The divergent effects of resilience qualities and resilience support in predicting pre-competition anxiety and championship performance

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Abstract

Psychological resilience is vital to the development of sport talents. Qualitative research has consistently demonstrated that sport resilience encapsulates a mixed package of *resilience qualities* (reflecting positive traits and characteristics) and *resilience support* (reflecting perceived support and related resources). Ironically, sport resilience research adopting quantitative methods has been assessing resilience as a unidimensional construct, with little attention to the multi-facet nature of resilience and its effects on performance. In the present research, we tested a novel proposition that resilience qualities predict reduced pre-competition cognitive anxiety and contribute to performance more than resilience support. Across two samples of competitive table tennis players (Study 1: $N = 196$ competing at province level; Study 2: $N = 106$ competing at national level), we consistently found resilience qualities, rather than resilience support, predicted lower levels of pre-competition cognitive anxiety and superior performance at a national championship. Results also suggest that pre-competition cognitive anxiety mediated the relationship between resilience qualities and performance. The findings provide the first evidence supporting the divergent effects of resilience qualities and resilience support in predicting pre-competition anxiety and championship performance and call for the consideration of such a distinction when designing and delivering resilience programmes.

Keywords: resilience qualities, resilience support, cognitive anxiety, performance

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Resilience in sport encapsulates a dynamic process of positive adaptation in the context of significant adversity (Fletcher, 2021; Fletcher & Sarkar, 2013; Galli & Gonzalez, 2015; Hill et al., 2018). Central to this process perspective, resilience contains both trait- and state-like components, not only reflecting one's ability to sustain relatively stable and healthy levels of psychological and physical functioning but also that to bounce back or recover from difficult situations (Fletcher, 2019; Windle et al., 2011). While research has supported the important role of resilience in achieving superior sport performance (e.g., Fletcher & Sarkar, 2012) and overcoming performance slump (e.g., Brown, Butt, & Sarkar, 2020), to date, the magnitude of resilience's effect on sport performance and the mechanism(s) underlying the resilience-performance relationship have yet to receive much research attention. Current knowledge is also limited about whether the multiple facets of resilience, such as positive traits and perceived support (Hill et al., 2018; Hu & Gan, 2008; Sarkar & Fletcher, 2013), demonstrate different effects on sport performance. In the present research, we aim to bring new insights to dissolve these uncertainties.

Resilience is fundamental to high-level performance (Fletcher, 2021). In their seminal work on sport resilience, Fletcher and Sarkar (2012) interviewed twelve Olympic champions and found protective factors (e.g., positive personality, perceived social support) protected the world's best sport performers from adverse circumstances. Importantly, these identified resilience factors contribute to Olympic champions' challenge (not threat) appraisal and promote facilitative stress response, which precedes exceptional performance (Fletcher & Sarkar, 2012). More recently,

Brown et al. (2020) conducted focus group and interviews among fourteen expert cricket batsmen and found psychological resilience protected against players' performance setbacks and facilitated them to overcome slumps. As was in Fletcher and Sarkar's study, Brown et al. demonstrated a variety of resilience manifestations under performance slumps (e.g., personal protective factors, controlling performance states, appraisal, and understanding contexts of the slump). Findings are consistent when investigating resilience in high-level performers in domains of other professions beyond sport (Fletcher, 2019; Sarkar & Fletcher, 2014a).

Despite its contribution to the understanding of resilience in high performers, almost all existing research adopted qualitative and exploratory methods. Among the relatively limited quantitative literature of resilience performance, previous researchers tended to operationalise resilience as the behaviour of performing successfully following poor performance thus drawing a performance metric for assessing resilience (Hill et al., 2021; Mummery et al., 2004). One exception is by Galli et al. (2015) examining the predictive power of resilience in weightlifting performance. However, these researchers reported a ceiling effect with its study measures and a large time interval between resilience measure and the performance event (i.e., an average of 37.04 days), which may be responsible for a non-relationship between resilience and performance (Galli et al., 2015). Also, the lack of consideration of mediating factor(s) in Galli et al.'s study also made it impossible to test any underlying factor of the resilience-performance relationship (see also Jones & Jetten, 2011; Mummery et al., 2004). The present research, therefore, aimed to employ quantitative methods to further examine the performance effect of resilience and its potential underpinning factors.

