiety) in elite bowlers prior to competition.Through the analysis of the structural equation model using formal study data, CR and AVE of the model indicated that measurement model had good internal consistency, convergent validity, and discriminant validity. The path shows that the influence of independent variables on dependent variables. Also, from the analysis of the structural model, the R^2 value (coefficient of determination) showed that the model has higher prediction accuracy. In addition, the SRMR results obtained indicate that the model fits well. Therefore, this model can be put forward for the use in managing the multidimensional state anxiety of the athletes prior to competition.*

Keywords--- *Structural Model, Autogenic Training, Psychophysiological Measure, Multidimensional State Anxiety.*

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I. INTRODUCTION

Anxiety has been definedas a subjective feeling of tension, fear, nervousness, and worry associated with stimulation of the nervous system(Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983; Vigneau & Cormier, 2008). There are two symptoms that can be identified with anxiety, that is, psychological and psychophysiological. The psychophysiological symptoms include sweaty palms, cold, nervous, panic, breathing fast, heartbeat racing, or abdominal pain(Prima, Wahab, Othman, & Awang, 2010).

Anxiety has been the most massively researched area and most widely discussed theme among the sport psychology community (Pineschi & Pietro, 2013). Previous researchers proposed that anxiety consists of two components: a cognitive component, associated with worry, and a somatic component, associated with nervousness or tension (Prapavessis, Cox, & Brooks, 1996). Moreover, anxiety usually issue in the terms of facilitating or debilitative anxiety, as some athletes may interpret their anxiety symptoms as facilitative to performance whilst others may interpret them as debilitative (S. Hanton, O'Brien, & Mellalieu, 2003). Also, frequency of cognitive anxiety symptoms tends to remain high in the run up to competition, whilst somatic anxiety increases dramatically as the competition nears(Sheldon Hanton, Neil, & Mellalieu, 2008).

Sports and athletics create special opportunities for the study of the feelings of the athletes in various sporting events (Thelwell, Weston, Lane, & Greenlees, 2006). From the previous studies, many coping strategies suggested by sport psychology researchers (Smith, Smoll, & Cumming, 2007). For the anxiety management, the psychophysiological techniques have been producing effects that are antagonists of the state of anxiety: reduced muscle tension, heart rate and blood pressure, and increased alpha waves (Cacioppo, Tassinary, & Berntson, 2007).

Many athletes have acknowledged coping strategies such as imagery, deep breathing exercises, autogenic training, biofeedback training, and progressive relaxation training are important strategies in anxiety management (Zhang, Si, Chung, & Bu, 2017). A number of studies have investigated the relationship between psychological skills and competitive anxiety. Findings showed that performers who reported greater use of relaxation strategies experienced lower levels of anxiety and interpreted symptoms as more facilitative to performance than their low usage counterparts. The relaxation strategy adopted was found to reduce the intensity of anxiety symptoms and increase facilitative interpretations of symptoms and levels of self-confidence (Mamassis & Doganis, 2004).

Autogenic Training is based on passive concentration of bodily perceptions (e.g. heaviness and warmth of arms, legs, and abdomen, rhythm of breath; and heartbeat) and increased feelings of well-being (Benor, 1996). The Autogenic Training technique consists of six standard exercises (Schultz & Luthe, 1969). The first exercise aims at muscular relaxation by repetition of a verbal formula, ‘my right arm is heavy’, emphasizing heaviness. Subsequent passive concentration is focused on feeling warm, initiated by the instruction ‘My right arm is warm’, followed by cardiac activity using the formula ‘My heartbeat is calm and regular’. Then follows passive concentration on the respiratory mechanism with the formula ‘It breathes me’, then on warmth in the abdominal region with ‘My solar plexus is warm’ and finally on coolness in the cranial region with ‘My forehead is cool’. It usually takes 8 weeks to learn the technique, and home practice of the exercises at least three times daily is encouraged (Schultz & Luthe, 1969).

