Perceived Stressors Experienced by Competitive Esports Athletes

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Abstract

Aim: This study explored the sources of stress experienced by competitive esports athletes.

Methods and results: In this cross-sectional survey design, participants were 270 esports athletes ranked in the top 40% (determined by in-game rank) of one of five major esports: Rainbow Six: Siege, Overwatch, Counter-Strike: Global Offensive, League of Legends, and Defense of the Ancients 2. Participants reported a stressor they had recently encountered as part of a stress appraisal measure (1). 11 sources of stress reported by traditional sports athletes were reported by these esports athletes (2). Furthermore, four novel esports-specific stressors were identified: Technical issues, balancing life commitments, anti-social behaviour, and critical moment performance. Similar to traditional sports, teammate stressors (53.7%) and performance stressors (26.9%) were reported by 79.2% of participants. Finally, esports athletes in the 99 – 100th percentile reported more performance-related stressors than teammate stressors, whereas esports athletes in the 60-99th percentile reported more teammate-related stressors than performance stressors.

Conclusions: Results from this study suggest that a small number of stressors account for the majority of reported stressors experienced by esports athletes. Esports-specific stressors emerged from the data, including technical issues, anti-social behaviour, balancing life commitments, and critical moment performance. Finally, elite esports athletes were more likely to report performance stressors, whereas sub-elite (60-99th percentile) esport athletes were more likely to report teammate-related behaviours as stressors.

Keywords: Electronic sport; Competitive Gaming, Stress; Performance psychology

Highlights:
- There are similarities in the stressors experienced by competitive esports athletes and traditional sports athletes.

- Esports players reported novel esports stressors; technical issues, anti-social behaviour, balancing life commitments and critical moment performance.
- Elite esports athletes appear to report more performance related stressors, whereas sub-elite esports athletes report more teammate related stressors.

Introduction

Stress and coping in athletic populations is an area of sports psychology research that has received extensive attention (2,3). An athlete's ability to effectively manage stressors has been shown to be critical to athletic success, and athletes who use more adaptive coping strategies to deal with stress tend to be better performers (3,4). The predominant stress and coping model adopted by sports researchers has been the cognitive-motivational-relational theory of stress and coping (2,4). This theoretical model views the appraisal of stressors, coping, and consequences as a dynamical and recursive process between a person's internal (e.g., goals and values) and external (e.g., situational) environments (4).

A significant amount of stress and coping literature has investigated the sources of stress in traditional sports (2,3,5). It was initially theorised that athletes could experience an unlimited number of stressors (6,7). More recent sport studies have suggested a smaller number of reoccurring stressors that impact most athletes. For example, diary studies with golf and rugby union players have reported that between three and five sources of stress account for most stressors reported by these athletes (8,9). Over 31 days of competitive play, international adolescent golfers reported four main stressors – physical error, making a mental error, watching an opponent playing well, and challenging weather conditions – that accounted for 75.3% of all the stressors reported (8). Similarly, international adolescent rugby union players reported five stressors – physical error, criticism from coach/parent, making a mental error, injury, and observing an opponent play well – accounting for 73% of stressors reported in a 31-day period (9). Similar stressors were reported by professional rugby union players over a 28-day period (physical injury, mental error, and physical error), accounting for 44% of all stressors (10).

A study by Nicholls et al. (5) used concept maps to understand stress and coping in a large sample of athletes of diverse ability ranging from club level to international level. Overall, 20 stressors were reported with some specific to the nature of the sport (i.e, individual vs. team; contact vs. non-contact) and the athletes' abilities. For example, national/international athletes reported only seven stressors – injury, error, performance, outcome, training, opponent, and fitness. Overall, the body of research on sport-specific stressors suggests that athletes are likely to encounter a small number of stressors that reoccur over time and differ based on the nature of the sport and achievement level (3).

A rapidly emerging sporting industry is esports, or the competitive and organised playing of video games (11). In the last decade, the esports industry has seen rapid growth in prize money, spectatorship, and economic activity. The esports industry is estimated to be worth USD$24.9 billion (12) and, in 2020, total prize pools were expected to reach over USD$300 million (13).

