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Safety behaviour and grit in sports performance among Ghanian university athletes

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Abstract

Grit is consistency of interest, perseverance and passion for long-term goal in a chosen activity, which normally translates into better acievements. Grittier athletes are assumed to be more safety conscious since they want to produce better performance in competitions. Therefore, this study explored the influence of university student-athletes' perseverance and passion for long-term goal attainment and safety behaviour in sports performance. The Grit Scale and Safety Behaviour items were used to collect data from a sample of 644 university athletes who took part in the 2018 Ghana University Sports Association Games (2018 GUSA Games). Results indicate that 46% of these athletes had won at least a medal during the competition. However, about 10.4% either consumed alcohol, a mixture of alcohol and energy drink, smoked tobacco and/or took illicit drugs such as tramadol, marijuana, fentanyl, morphine, etc. at least once a day during the competition. Binomial logistic regression analysis indicates a significant prediction of sports performance ($\chi^2 = 46.57$, $p = .001$), with female athletes, those having higher grit scores and reporting health risk behaviours more likely being medal winners. However, female athletes with higher grit scores were less likely to engage in health risk behaviour, which could compromise the students' sports performance and health status.

Keywords: Grits, perseverance, consistency of interest, health, safety behaviour, athletes, performance**.**

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Introduction

The aim of this study was to explore how university athletes' perseverance and passion for long-term goal attainment and safety behaviour affect their sports performance, and how such factors in turn influence the athletes' safety behaviour during competitions. This is because sports as a discipline and its performance has inherent challenges including injuries and dehydration (Meyer, Szygula & Wilk, 2016), thereby exposing some performers to unhealthy behaviours such as drug use which has both immediate and future health consequences to the users. Exposure and onward engagement in such unhealthy sport-related safety behaviours could result in loss of concentration and severe dehydration (Muray,

2007), which not only negatively affect the athletes' performance but also their health. Therefore, any behaviour of athletes that would lead to the above consequences needs to be prevented (Weber, Mihalik, Register-Mihalik, Mays, Prentice & Guskiewicz, 2013). For example, in a laboratory controlled study by Patel, Mihalik, Notebaert, Guskiewicz and Prentice (2007) found that performers in dehydrated condition had significant deterioration in visual memory and self-reported fatigue measures. The authors further observed that the dehydrated condition resulted in athletes reporting a significantly higher number and severity of symptoms of concussion. They c*oncluded that* moderate dehydration was enough for performers to report symptoms commonly associated with concussion, a condition that threatens health and lower sports performance.

Aside these challenges is the athletes' quest for peak performance and winning a medal during competitions. All these are critical, but are influenced by several factors, including age and sex, experience and level of training, nutrition as well as the athlete's psychological state (Wiese-Bjornstal, 2010). Psychologically, sustaining interest in an activity and the ability of an individual to persevere in order to achieve a targeted goal are very relevant to peak performance in sports (Larkin, O'Connor & Williams, 2015) and many other life endeavours, including academic performance (Suzuki, Tamesue, Asahi & Ishikawa, 2015). Nutritionally, what athletes consume in terms of food and drinks before, during and after training and in the period of competition are essential to their performance as well as contribute to their present and future health status (Ansah, Menyanu & Agyei, 2014; Tawfik, Koofy & Moawad, 2016). However, most of the earlier studies failed to address the nutritional behaviour, including substance use, of university athletes and how that affects their health and performance.

Grit is a combination of passion and perseverance that helps individuals to succeed above and beyond cognitive functioning (Duckworth & Quinn, 2009; Namikawa et al., 2012). For example, grittier children have been reported to be better swimmers than others (Duckworth & Quinn, 2009). Thus, any two or more athletes with comparable talent and skill when given the same training under similar conditions, are likely to achieve analogous levels of success. However, the most outstanding performer would be the athlete with a passion to achieve his/her long-term goals, who is also likely to persevere towards the attainment of such goals (grit), even in the face of obstacles. Grit is therefore seen as a key determinant of the individual's achievement such as in Grade Point Average (GPA), levels of educational attainment, success in scholastic competitions (Bazelais, Lemay & Doleck, 2016) and optimal sports performance (Kannangara et al., 2018). Grittier individuals are likely to show significantly higher levels of self-control, mental well-being and possess more resilience and growth-oriented mindsets (Roberson-Kraft & Duckworth, 2014).

