

The effects of coach autonomy support, sports mental training, experiential avoidance, and sports anxiety among badminton college athletes

CHUAN-CHEN HUANG

Department of Athletic Performance, National University of Kaohsiung, Kaohsiung City, TAIWAN

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Abstract:

Introduction: College athletes not only have to deal with their academic responsibilities but also undergo rigorous training processes and face the pressures of winning and losing in competitions. This is particularly challenging for badminton players, as the sport demands quick reaction times and involves varying speeds during play. Therefore, in addition to mastering the necessary skills, badminton players undergo significant psychological testing. **Purpose:** The purpose of this study is to investigate the relationships between coach autonomy support, sports mental training, experiential avoidance, and sports anxiety among badminton college athletes. **Methods:** A purposive sampling method was employed to distribute questionnaires to representative players from various college badminton teams in Taiwan. This study used the Learning Climate Questionnaire (LCQ) was used to measure the perception of coach autonomy support. The Sport Anxiety Scale (SAS) was employed to assess sports anxiety. The Acceptance and Action Questionnaire (AAQ) was utilized to gauge the level of experiential avoidance. Lastly, the Sport Mental Training Questionnaire (SMTQ) was used to evaluate sports mental skills. A total of 251 questionnaires were distributed, out of which 201 valid responses were received, resulting in a response rate of 80.08%. The collected data were processed using a linear structural equation model. **Results:** Coach autonomy support had a positive impact on sports mental training among badminton college athletes ($p < 0.05$). Conversely, sport mental training had a negative effect on experience avoidance and sports anxiety ($p < 0.05$). This implies that higher levels of coach autonomy support lead to better sports mental training, which, in turn, reduce the levels of experience avoidance and sports anxiety. **Conclusion:** Creating a positive sports atmosphere, nurturing the psychological skills of elite athletes, and mitigating the negative psychological impact during sports training is crucial. It is recommended to plan in place to enhance athletes' positive psychological skills and provide them with timely psychological care. Understanding the sources of pressure that athletes face beyond their daily training and competitions is crucial. Through psychological skills training, athletes can benefit more from these experiences and demonstrate superior performance in sports competitions.

Keywords: linear structural equation model, social support, psychological resilience, self-efficacy.

Introduction

Badminton is currently the fastest sport in the category of ball sport, with new records of highest shuttlecock speed constantly being set, forcing the players to continue practicing their skills in serving, returning, saving, and smash in order to improve their sports performance. Besides the training in physical fitness and sporting skills, the relatively fast pace of games due to extremely high shuttlecock speeds subject the players to tremendous sense of pressure and make the environment of this sport that is studded with best players always full of competition and peer pressure (Arnold & Fletcher, 2012). As a result, players have to deal with high levels of training loads, physical pains and sport injuries, extensive stressors, rise of anxiety, and various mental health challenges (Arnold & Fletcher, 2012; Gulliver et al., 2012; Reardon et al., 2019; Soligard et al., 2016) in order to maintain excellent sporting performance, which in turn subjects their performance to not only physiologically factors but also mentally and psychological trouble (Massey et al., 2013). As these experiences and challenges are an unavoidable part of the process for players to achieve outstanding performance, how to enable them to overcome these difficulties and to possess a healthy mental state has become a major concern for today's sport psychologists and players of competitive sports (Wang et al., 2023).

In such context, the psychological state of players began to receive wide attention, and the number of research issues examining mental skills and relationships thereto keeps increasing, contributing to the development of the sport psychology over the past two decades (Foster & Chow, 2020). Coaches and players nowadays realized that apart from physical exercise training, the development of mental health is no less important. Yet, sports training being a lengthy and repetitive process, players have to undergo incessant technical training before they can display performance above standard. They face many difficulties and challenges in the process of training and games as well, such as, physical activity-wisely, technical bottlenecks or incidental injuries, as well as a wide range of stressors, which can give rise to stress and anxiety in them (Gulliver et al.,

2012). According to the model of competition-stress interaction, state and sport anxiety are considered to be determined by both personal (trait anxiety, perfectionism) and situational factors (state, self-confidence) through cognitive processes (Cerin et al., 2000), and lead to a series of cognitive assessments, behavioral responses, or physiological stimuli (Ford et al., 2017); thus, any level of anxiety, either cognitive or physical, can have a considerable impact on the players (Wilson et al., 2009).