The similarities between esports and traditional sport are becoming more evident in how esports organisations support their esports athletes to improve both physically and mentally (14). For instance, Team Liquid, a major international esports organisation, constructed an 8000-square-foot esports training facility. The facility allows players access to high-performance gaming computers for practice and an on-site chef, sport psychologist, nutritionist, and gym facilities (15). Moreover, an Australian university uses the Foundations, Talent, Elite and Mastery (FTEM) framework (16), developed in sport, to offer scholarships to esports athletes playing League of Legends (LoL) and supports the LoL team with a multidisciplinary sports science team, consisting of a sports psychologist, strength and conditioning coach, and dietitian (17).

There is a growing body of literature investigating cognition, neuropsychology, and performance psychology principles in esports (11,18,19). Of relevance to this study are those investigating the psychological determinants of success of esports athletes. Himmelstein et al. (20) found that the mental skills and obstacles experienced by LoL players are similar to those used and experienced by traditional athletes. Smith et al. (21) found that the coping strategies – emotion-focused, problem-focused, avoidance, approach and appraisal coping – were employed by seven professional esports athletes. Similarly, Poulus et al. (22) found that competitive esports athletes, in the top 40% (determined by in-game rank) of five major esports, used more problem-focused and emotion-focused coping strategies and less avoidance coping strategies. Esports athletes' use of coping strategies appears to share similarities to the coping strategies employed by traditional sports athletes (3). It must be noted that the work of Himmelstein et al. (20) and Smith et al. (21) is limited by small sample sizes and focus on one esport (LoL and Counter-Strike: Global Offensive (CS: GO), respectively). Clearly, there is a need for continued investigation into the psychological determinants of success in esports and to investigate the sources of stress experienced by competitive esports athletes. This would provide important information for potential future psychological interventions in esports athletes to enhance performance and athlete well-being (18).

Therefore, to better understand the stressors experienced by competitive esports athletes, the present study targeted players in the top 40% (as determined by in-game rank) of five team-based esports: Defense of the Ancients 2 (DOTA 2), LoL, CS: GO, Overwatch (OW) and Rainbow Six: Siege (R6). The esports were chosen due to their popularity, prize pool (tournaments), in-game ranking system, and accessibility of participants (11). The present study seeks to contribute to the growing investigation into the psychological determinants of success in esports by exploring the sources of stress reported by competitive esports athletes. Due to the exploratory nature of this research, no explicit predictions were made about the stressors experienced by competitive esports athletes.

Methods

Participants

Participants were 270 esports athletes (241 males, 29 female) aged 18-39 years (M = 22.40, SD = 4.12). The sample consisted of 18 DOTA 2, 112 LoL, 59 CS: GO, 80 Overwatch and 32 R6 players. Only players in the top 40% of their chosen esport completed the survey. The in-game cut off ranks for each esport were DOTA 2 ≥Archon 3, LoL ≥Silver 1, CS: GO ≥Master Guardian 1, OW ≥Platinum 1, R6 ≥Gold 3 (Table 1). The majority of participants were located in Australia (41.1%), United States (25.9%), Canada (6.3%), and Germany (4.1%), with the remaining 22.6% of participants being located in 36 other countries. This sample consisted of 37 (13.7%) athletes who have competed as professionals and 233 (86.3%) were non-professional esports athletes.

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Table 1 - In-game Ranking Standardised into Achievement Level Groups across Esports