One factor that influences performance and perhaps underlies resilience and performance is cognitive anxiety (Mellalieu et al., 2006; Neil & Woodman, 2017; Zhang et al., 2018). In performance settings, cognitive anxiety reflects the worrying mind of a performer about making mistakes, not performing to personal standards, consequence of failure, and uncertainty of what may happen (Jones et al., 2019). Literature has suggested that excessive cognitive anxiety can pre-empt the limited cognitive resources and shift attention to task irrelevant stimuli such as worrisome feelings (Eysenck et al., 2007), disrupt skilled task execution by applying explicit rules or step-by-step monitoring to compensate fear of failure (Masters & Maxwell, 2008), or direct attention to unwanted thoughts increasing the likelihood of ironically performing what one typically wants to avoid (Wegner, 2009). Given the benefits of resilience protective factors in competitive sport (e.g., positive personality, perceived social support), one would expect that individuals high in resilience are less prone to cognitive anxiety because these individuals are more confident, motivated, superior in maintaining goal-directed behaviors, and see difficult situations more a challenge to approach rather than a threat to avoid (see Fletcher, 2019, 2021). Such an argument is also in line with proposition of the integrated model of anxiety and performance (Nieuwenhuys & Oudejans, 2017); that is, psychological resilience allows individuals to have greater mental resources when performing under pressure and anxiety thus more capable of resisting worrying mind (in other words cognitive anxiety). Surprisingly, although emerging research established evidence for a negative relationship between self-report resilience scores and perceived cognitive anxiety in diverse sports (Çutuk et al., 2017; Trigueros et al., 2020; Wu et al., 2021), none examined the degree to which reduced cognitive anxiety accounts for high-level performance among resilient

individuals. In the present research, we conducted the first formal test to assess to what extent reduced pre-competition cognitive anxiety explains the resilience-performance relationship.

While the protection of resilience in cognitive anxiety and its benefits to performance stands, there is one paradox in this context that requires addressing. Specifically, although qualitative studies (e.g., Brown et al., 2020; Fletcher & Sarkar, 2012; Sarkar & Fletcher, 2014) have unveiled the complexity of resilience in sporting context, most psychometric tools adopt a unidimensional conceptualisation and assesses resilience at a global level (see Windle et al., 2011). One exception is Hu and Gan's (2008) Resilience Scale for Chinese Adolescents. In their scale development and validation, these researchers identified five protective factors of resilience in Chinese contexts, including goal planning, affect control, positive thinking, family support, and help-seeking. Importantly, these researchers found support to two higher-order resilience factors, namely *resilience qualities* (indicated by goal planning, affect control, and positive thinking) and *resilience support* (indicated by family support and help-seeking). These researchers also found that resilience qualities predicted personal competence more strongly but acceptance of self and life weaker compared to resilience support (Hu & Gan, 2008).

Hu and Gan's qualities-support distinction of resilience and findings of divergent effects demonstrated by the two distinguishable components dovetail with the conceptualisation of '*matching effect*' between protective factors and different stressors as documented in sport resilience literature (see Fletcher & Sarkar, 2016; Sarkar & Fletcher, 2014b). Specifically, Fletcher and Sarkar (2016) posited that being resilient to competition-related stressors likely necessitates a different combination of protective factors compared to those needed to withstand training-related

stressors. However, the knowledge regarding which protective factors match best with certain stressors in competitive sport remains scarce (see also Sarkar & Fletcher, 2014b). Since a large body of research has revealed the proximal influences of positive personality traits, rather than perceived support, on cognitive (performance) anxiety and performance (see Zhang et al., 2018), one would expect that resilience qualities (reflecting positive traits and personal characteristics) is more strongly associated with reduced pre-competition cognitive anxiety and enhanced performance compared to resilience support (reflecting perceived support and related resources). In the present research involving two samples of competitive table tennis players, we examined a novel proposition that resilience qualities outperforms resilience support in predicting players' pre-competition cognitive anxiety (Studies 1 and 2) and performance at a national championship (Study 2).