Negative gaming experiences in the past tend to create negative feedback on the players, resulting in their experiential avoidance during training or in games. Experiential avoidance means an individual's tendency to consciously try to avoid or change a negative experience, which is also a maladaptive approach, and which usually results in inconsistencies between the individual's goals and values, where thus he/she shies away in avoidance of an aversive experience or event in order to change the frequency of the event or the context in which it occurs, including bodily sensations, emotions, thoughts, memories and behavioral tendencies (Hayes et al., 1996). In the process of avoidance, there will be less positive emotions and more negative emotions (Grawe, 2007). Hence, while brief experiential avoidance may allow individuals to temporarily stay away from unpleasant thoughts, extended experiential avoidance may eventually lead to an inability to get rid of past frustrations, which gives rise to an increase in negative emotional experiences and social anxiety, as well as a decrease in positive interpersonal experiences. During the game in particular, anxiety affects sports performance and compromises self-confidence, which not only jeopardizes the players' physical and mental state, but also has an impact on their sporting career (Ong & Chua, 2020; Craft et al, 2003).

When a player faces dilemmas in the environment of a competitive sport, he/she should actively make good use of the supports from around him/her as a resource for coping with stresses, anxiety, problem solving, and performance enhancement (Gaudreau et al., 2016; Morbée et al., 2023). What cause one to seek help are encouragement from others (peers or family), a good relationship with the coach, pleasant interactions over time, a positive attitude, and the leadership of a coach who has kept company for extended period of time, which in particular has a significant effect on the psychological aspects of the player (Gulliver et al., 2012; Huang et al., 2021). Coach Autonomy Support is a positive environmental factor, with which a coach thinks like a player and gives him positive messages, including encouragements; Reinboth et al. (2004) discovered that specific aspects of the surrounding environment may be important in developing certain psychological needs and are crucial to physical and mental health in team sports. Hung Chen & Wu (2016) argued that coach autonomy support plays a key role in reducing experiential avoidance in players, and that perceived autonomy support from the coach can lead players to develop a positive, approach-oriented perspective on these experiences, which can reduce experiential avoidance. Similarly, Pankow et al. (2021) believed that increased vigor and reduced experiential avoidance due to coach autonomy support can cause players to experience more positive emotions and adopt a more positive approach when coping with difficulties in training, games, and life. From all above-mentioned research, we find that coaches play a key role in shaping players' everyday sporting experiences. According to the self-determination theorem by Deci and Ryan (2001), the atmosphere of autonomy support provided by coaches is highly related to positive mental training or states such as positive cognition, affection, and behavioral outcomes of players (Reynolds & McDonough, 2015; Stebbings et al., 2016); therefore, we propose **Hypothesis 1: Autonomy support from coaches has a significant, positive effect on sport mental training**. Whereas, in addition to that coach autonomy support can reduce experiential avoidance in players (Hung Chen & Wu, 2016) and can develop autonomous motivation, high quality sport participation and psychological well-being (Adie et al., 2008; Pelletier et al., 2001), Deci et al. (2013) also found that the fulfillment of an individual's basic psychological needs will further affect self-realization and positive well-being, and reduced anxiety; therefore, we propose **Hypothesis 2: Coach autonomy support has a significant, negative effect on experiential avoidance**; and **Hypothesis 3: Coach autonomy support has a significant, negative effect on sport anxiety**.