DOTA 2			League of Legends			Counter Strike: Global Offensive (CS:GO)		
Group	Rank	Percentage	Group	Rank	Percentage	Group	Rank	Percentage
5	Archon 4	(58.17-63.61)	5	Silver 1	(56.3 - 62.18)	5	Master Guardian 1	(66.61- 74.16)
5	Archon 5	(63.61-68.96)	5	Gold 5	(62.18-73.62)	4	Master Guardian 2	(74.16 - 80.77)
5	Legend 1	(68.96-74.11)	4	Gold 4	(73.62-79.26)	3	Master Guardian Elite	(80.77 - 86.01)
4	Legend 2	(74.11-78.73)	4	Gold 3	(79.26-83.28)	3	Distinguisher Master Guardian	(86.01 - 90.16)
4	Legend 3	(78.73-82.78)	3	Gold 2	(83.28-85.92)	2	Legendary Eagle	(90.16- 93.41)
3	Legend 4	(82.78-86.24)	3	Gold 1	(85.92- 89.7)	2	Legendary Eagle Master	(93.41-96.61)
3	Legend 5	(86.24-89.19)	3	Platinum 5	(89.7-93.02)	2	Supreme Master First Class	(96.61-99.25)
3	Ancient 1	(89.19-91.60)	2	Platinum 4	(93.02-94.72)	1	The Global Elite	(99.25-100)
2	Ancient 2	(91.60-93.52)	2	Platinum 3	(94.72-96.19)			
2	Ancient 3	(93.52-95.05)	2	Platinum 2	(96.19-97.37)			
2	Ancient 4	(95.05- 96.25)	2	Platinum 1	(97.37-98.01)			
2	Ancient 5	(96.25 - 97.56)	2	Diamond 5	(98.01-99.25)			
2	Divine 1	(97.56 -98.19)	1	Diamond 4	(99.25-99.6)			
2	Divine 2	(98.19-98.64)	1	Diamond 3	(99.6-99.78)			
2	Divine 3	(98.64-99.0)	1	Diamond 2	(99.78-99.88)			
1	Divine 4	(99.0-99.26)	1	Diamond 1	(99.88-99.95)			
1	Divine 5	(99.26-99.45)	1	Master	(99.95- 99.98)			
1	Immortal	(99.45-100)	1	Challenger	(99.98-100)			

Overwatch			Rainbow Six: Siege		
Group	Rank	Percentage	Group	Rank	Percentage
5	Platinum (>2588)	60.0 -77.7	5	Gold 3	(64.89-73.64)
4	Diamond	77.8-91.2	4	Gold 2	(73.64-81.81)
2	Master	91.3-96.7	3	Gold 1	(81.81-88.06)
2	Grandmaster	96.8-99.9	3	Platinum 3	(88.06- 95.52)
1	Top 500	99.9-100	2	Platinum 2	(95.52-98.1)
			2	Platinum 1	(98.1-99.11)
			1	Diamond	(99.11-100)

Key	
Achievement Level Groups	Ranking Percentage
5	~ 60-70
4	~ 70-80
3	~ 80-90
2	~ 90-99
1	~ 99-100

Note: the ranking percentages above were gathered at the below times and locations.

Game Title	Date Rank Gathered	Cut off Rank	Rank Reference
DOTA 2	June 2018	>Archon 3	https://www.esportstales.com/dota-2/seasonal-rank-distribution-and-mmr-medals
League of legends	August 2018	>Silver 1	https://www.esportstales.com/league-of-legends/rank-distribution-percentage-of-players-by-tier
CS:GO	August 2018	>Master Guardian 1	https://totalcsgo.com/ranks
Overwatch	August 2018 (season 11)	Platinum (>2588SR)	https://www.esportstales.com/overwatch/competitive-rank-distribution-pc-and-console
Rainbow Six Siege	July 2018	Cut off rank: >Gold 3	https://www.esportstales.com/rainbow-six-siege/seasonal-rank-distribution-and-percentage-of-players

Procedure

Institutional ethical approval was received from the Queensland University of Technology , approval number: 1800000435. All participants provided informed consent before participating in the study and completed basic demographic information (e.g., age, gender, in-game rank). Participant recruitment was completed either online or in-person at major esports events. For in-person events, the lead author approached potential participants in-person at major Australian esports events and directed them to the online survey. Online participants were directed to a URL to complete the questionnaire pack (developed and managed by Qualtrics). Similar to stress appraisal measures used in traditional sports and esports (1,22), participants

were asked to list a single stressor that they had recently encountered when competing in their chosen esport in an open-ended stressor box. As the present study was exploratory in nature, an open-ended stressor box was used instead of a stressor checklist with pre-determined stressor categories. The URL was also distributed online via social media (Twitter & Facebook) and YouTube advertising.