Study 1: Method

Participants

We recruited 196 junior table tennis players (n = 121 males, 75 females; M_{age} = 13.35, SD = 1.35; $M_{training\ years}$ = 2.95, SD = 2.26) from a province-level table tennis training centre in China. Power analysis (G*Power; Faul, Erdfelder, Lang, & Buchner, 2007) suggested that this sample provided us with adequate power (1-β = .80) in detecting a relatively small regression effect (i.e., Cohen's f^2 = .04) at .05 alpha level.

Measures

Resilience. We assessed resilience using the *Resilience Scale for Chinese Adolescents* (RSCA; Hu & Gan, 2008). The RSCA was designed specifically for Chinese adolescents and has

been successfully used in sport resilience research (e.g., Li et al., 2021). The RSCA contains 27 items rating on a 5-point Likert scale ranging from 1 (not true at all) to 5 (true all the time) and constitutes five sub-scales, namely *goal planning* (5 items; e.g., "I will make a plan and think about possible solutions when facing challenges/difficulties"), *affect control* (6 items; e.g., "I struggle to get away from unpleasant emotions"), *positive thinking* (4 items; e.g., "Compared to outcome or result, I believe it is the process that helps one grow"), *family support* (6 items; e.g., "My parents respect my opinion"), and *help-seeking* (6 items; e.g., "I do not know whom I could speak to when I am down"). Following guidance (Hu & Gan, 2008), we generated mean scores for resilience qualities (i.e., goal planning, affect control, positive thinking) and resilience support (i.e., family support, help-seeking), with higher scores indicating superior resilience.

Pre-competition cognitive anxiety. We assessed the pre-competition cognitive anxiety using the cognitive anxiety items from the Chinese version of Competitive State Anxiety Inventory-2 (C-CSAI-2; Zhu, 1994). C-CSAI-2 is the validated Chinese version of the original CASI-2 (Martens et al., 1990). Following recommendations, we used the five cognitive anxiety items (e.g., "I am concerned that I may not do as well in this competition as I could") suggested by Cox et al.'s (2003) in the revised short version of CSAI-2 (i.e., CSAI-2R) for enhancement of factorial validity and scale reliability. Consistent to the original CASI-2 and the CSAI-2R, all C-CSAI-2 items adopted a 4-point Likert scale ranging from 1 (*not at all*) to 4 (*very much so*). We generated mean scores for cognitive anxiety, with higher scores indicating higher levels of cognitive anxiety.

Procedure

With institutional ethical approval, head coach of the mentioned table tennis training centre was contacted providing detailed information about the study. With consent from the head coach, one of the authors visited the centre prior to an intra-centre competition day and distributed a survey pack to any players who agreed to complete prior to starting the competition. It took approximately 10-15 minutes to complete the survey pack. Players and their coaches were thanked and debriefed.

Data analyses

At preliminary analysis stage, we checked for missing data, outliers (i.e., scores more than three standard deviations from the mean; Jaccard & Turrisi, 2003), and generated descriptive statistics for each study variable. We then assessed the zero-order correlation among study variables. For the main analyses testing the influence of resilience qualities and support on athletes' competitive cognitive anxiety, we performed hierarchical regression using IBM SPSS Statistics, Version 26. Specifically, we first ran a baseline model on pre-competition state cognitive anxiety using demographic variables (i.e., age, sex, training years). Following that, we ran a second model adding resilience qualities to the baseline model and a final model adding in resilience support to the second model. Such an approach allowed us to estimate the unique influence of resilience qualities and resilience support on athletes' levels of cognitive anxiety. We generated unstandardised coefficients (B) that aid the interpretation of regression effect and also reported standardised coefficients (β) for insights into the effect size (Hayes, 2013). To compare the effects of resilience qualities and resilience support, we performed the test of equality of regression coefficients (see Paternoster, Brame, Mazerolle, & Piquero, 1998). We reported 95% confidence

intervals (CIs) that indicate significance at .05 level when not encompassing zero within its lower and upper bound. Alpha was set at .05 for all analyses.

Study 1: Results

Preliminary analyses

One missing score was found in training years, and all individual scores on study variables were within three standardised deviations of the mean. The participant with data missing in training years did not affect our main analyses. Table 1 presents means, standard deviations, correlations, and Cronbach's alphas for the study variables measured.