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Also, Autogenic Training is frequently applied in group settings. Clinical evidence and evidence from many other controlled studies demonstrates that the group setting is as well appropriate (Da Ronch, Gastaldo, Ottobre, & Gastaldo, 2014). The effectiveness of Autogenic Training on the stress response is two-fold: Autogenic Training produces a switch from sympathetic (fight/flight) dominance to parasympathetic dominance with increased activity of the rest/digest, relaxation/restorative system (Schultz & Luthe, 1969). Once the excesses of stress are removed, whatever the cause, the individual is better equipped to address other aspects of themselves. On top of that, the scientific basis for the use of the sensations of heaviness and warmth comes from observation and discoveries in the field of medical hypnosis. The sensation of freshness on the forehead contrasts with the warmth experienced in this region during active problem solving and moments of intense mental activity (Sadigh, 2001).

Most psychophysiological research investigating the link between anxiety and physiology has been conducted in the laboratory where it is easier to monitor and induce anxiety with a minimum of confounding variables. The often-cited concern about this laboratory research is its ecological validity and the generalizability of artificially inducing anxiety in an unnatural environment (Wilhelm, Trabert, & Roth, 2001). When anxiety is measured as it occurs naturally in a real-life setting, it is more representative of that experienced by individuals in their day to day lives (Wilhelm et al., 2001) especially during sport competition.

With respect to the physiological indicators of anxiety and relaxation, these can be detected and monitored by biofeedback equipment, which generally comprises biological sensors, an encoder and corresponding software. Such equipment captures, amplifies and transmits information to the individual, in a numeric, auditory and/or visual way, that allows him/her to regulate “involuntary” psychophysiological processes (Pineschi & Pietro, 2013). In the scope of sport performance, the potential effects of biofeedback increase when it forms part of a larger intervention package containing, for example, relaxation and visualization techniques (Bar-Eli, Dreshman, Blumenstein, & Weinstein, 2002).

Biofeedback is an evidence-based mind-body technique where individuals learn to consciously control their physiology (Frank, Khorshid, Kiffer, Moravec, & McKee, 2010). Biofeedback makes people aware of and understand how their thoughts, feelings and behaviour are related to their physiology and due to the increased awareness they gain conscious control over it. Biofeedback is taught by a trained biofeedback practitioner (therapist) who uses specialized equipment which converts physiological signals, such as heart and breathing rate, heart rate variability, galvanic skin response, skin temperature or muscle tension into meaningful visual and/or auditory cues which are directly shown to a client on a computer monitor. After using biofeedback equipment for some time, a person learns to self-regulate without any feedback (Frank et al., 2010).

The psychophysiological measures such as skin temperature (TEMP) is measured by sensors placed on the ring fingers. The temperature modality indicates the contraction of the smooth muscles surrounding the blood vessels, which determines how much blood reaches the fingertips. When these muscles are contracted (tense), the temperature is cooler because less blood reaches the fingers(Shaffer & Moss, 2006). Also, the skin conductance (SCL) is a measure of eccrine (sweat) gland activity. Most people are familiar with having cold, clammy hands under stressful circumstances, such as meeting new people or having to perform before an audience. The coldness

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comes from constriction of the smooth muscles surrounding the blood vessels (measured by hand temperature), while the dampness is caused by eccrine gland activity (Vitasari, Wahab, Herawan, & Sinnadurai, 2011). The eccrine glands secrete a salty solution in response to emotional and stress stimuli(Shaffer & Moss, 2006). Additionally, heart rate (HR) is measured in beats per minute. Faster heart rates are often caused by stress; our hearts may race and pound when we are afraid. Other kinds of stress, such as depression, may result in lower heart rates. To measure heart rate, we place a sensor on a finger to detect each beat of the heart (Shaffer & Moss, 2006; Vitasari et al., 2011).