Data Analysis

Data analysis consisted of both deductive and inductive processes. The deductive analysis was guided by methods utilized by Nicholls et al. (5) and Nicholls and Polman (9). The stressors reported in the appraisal measure were initially coded into the 20 themes reported in traditional sports (5,9): injury, specific error, general performance, outcome, training, criticism, coach, official, opponent, tactics/techniques, crowd, selection, teammate communication, fitness, teammate mistake, social appearance, weight/strength, teammate in general, university work, and environment. Initially, the first and third authors independently coded the same random sample of 50 stressors to categorise the stressors reported into the themes developed by Nicholls and Polman (9). As esports is a novel area, there was a series of codes that did not fit the previously reported; therefore, an inductive analysis procedure (23) was followed again by the first and third author independently. Meaning, units that did not fit the deductive codes were grouped and assigned a label that reflected the meaning of the theme. To ensure each unit's uniqueness, the constant comparative method (24) was employed until agreement was made between researchers. As stressors were grouped into labels, they were continuously assessed against other labels. If there were no similar labels, a new theme was created.

Nicholls et al. (5) found that in undergraduate athletes, their reported stressors differed in relation to the athletes' skill level. To understand if the achievement level in esports influenced the stressors reported by esports athletes, in-game ranks were standardised between games. Esports classify their players into ranks based on a percentage range. The number of levels differs across esports. To standardise achievement levels across the five games, five category classifications were developed. Level 1 = 99-100%; Level 2 = 90 – 98%; Level 3 = 89 - 80%; Level 4 = 79 –70%; Level 5 = 69 – 60% (Table 1). Chi-square analysis was conducted to explore differences in stressors reported based on achievement level if it did not violate assumptions. Post-hoc analysis was conducted through visual inspection of the data (25). All statistical analyses were conducted in SPSS version 26.

Results

Table 2 shows the numbers and percentages of participants of first and second-order stressor categories. Eleven second-order stressor categories identified by Nicholls et al. (5) were present in the data: general performance (in-game), outcome, criticism, coach, official, opponent, crowd, teammate in general, teammate communication, teammate mistake, and injury.

Table 2 - Frequency and Percentages of Reported First-order and Second-order Stressors

Stressor Categories	Frequency	Percentage
Performance	**73**	**27.0**
General Performance	36	13.3
Outcome	22	7.4
Critical Moment Performance	16	5.9
Injury	1	0.4

Teammate	**141**	**52.2**
Teammate Communication	37	13.7
Teammate Mistake	10	3.7
Teammate General	37	13.7
Anti-social Behaviour	57	21.1
External Individuals	**26**	**9.6**
Criticism	4	1.5
Crowd	3	1.1
Coach	1	0.3
Official	6	2.2
Opponent	12	4.4
Balancing Life Commitments	**20**	**7.4**
Technical Issues	**10**	**3.7**

Four esports-specific second-order themes were generated from the data: technical issues, anti-social behaviour, balancing life, and critical moment performance. Table 3 shows the second-order themes and a raw data example for each. The second-order theme, anti-social behaviour, included stressors that mentioned 'toxicity', 'griefing' or offensive behaviours by teammates (e.g., "annoying and toxic players (abusing voice chat)"). Balancing life commitments refers to participants who reported that a stressor in relation to their gaming was a difficulty balancing gaming with the rest of their lives (e.g., "Due to university work, playing any video games, esports included, I feel stressed that I could/should be working more"). Technical issues included stressors related to internet issues (e.g., "lag" or "disconnections"), and computer hardware issues (e.g., "unresponsive keyboard") that impacted in-game performance. Critical moment performance included stressors associated with having to perform well in specific moments in esports (e.g., "being the last team member alive in the round"). This is also known as having to "clutch" the round (e.g., as the last team member alive, one might be required to kill multiple enemies to win).