Main analyses

The baseline model revealed that 8.3% variance in state cognitive anxiety were accounted by demographic differences (i.e., age, sex, training years). Elder players tended to report higher level cognitive anxiety (B = .09, β = .17, p = .025; 95% CI = [.01, .16]). Males (B = -.34, β = -.24, p = .001; 95% CI = [-.53, -.15]) and those with longer training years (B = -.07, β = -.24, p = .002; 95% CI = [-.12, -.03]) reported lower cognitive anxiety. Entering resilience qualities to the baseline model, the model accounted for 19.7% variance in state cognitive anxiety (R^2 change = .12, p < .001). Resilience qualities was associated with reduced state cognitive anxiety (B = -.40, β = -.36, p < .001; 95% CI = [-.55, -.25]), after controlling for demographic factors. However, adding in resilience support in the final model did not lead to significant model improvement (R^2 change = .02, p = .051). More specifically, the influence of resilience qualities on state cognitive anxiety remained significant (B = -.32, β = -.28, p < .001; 95% CI = [-.49, -.14]) in the final model, but the effect of resilience support was marginal (B = -.14, β = -.14, p = .051; 95% CI = [-.27, .00]). Test

of slope equality (Paternoster et al., 1998) suggested that increase in resilience qualities was associated with significantly larger reduction in pre-competition cognitive anxiety compared to resilience support ($Z = 10.87$, $p < .001$). Table 2 presents full details of each regression model.

Study 1: Discussion

The study was the first to examine the divergent effects of resilience qualities and resilience support in predicting pre-competition cognitive anxiety. Results supported the position that athletes' resilience qualities is associated with reduced pre-competition cognitive anxiety more than resilience support. However, the study has noticeable limitations such as the use of single-source data (see Chang et al., 2010), and the levels of competitive cognitive anxiety prior to a localised competition might differ to that at an open and higher-level competition. Lacking in the insight into role of pre-competition cognitive anxiety plays within the relationship between the two resilience components and performance is also a pitfall of Study 1. To bridge the identified gaps, in Study 2, we recruited higher level players competing at a national table tennis championship and used objective performance data at the event (i.e., a prospective design) to investigate the divergent effects of resilience qualities and resilience in predicting players' championship performance. We anticipated resilience qualities of the participating players to predict reduced pre-competition cognitive anxiety and higher-level championship performance more strongly compared to resilience support, and reduced pre-competition cognitive anxiety mediates the relationship between resilience components and performance.

Study 2: Method

Participants

We recruited 106 elite table tennis players (n = 51 males, 55 females; M_{age} = 15.82, SD = 1.69; $M_{training\ years}$ = 8.04, SD = 2.43) at a Chinese national table tennis championship. Among those participants, 39.6% held a national title level 1 (n = 42) and 53.8% held a national title level 2 (n = 57)[1]. Power analysis indicated that this sample allows us to detect a small-to-moderate regressive effect (i.e., Cohen's f^2 = .08; Faul et al., 2009) and moderate indirect effect (i.e., beta coefficients of all paths = .30; Kenny, 2017) with sufficient power (i.e., 1-β = .80) at .05 alpha level.

Measures

Resilience and pre-competition cognitive anxiety. We assessed resilience qualities and resilience support using the RSCA and measured the pre-competition cognitive anxiety using the C-CSAI-2, as described in Study 1.

Performance. Win-lose score (WLS) ratio was used as an indicator of players' championship performance. We obtained participants' win and lose scores for each of their games from the official open match results. We then calculated the WLS ratio for each participant in each completed game. For instance, if a player lost a game with a result of 7:11, the WLS ratio for the player in this game is *7/11 = 0.64*; if a player won a game with a result of 11:7, the WLS ratio for the player in this game is *11/7 = 1.57*[2]. Following that, we generated the mean WLS ratio of all games played in the championship for each study participant, with a higher WLS ratio indicating

[1] Chinese athlete national title contains five levels including international elite or superelite, national elite, national levels 1, 2, and 3. The current study sample consists of a mid-ranged elite level Chinese athletes in table tennis.

[2] We acknowledge that when a game ends 11-0 it is impossible to generate the WLS ratio as 11/0 does not yield a value. However, this circumstance was not observed in our data and is considerably rare in table tennis.