The multidimensional approach to the study of anxiety considers subcomponents of anxiety, specifically cognitive anxiety, somatic anxiety, and self-confidence(Mabweazara, Leach, & Andrews, 2016).A temporary anxiety condition would then comprise two components: a mental (cognitive) component consisting of negative expectations about success or negative self-evaluation(Mabweazara et al., 2016); and a physiological (somatic) component corresponding to increased heart rate, shortness of breath, sweaty hands, butterflies in the stomach, increased muscle tension, cold sweat (Mabweazara et al., 2016). In a sport context, two factors during competitions lead to a perception of threat and thus, to the state of anxiety: (a) "uncertainty about the outcome," namely, uncertainty about winning or losing; and (b) "importance of the outcome," namely, the importance of obtaining extrinsic and intrinsic rewards(Mabweazara et al., 2016).

Following the introduction the multidimensional conception of anxiety into sport psychology, Martens and colleagues developed the Competitive State Anxiety Inventory-2 (CSAI-2) to measure the intensity of performers' cognitive and somatic responses, and also self-confidence(Lane, Terry, & Karageorghis, 1995). Subsequent research employing the CSAI-2 has provided evidence to support the separation of cognitive and somatic components as a function of antecedents(Mellalieu, Hanton, & Fletcher, 2006).

Ten-pin bowling is an individual precision sport, which requires a bowler to grip the bowling ball firmly, walk in rhythmic step with a finishing sliding step and release the ball through the lane in order to strike all pins. In competitive ten-pin bowling, it is most probable that technical and psychological skills (Newton, Duda, & Yin, 2000) contribute to high scores. Additionally, ten-pin bowling is basically a self-paced and precision sports that needs a high mental toughness and concentration to perform well. The psychophysiological, cortical, behavioural, and kinematic features of self-paced tasks (e.g., ten-pin bowling, shooting, golf putting, dart-throwing, archery) have been usually studied involving a within-subjects approach by contrasting individual's best and worst performance patterns (Comani et al., 2013). Thus, by using various psychophysiological measures, we can examine state anxiety level of the ten-pin bowlers.

To the best of our knowledge and existing literature search, no previous studies have investigated the correlations of Autogenic Training on Psychophysiological Measures and Multidimensional State Anxiety with Structural Model of the Reflective Model Constructs with PLS-SEM in sport psychology research.

The PLS-SEM method is very appealing to many researchers as it enables them to estimate complex models with many constructs, indicator variables and structural paths without imposing distributional assumptions on the data. More importantly, PLS-SEM is a causal-predictive approach to SEM that emphasizes prediction in estimating statistical models, whose structures are designed to provide causal explanations (Sarstedt, Ringle, & Hair, 2017).

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PLS- SEM is a regression based approach that explores the linear relationships between multiple independent variables and a single or multiple dependent variables. Further, PLS-SEM will have greater statistical power and converges quickly handling much larger and complex models. Additionally, user-friendly software packages are available that generally require little technical knowledge about the method, such as SmartPLS (Henseler, Ringle, & Sarstedt, 2015).

At such, the main aim of this study was to construct a statistical model using SmartPLS to explore the linear relationships of single independent variable (Autogenic Training) on the multiple dependent variables (Psychophysiological Measures & Multidimensional State Anxiety) in elite bowlers prior to competition. Majority of previous studies related to autogenic training, psychophysiological measures and anxiety were on cause and effect in nature. Also, most of the previous studies in this area were conducted in laboratory setting, this study was carried out on the training and competition venues, these are the real-life setting for the bowlers, it will be more representatives the nature of anxiety prior to competition.

II. METHODS

Participants

Thirty Malaysian elite backup bowlers (15 females and 15 males), aged 17-20 years, with a mean age of 18.63 (SD= 0.92) years had international experience in international bowling competitions recruited to participate in this study. All participants were under the training program of National Sport Council of Malaysia. They were provided written informed consent to undertake this research and were obtained an institutional ethics committee approved the procedures of this study.