Table 3 - First-order Themes, Second-order Themes, and Raw Data for Esports Players Self-reported Stressors

First-Order Themes	Second-Order Themes	Raw Data
Performance	General Performance	"Poor team performance and choking in finals."
	Outcome	"Competing in the APAC Pro League of Rainbow Six versing View Sonic Dark Sided to decide whether or not we would be relegated to 7/8th place."
	Critical Moment Performance	"Being the only one alive and having to "Clutch" or play against a team solo."
	Injury	"Tinnitus – the fear of losing hearing permanently."
Teammate	Teammate Communication	"The entire team not communicating and only caring about their point score."
	Teammate Mistake	"Losing because of my teammates."
	Teammate General	"Teammates that do not handle failure well"
	Anti-social Behaviour	"Toxic players being sexist."/ "Someone feeding (deliberately allowing the enemy team to kill them repeatedly, to the benefit of the enemy team and detriment of the friendly team)."
	Criticism	"Criticisms that lack a purpose."

External Individuals	Crowd	"Playing on stage at a LAN event (Specifically Gfinity)."
	Coach	"Team coaching in real life."
	Official	"Adjusting to the games changes (meta)."
	Opponent	"Facing the top Australian team in the R6 Pro League."
Balancing Life Commitments	Balancing Life Commitments	"Competing in events as well as studying for exams is an extremely stressful time."
Technical Issues	Technical Issues	"Bad internet connection."/ "Unresponsive keyboard."

The first-order stressor category – teammate – was reported by 53.8% of participants. Teammate stressors consisted of four second-order stressors: teammate communication (13.3%), teammate mistake (4%), teammate general (15%), and anti-social behaviour (21.6 %). Performance-related stressors were reported by 26.9% (81) of participants. Four second-order stressors were categorised under the theme of performance: general performance (13%), outcome (7%), critical moment performance (6.3%) and injury (0.7%). Together, teammate-related (53.8%) and performance-related (26.9%) stressors accounted for 79.2% of the total stressors reported by participants. The remaining 19.3% of stressors were made up by external individuals (9%), balancing life commitments (6.6%), and technical issues (3.7%).

Higher-order stressor frequencies were calculated between esport titles (see Table 4). DOTA 2 athletes reported teammate stressors (72%) most frequently, followed by performance stressors (11.1%). Similarly, LoL athletes reported teammate stressors (54.5%) most frequently, followed by performance stressors (26.7%). CS: GO athletes reported an equal percentage of teammate (34.7%) and performance stressors (34.7%). Furthermore, CS: GO athletes also reported equal percentages of external individual (14.3%) and balancing life commitment stressors (14.3%). Overwatch athletes most frequently reported teammate stressors (69.9%), then performance stressors (20.5%). In contrast to the other esport titles in this study, R6 athletes reported performance stressors (41.4%) most frequently, followed by teammate (31%) and external individual stressors (17.2%).

Table 4 - Frequency and Percentage of Higher-order Stressors between Esport Titles

Esport	Higher-order Stressor	Frequency	Percentage
DOTA 2	Performance	2	11.1%
	Teammate	13	72.2%
	External Individual	1	5.6%
	Balancing Life Commitments	1	5.6%
	Technical Issues	1	5.6%
League of Legends	Performance	27	26.7%
	Teammate	55	54.5%
	External Individual	9	8.9%
	Balancing Life Commitments	6	5.9%
	Technical Issues	4	4.0%
Counter Strike: Global Offensive	Performance	17	34.7%
	Teammate	17	34.7%
	External Individual	7	14.3%
	Balancing Life Commitments	7	14.3%
	Technical Issues	1	2.0%
Overwatch	Performance	15	20.5%
	Teammate	51	69.9%
	External Individual	2	2.7%

	Balancing Life Commitments	3	4.1%
	Technical Issues	2	2.7%
Rainbow Six: Siege	Performance	12	41.4%
	Teammate	9	31.0%
	External Individual	5	17.2%
	Balancing Life Commitments	2	6.9%
	Technical Issues	1	3.4%

Table 5 displays the frequency and percentages of the first-order stressors at each level of achievement. Chi-squared analysis of performance and teammate stressors at each level of achievement showed a significant result, χ^2 (8) = 18.80, p = .016. Visual inspection of the data (including the residuals) revealed that esports athletes in the 60 – 70th, 70 – 80th, 80 – 90th and 90 – 99th percentile groups reported more teammate stressors than performance stressors, with teammate stressors accounting for nearly half of all the reported stressors in these groups. The 99 – 100th percentile was the only group to report more performance-related stressors than teammate stressors.