247 better performance. Such an approach allowed the comparison of performance among different
248 players, which also aligns with recommendations from the rules of the *Official International Table*
249 *Tennis Federation* (ITTF, 2021). Hereafter, when we use the term "performance" we refer to the
250 WLS ratio as an objective performance metric.

251 **Procedure**

252 With institutional ethical approval, one of the authors visited the players' village one day
253 before start of the championship. Coaches of players received study information first; upon their
254 approval, a short briefing about the study was delivered to players in companion with their coaches.
255 Once completed their consent, participating players received a survey pack which took
256 approximately 10-15 minutes to complete. Players and their coaches were thanked and debriefed.

257 **Data analyses**

258 We followed the same approach to preliminary analyses as described in Study 1. For the
259 main analyses, we used the PROCESS (Hayes, 2013) to test the indirect effects of resilience
260 qualities and resilience support in predicting championship performance via pre-competition
261 cognitive anxiety. We ran separate mediation analyses for resilience qualities and resilience support
262 using the total effect model (i.e., model 4 in PROCESS), controlling for the potential confounding
263 of demographic variables (i.e., age, sex, training years). Following guidance on testing indirect
264 effects (Preacher & Hayes, 2008), we used bootstrapping method and generated bootstrap adjusted
265 standard error (SE) and confidence interval (CI). We followed the same criteria as Study 1 in
266 testing and reporting statistical analyses such as reporting unstandardised coefficients (B) to aid
267 the interpretation of regression effect and standardised coefficients (β) for effect size interpretation.

Study 2: Results

Preliminary analyses

No missing data was found, and all individual scores on study variables were within three standardised deviations of the mean. Table 3 presents means, standard deviations, correlations, and Cronbach's alphas for the study variables measured.

Main analyses

The mediation model for resilience qualities explained 20% of the variance in performance, F (5, 100) = 5.10, $p < .001$. We obtained a significant positive indirect effect of resilience qualities on players' championship performance via reduced pre-competition cognitive anxiety (Indirect effect = .57, SE = .37, 95% CI = [.01, 1.45]; standardized indirect effect = .09). To expand, resilience qualities predicted significantly reduced cognitive anxiety (B = -.26, β = -.20, p = .047; 95% CI = [-.52, -.01]), and cognitive anxiety subsequently predicted decreased championship performance (B = -2.21, β = -.27, p = .005; 95% CI = [-3.74, -.67]). Moreover, resilience qualities demonstrated a positive direct effect on championship performance (B = 2.17, β = .20, p = .040; 95% CI = [.10, 4.23]). Male (B = 3.39, β = .28, p = .005; 95% CI = [1.03, 5.75]) and longer training years (B = .71, β = .28, p = .018; 95% CI = [.12, 1.30]) were related to better performance. Figure 1 provides an illustration of the mediation model with detailed statistics of all the paths presented.

In comparison, the mediation model for resilience support explained 17% of the variance in performance, F (5, 100) = 4.25, p = .002. However, we failed to obtain a significant indirect effect of resilience qualities in predicting players' championship performance via pre-competition cognitive anxiety (Indirect effect = .50, SE = .35, 95% CI = [-.05, 1.31]; standardized indirect

effect = .06). Further examination revealed that resilience support manifested a non-significant relationship with pre-competition cognitive anxiety (B = -.23, β = -.17, p = .066; 95% CI = [-.47, .03]) and championship performance (B = -1.05, β = -.12, p = .212; 95% CI = [-2.72, .61]), respectively. Males (B = 3.04, β = .25, p = .013; 95% CI = [.66, 5.41]) and those with longer training years (B = .84, β = .34, p = .005; 95% CI = [.26, 1.42]) performed better.

General discussion

The aim of this research was to conduct the first test of the divergent effects of resilience qualities and resilience support on athletes' pre-competition cognitive anxiety and performance. Across two studies, we found athletes' resilience qualities consistently demonstrated a stronger and negative effect in predicting pre-competition cognitive anxiety, compared to their resilience support. In Study 2, we further demonstrated that the emotional and regulatory benefit associated with resilience qualities (i.e., reduced pre-competition cognitive anxiety) contributed to better championship performance among Chinese elite table tennis players. In contrast, resilience support of athletes did not predict pre-competition cognitive anxiety at the national championship nor predict performance. Collectively, the two studies provided the first quantitative evidence to support the facilitative role of resilience on objective performance (i.e., championship performance) and offered new insight into why resilient athletes performed better (i.e., protecting against undesirable cognitive anxiety).