As negative emotions and low level of psychological state of players during the game are critical and fatal factors for their sports performance, coping with these negative experiences by developing strong psychological skills in everyday training is essential for optimal sports performance (Mahoney & Hanrahan, 2011). Indahwati (2023) stated that successful players not only are physically and technically excellent, but also possess good psychological qualities enough to overcome the obstacles and stresses of these scenarios of sport. Past research discovered, too, that Olympic game winners or outstanding performers typically had high levels of mental or emotional states (self-confidence, concentration, emotional control, initiative, etc.), cognitive and behavioral strategies (self-dialogue, imagery- and goal-setting, etc.) as well as personalities (optimism) (Taylor et al., 2008; Gould et al., 2002; Gould & Maynard, 2009, Norlander & Archer, 2002). Cowden (2017) stated that players competing at higher levels of games had higher mental skills than those competing at lower levels, meaning that players with higher levels of mental skills tended to perform better than those with lower levels. Thus, in addition to the externally visible sport skills and competitive abilities, there are a number of major issues that players have to face in the game, and among them is the level in terms of psychology. With different mental states, the mood of the players will have a great impact on their performance on the field of the game. As Foster and Chow (2020) stated that mental skills training not only serves to enhance sports performance, but also promotes positive psychological development and affects levels of experiential avoidance, we propose **Hypothesis IV: Sport mental skills have a significant, negative effect on experiential avoidance**; meantime, mental skills are used to cope with physically and psychologically stressful experiences (Wang et al., 2023), and

to reduce the negative effects of sport anxiety (Hanton et al., 2004; Neil et al., 2006), based on which we propose **Hypothesis V: sport mental training have a significant, negative effect on sport anxiety.**

It is a fact that the best players in major competitive sports in Taiwan are at their peak of sport careers in university years (Lee et al., 2022), at which stage, however, college sport players are faced with heavy academic load, arduous training process and the pressure from winning-or-losing games, which draws attention to their psychological state. In the case of badminton, in particular, owing to the features like short reaction time, high intensity, intermittent shift between high and low speeds, and the need for tactic or strategic settings, badminton players are challenged in terms of not only well-trained skills but also the level of mental state. Thus, in this study, we targeted college-representing badminton players to evaluate the variable relationships among the mental factors such as coach autonomy support, sport mental training, experiential avoidance and sport anxiety.

Material & methods

1. Subjects of Research

In this study, with the badminton team players of Taiwan's colleges as the subjects of research, the purposive sampling method was used to conduct the survey with questionnaire. It was administered, on line, among the coaches of badminton teams of Taiwan's colleges and universities from the beginning of February to mid-March 2023 to analyze the questionnaire data on the of badminton team players in terms of 'coach autonomy support', 'sport mental training', 'experiential avoidance', and 'sport anxiety'. The subjects were informed that the data would be used only for the purpose of academic study and they had given their consent before the questionnaire was administered. During the formal administration of the survey, 251 copies of questionnaire were distributed, and after ruling out those with missing or repeated responses, 201 valid copies were retrieved, a valid response rate at 80.08%.

2. Research Tools

For the purpose of this study, in addition to collecting the basic data of the participants, reference was made to past questionnaires and the questions were revised according to the characteristics of the badminton sport, to draw up a questionnaire on coach autonomy support, sport mental training, experiential avoidance and sport anxiety in college badminton team players. The questionnaire was graded on a 5-point Likert scale, 1 being strongly disagree and 5 being strongly agree.

Coach Autonomy Support Questionnaire

For the Autonomy Support Questionnaire, the items were adopted from the Learning Climate Questionnaire, LCQ, developed by Standage et al. (2006). Our single-construct questionnaire contains six items, including: "I think my coach offers me choices", "I think my coach understands me," and others.

Sport Anxiety Questionnaire

For the items of the Sport Anxiety Questionnaire, reference was made to the Athlete Specific Anxiety Scale developed by Smith (1990); our single-construct questionnaire contains 8 items, including: "I feel uneasy without realizing it", "I get nervous and panic when I face challenging training", and others.

Experiential Avoidance Questionnaire

The Acceptance and Action Questionnaire (AAQ) developed by Hayes et al. (2004) based on Acceptance and Commitment Therapy (ACT) is now widely used as a measure of experiential avoidance and psychological inflexibility. In this study, for the experience avoidance questionnaire to measure the degree of individuals' experiential avoidance, reference was made to the Acceptance and Action Questionnaire (AAQ-II), which was the second version of AAQ-I revised by Bond et al. (2011) and translated by Hung Chen and Wu (2016) in Chinese. Our single-construct questionnaire consists of 7 items, including "I am afraid of how I feel" and "I am worried about being unable to control my worries and feelings".