Table 5 - Frequency and Percentage of First-order Stressors Reported at each Level of Achievement

First-order Stressor	60-70th Percentile	70-80th Percentile	80-90th Percentile	90-99th Percentile	99-100th Percentile	Chi-Square
Performance	23 (28.7%)	14 (29.2%)	10 (23.8%)	9 (15.3%)	17 (41.5%)	χ^2 (8) = 18.80, p = .016
Teammate	47 (58.8%)	28 (58.3%)	20 (47.6%)	31 (52.5%)	15 (36.6%)	
External Individual	4 (5.0%)	5 (10.4%)	2 (4.8%)	9 (15.3%)	6 (14.6%)	
Balancing Life Commitments	4 (5.0%)	0 (0%)	5 (11.9%)	9 (15.3%)	2 (4.9%)	
Technical Issues	2 (2.5%)	1 (2.1%)	5 (11.9%)	1 (1.7%)	1 (2.4%)	
Total reported stressors (270)	**80**	**48**	**42**	**59**	**41**	

Discussion

The aim of this study was to explore the main sources of stress experienced by competitive esports athletes and how they might differ according to achievement level. Participants reported 270 stressors that were coded into 15 second-order stressors and five first-order stressors. There was similarity between the stressors reported by the esports athletes and those reported in sport, with 11 of the lower order categories, identified by Nicholls et al. (5), fitting the data. Four novel, esports-specific second-order categories were generated (technical issues, anti-social behaviour, balancing life commitments, and critical moment performance). In addition, achievement level influenced stressor type, but only for the highest performing players.

Results showed that two first-order stressors comprised of nearly 80% of all stressors reported by the esports athletes. Teammate-related and performance-related stressors accounted for 79.2% of the reported stressors. This finding is consistent with the current stress literature and suggests there may only be a small number of stressors that are likely to reoccur over time (8–10).

In the present study, esports athletes reported four stressor categories that have not been reported previously in traditional sport. Anti-social behaviour was reported 65 times (21.6%) and was the highest reported second-order stressor. Previous research has found that 'toxic' behaviour (intentionally feeding (i.e., in-game suicide), offensive and abuse language) is present in LoL (26). Results from this study support this finding and show that toxic behaviours appear to be a significant source of stress in competitive esports athletes. Twenty (7.4%) participants reported stressors relating to balancing life commitments. Balancing life commitments has been reported in traditional sports as role strain (27,28). Increased role strain levels are associated with reduced life satisfaction (27) and performance (29) in elite adolescent Australian Rules Football players and golfers, respectively. As such, it would be important for such athletes to develop, for example, time management strategies to better cope with the different roles in their life.

Critical moment performance was reported by 16 participants (5.9%). Some team-based esports (specifically, CS: GO and R6, in the present study) have a unique competitive structure, whereby one player can be the last member of the team alive and needs to eliminate multiple enemies to win the round (i.e., clutch). Critical moments in sport (30) and critical moment performance (31) have been researched in traditional sport. Although this stressor is unique to esports, in essence, it is not dissimilar to clutch situations in traditional sport. Coping adaptively in such instances would be important to success.

Ten participants (3.7%) reported technical issues as a source of stress. Technical issues appear to be specific to esports, and this is likely due to the computer-mediated nature of esports. This also appears to be a stressor over which participants have little control. The coping literature suggests that emotion-focused (32) or avoidance-coping strategies (3) might be most effective to deal with such stressors. This may be because the individual player cannot solve the problem when a technical stressor occurs, and it would be beneficial to manage potential negative emotions arising from experiencing such an uncontrollable stressor or ignoring it altogether (3).