While the results support the benefits of resilience in protecting athletes from pre-competition cognitive anxiety and enhancing performance, it is noteworthy that such benefits are driven by resilience qualities (positive traits or characteristics established within the athletes), not

resilience support (athletes' support resources), at least from the current study samples. This finding has built on previous qualitative investigations of the multi-facets nature of sport resilience (e.g., Fletcher & Sarkar, 2013; Galli & Gonzalez, 2015; Hill et al., 2018) by offering new, quantitative insights into the distinction between resilience qualities and resilience support, and also calls for a reflection of the current, predominate but ironic approach of assessing resilience in sport as a unidimensional psychological construct (cf. Windle et al., 2011). Since the measure of resilience qualities and resilience support used in this research originated in a Chinese context, researchers and practitioners would do well to develop and validate a new sport resilience scale to better assess such a distinction in their own population and sport-specific settings.

Second, the findings suggest building resilience qualities (reflecting positive personal traits and characteristics) likely plays a more vital role than providing support resources for performance enhancement, at least in protecting athletes from excessive pre-competition cognitive anxiety and in preparing for pressured games (e.g., a championship). Importantly, the findings suggest that, when building interventions or education programs for enhancing psychological resilience in sport, one should consider the appropriate weighting of the various protective factors based on clearly articulated goals. This implication provides support to Fletcher and Sarkar's (2016) proposed framework of developing psychological resilience for sustained success. Specifically, Fletcher and Sarkar (2016) outlined a mental fortitude training program, recommending practitioners to consider the different combinations of the variety of protective personality qualities and support resources in delivering desirable outcomes for aspiring sport performers. Central to this framework is the identification of required resources for being resilient to certain stressors and environmental

settings. Findings of the present research establish empirical support for Fletcher and Sarkar's (2016) framework and offer guidance that building resilience qualities (rather than providing support resources) needs to be prioritised when delivering a program or intervention focusing on enhancing athletes' ability to cope with competitive anxiety and perform under pressure.

Nevertheless, the non-effect (or lack of association) of athletes' perceived resilience support on pre-competition cognitive anxiety and championship performance does not reject the value of appropriate support resources in psychological resilience of sport performers. Indeed, qualitative research of resilience in Olympic athletes (e.g., Fletcher & Sarkar, 2013), youth (e.g., White & Bennie, 2015), and expert sport performers (e.g., Brown et al., 2020) has unveiled a consistent finding that social support and accessibility to such resources are fundamental to psychologically resilient athletes. It is possible that resilience support manifests different indirect effects on performance (i.e., not via cognitive anxiety or regulation of mental states at the performance event), and its performance effect may be less direct and mediated by enhanced mental wellbeing or reduced psychological distress (e.g., Purcell, Gwyther, & Rice, 2019; Reardon et al., 2019) and factors influencing quality of training (e.g., Woodman et al., 2010; Zhang et al., 2019; Zhang et al., 2021). Such a proposition contends that offering resilience support plays a more important role in the development of high-performing athletes (e.g., coping with adversity, engaging in training, managing mental wellbeing). Similar remarks exist in the literature, suggesting athletes' experience and management of organisational stress can be optimised when appropriate resilience support resources are present (see Fletcher & Arnold, 2017). Future researchers and practitioners would do well to explore the optimal design and delivery of sport

resilience programs for both on-site (i.e., at competition) and off-site (i.e., in training and preparation) benefits.

Limitations and other future directions

We must concede the two studies presented are not without limitations. One main concern is the sole focus of competitive table tennis players in the Chinese context. Such a limitation may restrict the generalisability of findings to other sports and athletes' populations in western contexts. However, it is also noted that the current research adopted validated measures assessing the divergent effects of resilience qualities and resilience support, recruited large samples of high-level athletes (i.e., receiving regular training for competition in Study 1 sample, 93.4% holding a national title in Study 2 sample), and used a prospective design assessing the influence of resilience on athletes' championship performance. The studies were well-powered, and the results were consistent across studies. With these advantages of the present research in mind, we call for new research to re-examine and replicate the findings in other sports and in different countries or populations.