A study by Roberson-Kraft and Duckworth (2014) also found that grittier teachers were less likely to leave the classroom in mid-year in low-income schools, where conditions are tougher than less gritty teachers. Similarly, persons who are grittier possess a high propensity to work harder and longer than their less gritty counterparts and such individuals are more likely to engage in deliberate efforts to improve their performance (Hogan, 2014). In sports, Martin, Byrd, Lewis and Dent's (2015) regression analysis showed that grittier athletes had the highest quality of life and engaged most in sports where challenges were deemed high. Although, grit literature seems clear on how it influences achievement in many domains, there seems to be not much information on university student-athletes' level of grit and its effect on their sports performance.

Both on-and-off field safety behaviours determine an individual's level of physical activity perfornace, including sports (Ansah et al., 2014). Thus, risky behaviours like the use of alcohol, smoking (tobacco and other illicit drugs), and energy drinks and the mixture of these have both short and long-term debilitating effects on the user (Buxon & Hagan, 2012; Peretti-Watel et al., 2004; Picard-Masson, Loslier, Paquin & Bertrand, 2016). Athletes who exhibit the "win-at-all-cost" attitude are likely to engage in risky health and safety behaviours (Ware, Jensen, Barrette, Vernec & Wayne, 2018), but such information is sparse in the grit-sports literature. Evidence from a large scale cross-sectional survey revealed that being elite student-athlete correlates negatively with cigarette, alcohol and cannabis such as marijuana use (Huang, Jacobs & Derevensky, 2010). However, according to Peretti-Watel et al. (2003), the use of cigarette, alcohol and cannabis is high among elite athletes, especially those participating in team sports. In a similar study, Huang, Jacobs and Derevensky (2010) reported heavy episodic drinking among college athletes in which a corresponding increase in sexual risk-taking behaviour among male and female athletes was prevalent, with females recording relatively higher volume intake.

The health and safety of athletes today and in the future are important and thus, behaviours like taking hard sports performance drugs such as energy drinks, tramadol, fentanyl and many others during competitions go a long way to affect their health and safety. Engaging in risky health and safety behaviour relates largely to the individual's self-control ability. For example, Freeman and Muraven (2010) indicated that individuals with low self-control are more likely to take excessive risks than those with high on the trait of self-control. Evidence from Duckworth and Gross (2014) showed that self-control and grit are strongly, but not perfectly correlated, but their roles in influencing sports safety behaviours especially among university studetns is missing.

Moreover, some exceptional achievers may be gritty but succumb to temptations. Then, grittier athletes are supposed to have high levels of self-control and be self-

protective, as they focus on their goals and pursue them to the end (Al-Shaar et al., 2017; Suzuki et al., 2015). Grittier student-athletes are therefore supposed to be more safety conscious which is likely to translate into successful sports performance. Thus, engaging in behaviours such as taking energy drinks, tobacco products, alcoholic drinks, a mixture of alcohol and energy drinks and illicit drugs could have immediate positive or negative effects on the athletes' health and sports performance (Mazzeo, 2016). To enhance performance, some student-athletes could be using these substances intentionally (doping) (Duckworth, Peterson, Mathew & Kelly, 2007), though most of the substances are prohibeted in sports performance. This act could defeat the purpose of university sports, where all students are expected to have equal opportunities.

Though grit constructs have been studied severally from other perspectives and covered many areas like sports and academic performance and work engagement, research in sub-Saharan African universities is very limited. Moreover, most of the studies on grit failed to address the combined effects of grit and safety behaviour on university student-athletes' performance. In addition, research studies do not seem to consider the relationship between grit and athletes' safety behaviour during competitions. The aim of the study was, therefore, to explore how grit and safety behaviour of student-athletes influenced their performance, and how grit determined safety behaviour of athletes during the 2018 Ghana University Sports Association (GUSA) Games.