Measurement

The Biofeedback 2000 x-pert Schuhfried, multi-module was employed in this study. The Biofeedback 2000 x-pert Schuhfried Gmbh system provides feedback of physiological parameters. Sensors record the signals non-invasively from the skin surface. In the various radio modules these sensor signals are filtered, amplified, digitalized and transmitted via a cordless Bluetooth connection to a computer. The digitalized data was then processes by the Biofeedback 2000 x-pert software and displayed diagrammatically on the screen. It provides immediate feedback from their biodata or biosignature while undergoing training.

Pre-competition multidimensional state anxiety temporal patterning was measured using the Competitive State Anxiety Inventory-2 Revised(Cox, Martens, & Russell, 2003) at the baseline and after 8 weeks of Autogenic Training prior to official international competition. The CSAI-2R is a 17-item scale that measures cognitive state anxiety (5 items), somatic state anxiety (7 items) and self-confidence (5 items) in a competitive setting.

Procedure

The nature of this study was explained to the participants, and they were asked to sign an informed-consent form. Baseline measures of physiological measures were obtained on-site during training session 8 weeks prior to official international competition.

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The intervention used in this study was the Autogenic Training. It usually takes 8 weeks to learn the technique, and home practice of the exercises is encouraged (Da Ronch et al., 2014). All the 8 weeks training sessions were carried out at the meeting room of training venue, and it were assisted by the Sport Psychologist from National Sport Institute of Malaysia. The intervention was carried out twice a week, 30 minutes/session for 8 weeks before their sport skill/technical training. After completion of the 8 weeks Autogenic Training, the participants were assessed again on the physiological measures one day prior to competition at the competition venue.

All data points were screened and epochs containing artefacts were excluded. All data points for Skin Temperature (TEMP), Skin Conductance (SCL) and Heart Rate (HR) were aggregated for each minute. Data were inspected for outliers by the SPSS outlier analysis procedure. The data used to construct this structural model were the post intervention data.

Statistical Analysis

The Smart PLS 3 was use to analysethe Structural Model on autogenic training to psychophysiological measures and multidimensional state anxiety, this analysis includes the prediction accuracy, prediction relevance and the model fit were tested.

III. RESULTS

Data obtained from this study constructs a Structure Modelwith PLS-SEM on Autogenic Training, Psychophysiological Measures and Multidimensional State Anxiety as figure 1.