Besides, the current set of studies only assess resilience at a single time point and therefore being unable to offer insights into the stability and fluctuations of resilience qualities and resilience support. However, since one's level of psychological resilience can change with repeated stressors (Den Hartigh & Hill, 2022), it is important for future research to replicate and extend the present research by examining how changes in resilience over time impact on fluctuations of competitive cognitive anxiety and performance.

Another limitation in the current research is the lack of consideration of alternative

mechanisms underpinning resilience and performance. It is known that a wide range of psycho-social-behavioural factors (e.g., obsessiveness and perfectionism regarding training and performance, persistent pursuit of sporting goals, and counterphobic attitude when performing under high pressure) play a role in the development of the world's best players (Hardy et al., 2017), and there are certainly other possible mechanisms beyond the regulation of competitive anxiety that underpin the resilience-performance relationship. We, therefore, encourage future research to investigate the various mechanistic factors that offer new insights into how and why resilience benefits performance. This new line of research should also provide knowledge and implications around how to tailor resilience programmes for talent development and performance enhancement, with the consideration of the divergent effects of establishing resilience qualities and providing resilience support resources (see also Fletcher & Sarkar, 2016).

Additionally, as many, if not all sport resilience research, we used what resilience can do to define what resilience is, by adopting the conceptualisation of resilience as a dynamic process of positive adaptation in the context of significant adversity (see Fletcher, 2021). Therefore, psychological characteristics that foster resistance against a stressor, help an individual to bounce back or stimulate growth, could all be identified as resilience protective factors, of which the resilience conceptualisation may lack in clarity and specific focus (see Den Hartigh & Hill, 2022). Nevertheless, the present research has provided at least two specific focuses of psychological resilience in sport, namely resilience qualities and resilience support. Future research would do well to offer more clarity on these specific domains of sport resilience, addressing how resilience as a psychological concept can be distinguished from its underlying factors.

Conclusion

In summary, the present research provided the first evidence supporting the divergent effects of resilience qualities (reflecting positive traits and dispositions underpinning resilience) and resilience support (reflecting support resources underpinning resilience) in predicting athletes' pre-competition cognitive anxiety and performance at championship. It is possible that resilience qualities serve a more vital role to optimising mental states (e.g., cognitive anxiety) and performance at the competition, while resilience support contributes more to athletes' developmental process on a daily basis (e.g., training, coping with adversity, wellbeing). We call for replication studies to examine the generalisability of the findings to different sports and populations. Coaches and practitioners should consider how to tailor a mixed package of building positive qualities and providing support when delivering resilience programme.

Disclosure statement

The authors do not have any financial or non-financial competing interests.

Data Availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to containing information that could compromise the privacy of research participants.

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559

Table 1

Descriptive statistics and zero-order correlations between variables of the Study 1 (n = 197)

Measure	1	2	3	4	5	6
(1) Age (in years)	–	.10	.42**	-.25	.70	.04
(2) Sex (1-male, 0-female)		–	-.05	.20**	.03	-.21
(3) Years of Training			–	.18**	.14*	-.16
(4) Resilience Qualities				(.75)	.50*	-.42**
(5) Resilience Support					(.81)	-.31**
(6) Pre-competition Cognitive Anxiety						(.80)
Mean	13.35	.62	2.95	3.75	3.58	2.03
SD	1.35	.49	2.26	.60	.72	.67

Note. The range score is 1-5 for resilience qualities and resilience support, 1-4 for pre-competition cognitive anxiety. Cronbach's alphas are presented in parentheses when appropriate.

*$p < .05$; **$p < .01$.

Table 2

Statistics of the Study 1 hierarchical regressions on pre-competition cognitive anxiety (n = 196)