Sport mental training

The Sport Mental Training Questionnaire (SMTQ) provides an in-sport psychological assessment to measure the level of psychological factors that contribute to a player's success in a particular sport as well as psychological well-being. Reference was made to the Sport Mental Training Scale developed by Behnke et al. (2019) for our SMTQ, which consists of five constructs, namely, interpersonal social skills, mental imagery, self-dialogue, general skills and performance skills, with a total of 22 items such as "I have a high level of self-confidence that allows me to believe that I can achieve anything I want", and "I can overcome any failure, recover my psychological state, and refrain from feeling frustrated toward my next move".

3. Data Processing

In this study, SPSS 18.0 and SmartPLS 4.0 statistical software were used to run statistics and analyses. We began by an analysis of the descriptive statistics of the sample hereof with SPSS to understand the basic background information of the badminton players; we then ran a confirmatory factor analysis and a linear structural equation modeling with Structural Equation Modeling, SEM, for the influential relationship between the variables.

Results

1. Analysis of Badminton Player Samples

The data of the recovered samples herein were put to a descriptive statistical analysis by different backgrounds of the badminton players, and their characteristics were described in terms of frequency distribution tables and percentages, which results are shown in Table 1 below. The samples hereof were mostly males; 18 to 20 years of age were a majority; most of the samples spent for and under 3 hours a day in terms of frequency distribution of practice. Most of the samples had been training for over 11 years (inclusive); in terms of highest level of games participated, the general category was the majority; and most of the samples were not Class-A team contracted players.

Table 1. Descriptive statistics of basic data on Badminton player samples

Variable of background	Group	Number of persons	%	Total %
Gender	Female	84	41.79	41.79
	Male	117	58.21	100.00
Age	18-20	95	47.26	47.26
	21-23	71	35.32	82.59
	24-26	12	5.97	88.56
	Above 27	23	11.44	100.00
Frequency of practice	Under 3 hr (incl.) daily	140	69.65	69.65
	3-6 hr (incl.) daily	51	25.37	95.03
	Over 6 hr (incl.) daily	10	4.98	100.00
Years of training	Under 3 yr (incl.)	37	18.41	18.41
	4-6 yr	51	25.37	43.78
	7-10 yr	53	26.37	70.15
	Over 11 yr (incl.)	60	29.85	100.00
	General category	115	57.21	57.21
Highest game level	Open class	65	32.34	89.55
	National team	11	5.47	95.03
	International player	10	4.98	100.00
A Class-A team contracted player	No	185	92.04	92.04
	Yes	16	7.96	100.00

2. Confirmatory Factor Analysis

Before the model path analysis, the reliability and validity of each construct was examined with a confirmatory factor analysis, where the measurements included the evaluation of the measurement model and the test of the discriminant validity; the results are itemized in Tables 2 and 3. According to the recommendation by Hair et al. (2021) that the factor loadings should be greater than 0.50, the criterion of 0.50 was adopted for ruling out the questions in this study. The factor loadings of the constructs ranged from .63 to .90, which all met the criterion, i.e., every questionnaire item had good convergent validity. As Hair et al. (2021) suggested that the critical ratio, CR, of the constructs should be greater than .7, the CR of the constructs hereof ranged from .89 to .92, which indicated that every construct had good internal consistency (Hair et al., 2021).

Average Variance Extracted, AVE, measures the convergent and discriminant validity of a construct. Whereas Fornell & Larcker (1981) and Hair et al. (2021) adopted .50 as a measure to determine the AVE standards, the variables in this study ranging from .55 to .71 means that every variable has convergent validity. According to the suggestion by Hair et al. (2021) that the correlation coefficients among the constructs should be less than the square root taken of the mean variance extract for each construct, which means that the constructs have differentiated validity. In this study, the value of square root taken of the correlation coefficients between the mean variance extractions of the constructs were all greater than the correlation coefficients with other constructs, which means that every questionnaire had differential validity (Hair et al., 2021), as shown in Table 3.