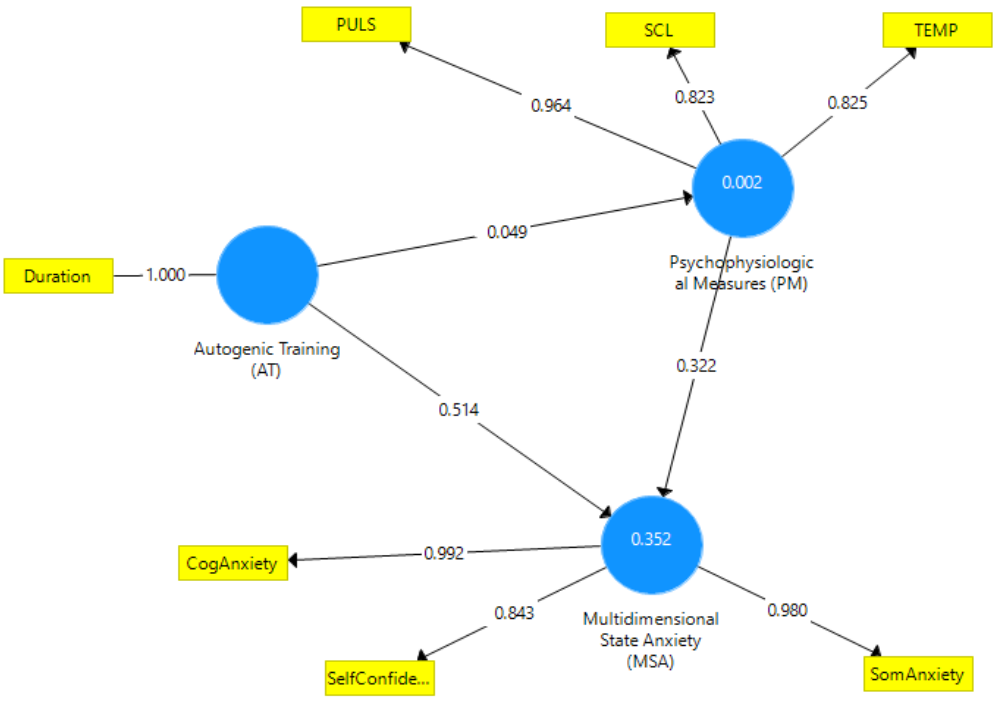

Figure 1: Structure Model of Autogenic Training, Psychophysiological Measures and Multidimensional State Anxiety

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Confirmatory Factor Analysis (Measurement Model Evaluation)

The purpose of confirmatory factor analysis (measurement model assessment) is to confirm reliability and validity of construct measures, therefore providing evidence of suitability of their inclusion in the path model(Hair et al., 2018).

Composite Reliability is amethod to measure of internal consistency reliability other than Cronbach's Alpha. The range of Composite Reliability in current model is .786 -.839, which is higher than .7(Hair et al., 2018). Average variance extracted (AVE) is a common measure to establish convergent validity on the construct level(Hair et al., 2018). Should AVE be higher than .5, it is considered that the construct is valid(Setiyowati, Pali, Wiyono, & Triyono, 2019)(Setiyowati et al., 2019). As can be seen from Table 2, the AVE value of each construct is greater than .5, and this indicates that convergence validity of the model is good.

Discriminant validity may be assessed more conservatively, as shown in **Table 1**, AVE square root values of each latent variable are higher than coefficients of more latent variables. Therefore, it seems to indicate that the tool has sufficient discriminant validity(Hair et al., 2018).

Table 1: Fit Index of Latent Variables

Dimension	AVE
Autogenic Training (AT)	0.589
Psychophysiological Measures (PM)	0.765
Multidimensional State Anxiety (MSA)	0.884

Structural Model Evaluation

Assessment of multicollinearity

Multiple collinearity refers to the fact that the model estimation is distorted or hard to gauge accurately because of the presence of accurate correlation or high correlation between independent variables in a linear regression model (Dormann et al., 2013). When two or more variables predict another variable, the multiple collinearity problem should be checked. Previous researchers suggested that the VIFs greater than 5.0 in the predictors indicated collinearity. According to Table 2, VIF < 5, demonstrating the absence of a multicollinearity issue(Hair et al., 2018).

Table 2: VIF Statistics of Collinearity Evaluation

Dependent Construct	Predictor Construct	VIF
Autogenic Training	Psychophysiological Measures	4.02
	Multidimensional State Anxiety	3.56

Path Coefficient

In this study, the Bootstrapping function of Smart PLS 3 (Fook-Chong & Choo, 2011) was performed to test significance of path coefficient and whether it is significantly judged according to the size of the T value. If T value is greater than 1.96, it is significant; on the other hand, if the T value is less than 1.96, it is not significant (Hair et al., 2018). It can be seen from Table 3 that the coefficients pass the significance test.

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Table 3: Path Coefficients

Path	t-value	P value
AT → MSA	1.982	0.038
AT → PM	1.943	0.032
PM → MSA	1.951	0.041

Coefficient of Determination (R^2)

The coefficient of determination (R^2) value is a standard based on which a structural model is compared(Quinino, Reis, & Bessegato, 2012). It stands for the cumulative effect of the total independent variables on any dependent variables. Previous researchers suggested that R^2 values of .20 are considered high. The R^2 of the model is shown in Table 4. We can see that the Psychophysiological Measures and Multidimensional State Anxiety exhibited a moderate to high predictive accuracy (Hair et al., 2018).