Results showed that DOTA 2, LoL, and Overwatch athletes report teammate-related stressors most frequently, followed by performance-related stressors. CS: GO athletes reported the same percentage of teammate-related and performance-related stressors. These results partially support previous findings that elite CS: GO players predominantly report team issues as stressors (21). It appears that, similarly to elite CS: GO players (21), DOTA 2, LoL, and Overwatch players also predominantly reported teammate-related stressors. However, in the present study, CS: GO players also reported a high percentage of performance-related stressors.

Achievement level was found to influence the reporting of stressors. Elite esports athletes (99-100th percentile) reported more performance stressors, whereas the majority of other esports athletes were more likely to report teammate as a stressor. Non-professional players' teammates are often determined by the esports in-built matchmaking system, giving the players no control over who their teammates will be. Players who are not playing in an organised team will be assigned teammates through an algorithm that matches players of similar skill levels. The elite sample in this study is more likely to play in organised, professional teams and play with the same players. They are, therefore, more likely to have knowledge and experience of the behaviours of their teammates. If anything, due to the nature of support being offered by esports organisations (e.g., sport psychology support), professional players might have engaged in training sessions to prevent teammates from becoming stressors to each other.

Practical Implications and Future Research Directions

The findings of the present study indicate a series of potential practical implications to improve the performance and well-being of competitive esports athletes. Psychological interventions targeted at semi/sub-professional esports athletes could help players better deal with anti-social behaviour. Players competing below the 99th percentile could benefit from psychological interventions to help them deal with a lack of perceived control over their teammates. A potentially beneficial psychological intervention for esports athletes could be Mindfulness-Acceptance-Commitment training (MAC) (33). MAC-based training has been shown to increase athletic performance in traditional sports (33,34). MAC training focuses on accepting internal experiences and helps clients develop connections between their thoughts, feelings, and actions. Case studies show that MAC-based interventions have been beneficial in athletic populations and could theoretically help competitive esports athletes better deal with anti-social behaviour (33) – more research is needed in this area with esports athletes. Also, esports athletes might benefit from coping interventions that help deal with the stressors reported in this study. This might include emotion-focussed coping strategies and avoidance coping strategies to deal with uncontrollable stressors (2).

Limitations

A strength of the present study is that it incorporated a wide range of elite and sub-elite competitive esport athletes from five major team-based esports. However, the present study is not without limitations. Whilst combining five major esports was necessary for the exploratory nature of the study, it limits the generalisability of the findings. The cross-sectional nature of the study means we cannot infer causality from the results. Participants were only asked on one occasion to report a stressor recently experienced. Longitudinal studies are required to examine whether the same stressors reoccur over time and to help reduce recency bias. Future research should track stressors at multiple points throughout the off-season and competitive season. For example, studies have suggested that more stressors are experienced during training. However, the intensity of the stressor is higher during competition (35). Hence, the stressor's intensity is also likely to influence whether it is appraised as a challenge or a threat (36). These are important issues when designing interventions to enhance the performance and well-being of esports athletes.

Conclusion

The present study is among the first explorations into the sources of stress for competitive esports athletes. This study found evidence that there are similarities in the type and number of stressors experienced by esports and traditional sports athletes. Like high performing traditional sports athletes, esports athletes reported a relatively small number of stressors (8,10). However, novel esports stressors did emerge from the data: technical issues, anti-social behaviour, balancing life commitments, and critical moment performance. Secondly, there appears to be differences in the type of stressor experienced based on achievement level. The elite athletes in the present study reported performance stressors more often, whereas the athletes between the 60-99th percentile reported teammate-related behaviours more often as a stressor. Results from this study could inform the development of psychological interventions for competitive esports athletes. Such interventions should be tailored to the achievement level of the esports athlete. Specifically, an esports adapted MAC-based training could help esports athletes better deal with anti-social behaviour in-game stress. Avoidance coping strategies might be particularly useful to cope with technical issues and anti-social

behaviour, whereas problem-focused coping strategies might help to achieve a more balanced life and deal with clutch moments.

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Conflict of Interest

The authors confirm that there are no conflicts of interest to declare.

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