Table 2. Parameters for estimating the measurement models of Coach Autonomy Support, Sport Mental Training, Experiential Avoidance and Sport Anxiety

Variable	Construct/Item	Factor loads	Standard deviation	<i>T</i>	Cronbach's Alpha	CR	AVE
Coach Autonomy Support	Coach Autonomy Support 1	0.83	0.03	27.70	.92	.92	.71
	Coach Autonomy Support 2	0.88	0.02	45.25			
	Coach Autonomy Support 3	0.81	0.03	32.11			
	Coach Autonomy Support 4	0.83	0.03	29.21			
	Coach Autonomy Support 5	0.88	0.02	51.84			
	Coach Autonomy Support 6	0.84	0.02	34.36			
Sport Mental training	General skills	0.87	0.02	47.19	.87	.90	.67
	Performing skills	0.90	0.02	5.73			
	Interpersonal social skills	0.69	0.04	15.72			
	Self-dialogue	0.80	0.03	24.56			
	Psychological imagery	0.81	0.03	26.54			
	Experiential Avoidance 1	0.80	0.03	24.48			
Experiential Avoidance	Experiential Avoidance 2	0.86	0.02	38.51	.88	.89	.55
	Experiential Avoidance 3	0.87	0.02	48.81			
	Experiential Avoidance 4	0.80	0.04	23.04			
	Experiential Avoidance 5	0.76	0.04	19.46			
	Experiential Avoidance 6	0.79	0.04	21.44			
	Experiential Avoidance 7	0.81	0.03	24.89			
Sport Anxiety	Sport Anxiety 1	0.76	0.04	21.06	.92	.92	.67
	Sport Anxiety 2	0.80	0.03	24.23			
	Sport Anxiety 3	0.73	0.05	15.76			
	Sport Anxiety 4	0.74	0.04	19.93			
	Sport Anxiety 5	0.76	0.03	22.66			
	Sport Anxiety 6	0.78	0.04	21.78			
	Sport Anxiety 7	0.63	0.05	11.86			
	Sport Anxiety 8	0.73	0.05	16.26			

Table 3. Discriminant validity of the variables Coach Autonomy Support, Sport Mental Training, Experiential Avoidance and Sport Anxiety

Variable	Coach Autonomy Support	Sport Mental Training	Experiential Avoidance	Sport Anxiety
Coach Autonomy Support	.84			
Sport Mental training	.56	.82		
Experiential Avoidance	-.20	-.34	.82	
Sport Anxiety	-.32	-.49	.70	.74

Note: The value of each bold number at the diagonal position is the square root taken of the AVE for each potential construct.

3. Structural Equation Modeling

After the test on the results of the confirmatory factor analysis, Table 4 shows that coach autonomy support had a significant, positive effect on sport mental training, with an impact estimate at .56 and a *p*-value at .000; coach autonomy support did not have a significant, negative effect on experiential avoidance or sport anxiety, with an impact estimate at -.01 and -.07, respectively, and a *p*-value at .932 and .388; and sport mental

training had a significant, negative effect on both experiential avoidance and sport anxiety, with an impact estimate at -.34 and -.45, respectively, and a *p*-value at .000. The above results revealed that Hypotheses 1, 4, and 5 hereof were true, while Hypotheses 2 and 3 were not true.

Table 4. Coefficient test for paths of influence of Coach Autonomy Support, Sport Mental Training on Experiential Avoidance and Sport Anxiety

Path of influence	Estimate	Standard deviation	<i>T</i>	<i>p</i>
Coach Autonomy Support -> Sport Mental Training	0.56	0.05	11.04	.000
Coach Autonomy Support -> Experiential Avoidance	-0.01	0.09	0.09	.932
Coach Autonomy Support -> Sport Anxiety	-0.07	0.08	0.86	.388
Sport Mental Training -> Experiential Avoidance	-0.34	0.08	4.20	.000
Sport Mental Training -> Sport Anxiety	-0.45	0.07	6.16	.000

Memon and Rahman (2013) stated that the purpose of model fit is to measure the adequacy of a framework to account for the data obtained from actual survey. The Smart PLS statistics software measures indicators for model fit with GOF (Goodness of Fit), with the values of GOFsmall = .10, GOFmedium = .25, and GOFlarge = .36 (Aker et al., 2011), which cannot be generated by the software and must be calculated by the researchers using the formula = $\sqrt{(\text{AVE mean} * \text{R}^2 \text{ mean})}$. A goodness of fit means that the model has a high real value, and the estimates are more representative. Table 5 shows a goodness of fit the model hereof at .38, which is a high fit, meaning that it is appropriate to use this model to measure the effects of coach autonomy support, sport mental training, experiential avoidance and sport anxiety in badminton players.