Table 4: R^2 Valuesof the Model

Construct	R^2
AT	--
PM	0.136
MSA	0.302

Standardized Root Mean Square Residual (SRMR)

The Standardized Root Mean Square Residual (SRMR) (Henseler, Hubona, & Ray, 2016)as a goodness of fit measure for PLS-SEM that can be used to avoid model misspecification. A value of less than .08 is considered a good fit. In this research, the SRMR value of this model is .056, less than .08. Hence, the model fit is also good from the SRMR index(Shi, Maydeu-Olivares, & DiStefano, 2018).

IV. DISCUSSION

Confirmatory Factor Analysis (Measurement Model Evaluation)

The main aim of this study was to construct a statistical model using SmartPLS to explore the linear relationships of single independent variable (Autogenic Training) on the multiple dependent variables (Psychophysiological Measures & Multidimensional State Anxiety). To evaluate the model, confirmatory factor analysis must be carried out to check the reliability and validity of the items construct in this model. Reliability is about constructs which means "either the items are reliable or not that were asked by the respondents on the same or different times". To put it into another way, we can say that the items were consistent with each others of the respective constructs.

At such, in this study we used Composite Reliability (CR) to measure reliability. In order to measure Cronbach Alpha for reliability, we can go back to mainstream statistical software like SPSS. Some researchers prefer to use CR rather than Cronbach Alpha because Cronbach Alpha is being criticized for its lower bound value which underestimates the true reliability (Peterson & Kim, 2012).However, CR can be used as an alternative as its CR value is slightly higher than Cronbach Alpha whereby the difference is relatively inconsequential (Peterson & Kim, 2012).

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Results from the SmartPLS analysis of this study showed that the CR were ranged .786 -.839 in current model, which is higher than .7 (Hair et al., 2018). Hence, we can state that the items construct in the model had high internal consistent with each others of the respective constructs and they are reliable for this model.

Another important confirmatory factors to analysis the model construct is the convergent validity. The convergent validity is the extent to which a measure correlates positively with alternative measures of the same construct. The loadings used to asses indicator reliability are the correlation between the latent variable and a standardized indicator. To analyze the convergent validity of the construct in this model, we used the Average variance extracted (AVE) which is a common measure to establish convergent validity on the construct level (Hair et al., 2018). From the results of this study revealed that Autogenic Training (AT) with AVE 0.589; Psychophysiological Measures (PM) with AVE 0.765 and AVE for Multidimensional State Anxiety 0.884. The results obtained of this study showed that the AVE of all the latent variables werehigher than .5. At such, it can be considered that the construct is valid (Setiyowati et al., 2019).

Also, in the confirmatory factors to analysis the model construct, the discriminant validity assessment has the goal to ensure that a reflective construct has the strongest relationships with its own indicators (e.g., in comparison with than any other construct) in the PLS path model (Hair et al., 2018). If independent variables are correlated, they share some of their predictive power over dependent variables(Hair et al., 2018). Inspection of the correlation matrix between latent constructs can often identify potential shared variance issues. In this study, the AVE square root values of each latent variable are higher than coefficients of more latent variables. Therefore, it seems to indicate that the tool has sufficient discriminant validity (Hair et al., 2018). From the reliability test and validity assessment of the construct items of this model, we can state that the construct items are valid reliable for this model.

Structural Model Evaluation

PLS-SEM provides researchers an opportunity to explore relationships among variables and identify the existing pathways among the variables as such, it is regarded as an appropriate tool for building the statistical model as well as prediction(Wong, 2013). Further, PLS-SEM will have greater statistical power and converges quickly handling much larger and complex models. To evaluate the structural model constructed, we need to check the multicullinearlity with **Variance inflation factor** (VIF) in the first place (Akinwande, Dikko, & Agboola, 2015).