	R^2	ΔR^2	*B*	*β*	*se*	*p*	95% CI for *B*
Model 1	**.08**	**.08**					
Age			.09	.17	.04	.03	[.01, .16]
Sex (1-male, 0-female)			-.34	-.24	.02	.00	[-.53, -.15]
Years of Training			-.07	-.24	.02	.00	[-.12, -.03]
Model 2	**.20**	**.12**					
Age			.06	.12	.04	.11	[-.01, .13]
Sex (1-male, 0-female)			-.22	-.16	.09	.02	[-.41, -.04]
Years of Training			-.04	-.15	.02	.04	[-.09, -.01]
Resilience Qualities			-.40	-.36	.08	.00	[-.55, -.25]
Model 3	**.22**	**.02**					
Age			.07	.13	.04	.07	[-.01, .14]
Sex (1-male, 0-female)			-.24	-.18	.09	.01	[-.42, -.06]
Years of Training			-.04	-.15	.02	.04	[-.09, -.01]
Resilience Qualities			-.32	-.28	.08	.00	[-.49, -.14]
Resilience Support			-.14	-.15	.07	.05	[-.27, .00]

Note. R^2 = proportion of variance in pre-competition cognitive anxiety accounted by the model; ΔR^2 = change or increase in R^2; *B* = unstandardised regression coefficient; *β* = standardised regression coefficient; *se* = standard error; CI = confidence interval.

Table 3

Descriptive statistics and zero-order correlations between variables of the Study 2 (n = 106)

Measure	1	2	3	4	5	6	7
(1) Age (in years)	–	.09	.54**	.10	-.05	-.01	-.05
(2) Sex (1-male, 0-female)		–	-.21*	.21**	-.03	-.19*	.16
(3) Years of Training			–	-.16	.03	.13	.15
(4) Resilience Qualities				(.79)	.58**	-.24*	-.21*
(5) Resilience Support					(.81)	-.21*	-.12
(6) Pre-competition Cognitive Anxiety						(.85)	-.21*
(7) Performance (win-lose score ratio)							–
Mean	15.82	.48	8.04	3.70	3.64	2.06	3.28
SD	1.69	.50	2.43	.56	.67	.73	6.07

Note. The range score is 1-5 for resilience qualities and resilience support, 1-4 for pre-competition cognitive anxiety, 0 to infinite for performance (win-lose score ratio). Cronbach's alphas are presented in parentheses when appropriate.

*$p < .05$; **$p < .01$.

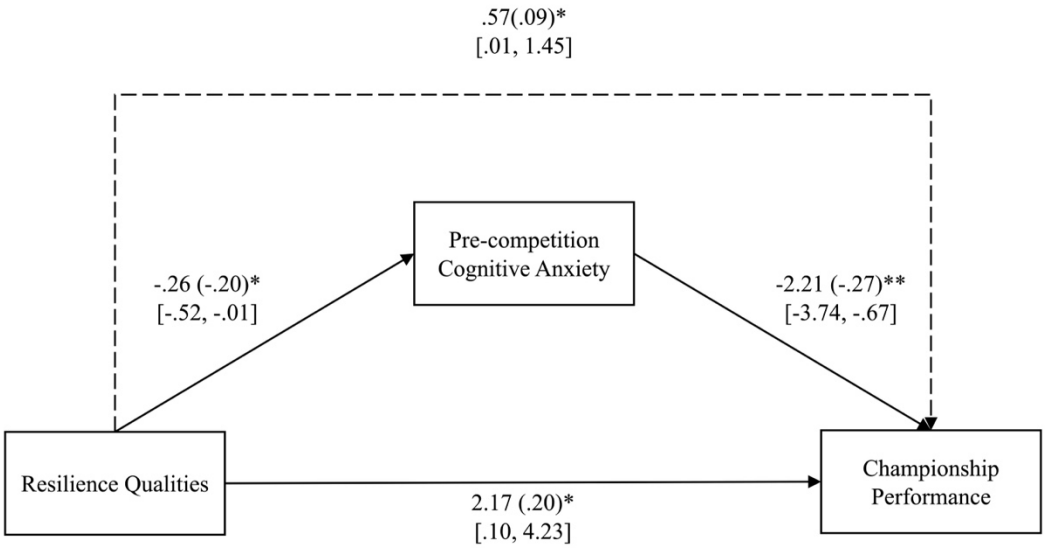

Figure 1. The mediation model examining effects of resilience qualities on championship performance via pre-competition cognitive anxiety. Significant indirect effect was obtained (reflected by the dotted, arrow path). Each solid, arrowed path represents a direct effect. Unstandardised estimates were displayed without the parentheses, and standardised estimates were within the parentheses. 95% confidence intervals were presented below the path estimates. *$p < .05$; **$p < .01$.