Table 5. Goodness of fit of overall models for Coach Autonomy Support and Sport Mental Training to Experiential Avoidance and Sport Anxiety

Variable	AVE	Composite Reliability	R ²	Cronbach's Alpha	GOF
Coach Autonomy Support	0.71	0.92		0.92	
Sport Mental Training	0.67	0.90	0.31	0.87	.38
Experiential Avoidance	0.67	0.92	0.12	0.92	
Sport Anxiety	0.55	0.89	0.24	0.88	

3. Multi-group Analysis

In this study, a model constancy analysis was conducted to ensure that the theoretical directions, meanings, or measurement errors assumed by the model would not vary due to group differences, and to facilitate the use of the measurement tool to provide a credible analytical basis for the research. The model hereof was analyzed by multi-group analysis with Smart PLS for model constancy, with the players grouped by ten different backgrounds, namely, gender (117 males and 84 females), whether a Class-A team contracted player (16 contracted players and 185 otherwise), general and open groups (180 players), national teams and international players (21 players), practice frequency (140 with low practice frequency and 61 with high practice frequency), years of training (88 with less training years and 113 with more training years), highest game level (180 in general and open categories and 21 in national team or international players). Table 6 indicates that with this structural model with badminton players grouped by different backgrounds, there is no significant difference in the coefficients for path of influence, meaning the model being generalizable, which result is suitable for being applied to the planning of mental training for badminton players with different backgrounds.

Table 6. Matrix of multi-group analyses

Path of influence	Group	Coefficient difference	p-value
Coach Autonomy Support -> Sport Mental Training	Male-female	-.05	.644
	General open – National players	.18	.423
	Class-A team contracted player - Otherwise	-.07	.486
	Low practice frequency – High practice frequency	.01	.913
	Less years of training – More years of training	.11	.253
Sport Mental Training -> Sport	Male-female	.02	.878

Path of influence	Group	Coefficient difference	p-value
Anxiety	General open – National players	-.11	.831
	Class-A team contracted player - Otherwise	-.50	.271
	Low practice frequency – High practice frequency	.12	.362
	Less years of training – More years of training	-.24	.066
	Male-female	.05	.699
Sport Mental Training -> Experiential Avoidance	General open – National players	.10	.487
	Class-A team contracted player - Otherwise	-.52	.361
	Low practice frequency – High practice frequency	.00	.982
	Less years of training – More years of training	-.14	.359
	Male-female	-.02	.955
Coach Autonomy Support -> Experiential Avoidance	General open – National players	.02	.826
	Class-A team contracted player - Otherwise	.27	.347
	Low practice frequency – High practice frequency	.15	.291
	Less years of training – More years of training	.15	.334
	Male-female	-.12	.408
Coach Autonomy Support -> Sport Anxiety	General open – National players	-.03	.829
	Class-A team contracted player - Otherwise	.13	.361
	Low practice frequency – High practice frequency	.03	.808
	Less years of training – More years of training	.18	.145

Dicussion

This study aimed at the coach autonomy support, sport mental training, experiential avoidance and sport anxiety of college badminton players. Our findings were that coach autonomy support had a significant, positive effect on sport mental training for badminton players, and that a good relationship developed between the players and their coaches will have an important effect on the psychological aspects of the players through pleasant interactions and positive attitudes over time (Gulliver et al., 201; Huang et al., 2021). Reynolds & McDonough (2015) and Stebbings et al. (2016) also found in their research that the atmosphere of autonomy support provided by coaches was highly related to players' positive mental skills or states, such as their positive cognitive, affective, and behavioral outcomes. That was similar to our findings, probably because that a good mental atmosphere and support with care from close people could positively guide the players' psychological mind, endowing them with sufficient psychological support and affirmation during against laborious training.