Multicollinearity (also collinearity) is a phenomenon in which one predictor variable in a multiple regression model can be linearly predicted from the others with a substantial degree of accuracy. Multicollinearity(Daoud, 2017) makes it tedious to assess the relative importance of the independent variables in explaining the variation caused by the dependent variable. VIF is a measure of the amount of multicollinearity in a set of multiple regression variables. This ratio is calculated for each independent variable(Daoud, 2017). A high VIF indicates that the associated independent variable is highly collinear with the other variables in the model. If the VIF for a factor is near or above 5 -- the solution may be relatively simple. Try one of these: Remove highly correlated predictors from the model. If you have two or more factors with a high VIF, remove one from the model. Results from this study as stated in table 3 that VIF for Psychophysiological Measures is 4.02 and Multidimentsional State Anxiety is 3.56. At such, when the VIF < 5, demonstrating the absence of a multicollinearity issue (Hair et al., 2018).

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A path coefficient indicates the direct effect of a variable assumed to be a cause on another variable assumed to be an effect. Path coefficients are standardized because they are estimated from correlations (a path regression coefficient is unstandardized). The bootstrapping algorithm was used to analyse the significance of relationships, it tells whether the effect of a certain IV on a certain DV is significant. Thereby, the path coefficients indicate to which extend an IV affects a DV (the bootstrapping indicates whether these relationships are significant). With SmartPLS 3.0, we apply a bootstrapping procedure for the significance of the path coefficient with two-tails significant level of 5 per cent. If t-values are greater than the critical value (1.96) and p-values smaller than 0.05, it shows that the statistically significance of the path coefficients (Hair et al., 2018). As shown in Table 4, results of this study revealed that the coefficients pass the significance test with all the t-values greater than the critical value (1.96) and p-values smaller than 0.05.

The R^2 value (coefficient of determination) is only applicable for DVs. It indicates how well all IV explain this DV. E.g., a value of 0.3 indicates that 30% of the variance in the DV is explained by the IV.Previous researchers suggested that R^2 values of .20 are considered high (Quinino et al., 2012).. Results of this study showed that the R^2 valuesof the model as shown in Table 5, the Psychophysiological Measures and Multidimensional State Anxiety exhibited a moderate to high predictive accuracy (Hair et al., 2018).

Model Fit

Researchers should be very cautious to report and use model fit in PLS-SEM (Hair et al., 2018). Hence, when using PLS-SEM for a path model that only includes reflectively measured constructs, one may be interested in the model fit. Therefore, we need to run the bootstrap procedure in SmartPLS. The Standardized Root Mean Square Residual (SRMR) is defined as the difference between the observed correlation and the model implied correlation matrix. Thus, it allows assessing the average magnitude of the discrepancies between observed and expected correlations as an absolute measure of (model) fit criterion. A value less than 0.10 or of 0.08 are considered a good fit. The SRMR as a goodness of fit measure for PLS-SEM that can be used to avoid model misspecification (Henseler et al., 2016). Results obtained from current study showed that the SRMR value of this model is .056, less than .08. Hence, the model fit is also good from the SRMR index (Shi et al., 2018).

V. CONCLUSION

Through the analysis of the structural equation model using formal study data,CR and AVE of the model indicated that measurement model had good internal consistency, convergent validity, and discriminant validity. The path shows that the influence of independent variables on dependent variables. Also, from the analysis of the structural model, the R^2 value (coefficient of determination) showed that the model has higher prediction accuracy. In addition, the SRMR results obtained indicate that the model fits well. Therefore, this model can be put forward for the use in managing the multidimensional state anxiety of the athletes prior to competition. Autogenic Training induced higher direct changes to multidimensional state anxiety if compared to the psychophysiological measures. Thus, this structural model providing a theoretical basis for sport psychologist to improve the management of anxiety to their athletes prior to competition.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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