On the other hand, coach autonomy support did not have a significant, negative effect on experiential avoidance or sport anxiety; past literature indicates that autonomy support from important others can reduce experiential avoidance and negative emotions in players, enabling them to develop the ability to manage their thoughts and emotions in stressful situations, and facilitating individuals to suppress and avoid emotional tendency (Jaffe et al., 2010; Williams et al., 2012). However, autonomy support does not come just from coaches; it may come from family members and friends as well. Given that badminton players often practice with their teammates during training, whether singles or doubles, i.e., more training time is spent together with teammates, which may be the reason why autonomy support from coaches cannot effectively affect badminton players' experiential avoidance and sport anxiety. In addition, Hung Chen and Wu (2016) stated that the negative effect of coach autonomy support on players' experiential avoidance was only observed among players featuring high levels of gratitude, which also reveals that it is probable that only the players with high levels of positive psychological traits benefit more from coach autonomy support. Future research may also consider the effects of autonomy support from important others and positive psychological traits in players.

Sport mental training has a significant, negative effect on both experiential avoidance and sport anxiety. Mahoney and Hanrahan (2011) found that as negative emotions and low levels of psychological state in players are important predictors of sports performance, and thus developing strong psychological skills by everyday training to cope with those negative experiences is crucial to optimal performance. Also, Foster and Chow (2020) stated that the use of psychological skills could enable players to improve their sports performance, and guiding them to maintain positive mental development could affect the level of experiential avoidance, too. Those findings were consistent with ours, probably because a stable and strong psychological state allows players to remain calm when facing setbacks and failures, to avoid excessive rejection, and to be able to manage to participate in training actively, to eventually exhibit best performance. Wilson et al. (2009) believed that any

level of cognitive or physical anxiety can have a considerable impact on players, as Taylor et al. (2008) and Gould et al. (2002) found that most outstanding players possess stable mental or emotional states, cognitive and behavioral strategies, as well as positive personalities. Wang et al. (2023) also mentioned that people can utilize psychological skills to cope with physical and psychological stressful experiences and reduce sport anxiety, that is to say, a stable and high level of psychological state and strong psychological skills can reduce anxiety or effectively manage negative emotions, as the findings hereof showed that sport mental training has a significant, negative effect on sport anxiety.

Conclusions

The conclusions of this study are that coach autonomy support had a significant, positive effect on sport mental training in the players of college badminton teams; coach autonomy support did not have significant, negative effect on experiential avoidance or sport anxiety; sport mental training had a significant, negative effect on experiential avoidance and sport anxiety; and no significant difference was seen in the path coefficients of the structural model hereof among the college badminton team players with different background variables.

This study investigated the relationships among coach autonomy support, sport mental training, experiential avoidance and sport anxiety among college badminton team players and verified the findings that coach autonomy support upgraded the level of sport mental training, that coach autonomy support failed to affect experiential avoidance and sport anxiety, and that sport mental training decreased the level of experiential avoidance and sport anxiety. Therefore, creating a sport atmosphere with coach support can be expected to upgrade players' sport mental training, while strengthening their sport mental training can cause experiential avoidance and sport anxiety to decrease. In particular, as elite players commit more effort and time to the sports, they benefit more from psychological interventions. In such view, it is important to create a good sport ambience and train elite players in psychological skills, as well as to minimize the negative psychological harms that are created during the sport training process. The recommendations of this study are that in making plans on training programs for players, besides strengthening their sport skills and physical training, coaches should further plan on how to improve the levels of their positive psychological skills and provide support and care for their academic life when appropriate. For example, during everyday training, to administer imagery training such as simulation of the process of games and tactical deduction, or positive self-cheering to counteract the increasing level of sport anxiety for the players during the game; also, to care about players' academic performance and everyday life, so as to understand the stressors other than routine training and games. These measures of mental training can be used to benefit the players more and thus enable them to exhibit much better performance in the sports arena.

With regard to the lack of a significant, negative effect of coach autonomy support on experiential avoidance and sport anxiety, we did empirical research and believe that players' perception of autonomy support comes not only from coaches, and that from family members and friends is equally important, especially when the persons they work at team sports or training are often teammates, autonomy support from friends and teammates could be even more influential. It was also suggested in the literature that the negative relationship between coach autonomy support and players' experiential avoidance was only observed on players with high levels of positive psychological traits. Therefore, researchers in future studies may consider autonomy support from important others and the differences in perceived autonomy support and negative psychological states between players with high and low levels of positive psychological traits.

Conflicts of interest

There are no relevant conflicts of interest involved in this study.

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