Methodology

Study design and sample

Six hundred and forty-four (644) student-athletes who participated in the 2018 Ghana University Sports Association (GUSA) games held at the University of Development Studies, Tamale were involved in this study. They included 55.4% (357) male amd 44.6% (287) female athletes, with a mean age of 21.97 years and an average of five years experience in competitive sports participation. The student-athletes who took part in the GUSA 2018 games were invited and tested on their level of grit (consistency of interest and perseverance towards attaining long term sporting goals), performance (i.e. number of medals won) and safety behaviour practices during the competition. Their descriptive characteristics are presented in the results section.

Procedure

The student-athletes were contacted through their coaches, about two weeks after the games and requested to complete a 27-item questionnaire used for data collection. Copies of the questionnaire were mailed to the coaches, of all the participating universities, who then administered the instrument to their respective athletes. The athletes were invited individually by their coaches at the various

sports directorates and units where the instrument was given to them separately to feel and return to the same office within five days. The questionnaire comprised 5 demographic and sport characteristic items such as gender, age, school standing, and the number of games played. Performance was measured using the number of medals won at the competition. The long form (17 items) Grits Scale [9], was used to evaluate students' level of grit, i.e. consistency of interest and perseverance of the attainment of long term goal. They answered to the Grit items such as, *"I aim to be the best in the world at what I do", "I have difficulty maintaining my focus on projects that take more than a few months to complete", and I am driven to succeed". The response opions included "very much like me" (5), "mostly like me" (4), "somewhat like me" (3), not much like me" (2) or "not like me at all" (1), but scores in items 3, 5, 7, 9, 10, 13, and 16* were reversed. In addition, 5 items taken from the literature (Ansah et al., 2014; Buxon & Hagan, 2012), were utilised to measure the students' sports-related safety behaviour as practised during the competition. The students also responded to this portion of the questionnaire on a four-point scale, ranging from strongly agree (4) to strongly disagree (1).

The 17-item Grits Scale (Duckworth et al., 2007; Duckworth & Quinn, 2009) was adopted for the study. Prior to data collection, the questionnaire was evaluated for face and content validity by a panel of lecturers in the Department of Health, Physical Education and Recreation (HPER), University of the Cape Coast (UCC) who were not part of the study. The questionnaire was modified as advised by the panel and subsequently tested for internal consistency. The questionnaire yielded an overall Cronbach Alpha coefficient of .81 (consistency of interest, .78, perseverance of goal, .80 and safety behaviour, .83). Moreover, the variables and their indicators provided satisfying construct validity, thus indicating that factor loadings were higher (> .6) on their various latent variables (Field, 2009; Lin, & Chang, 2017). The actual data collection lasted about two months.

Ethical considerations

Ethical approval (ID: UCCIRB/CES/2018/078) was obtained from the Institutional Review Board (IRB) of UCC, Ghana. The registrars, and the heads of the various Sports Directorates and Units also gave permission for the study to be conducted in their instutions and with the student-athletes. The sports directors and the unit heads also assisted in the administration of the questionnaire to their respective athletes. The student-athletes were provided an information leaflet which clarified the purpose and procedure of the study and subsequently gave written informed consent, to sign before taking part in the study. The athletes were assured of the confidentiality and anonymity of their responses, and informed that they could withdraw from participating at any stage of the study without any repercussion.

Data analysis

Descriptive statistics and Chi-Square test (χ^2) were run for the athletes' background variables. In addition, the extent to which the student-atheltes' level of grit (consistency of interest and perseverance of effort), safety behaviour, gender, age, school standing and the number of games played influenced their sports performance at the competition was evaluated. Performance was measured based on athletes' medal winning achievements, which was categorised as medalists (athletes who won medals) and non-medalists (athletes who failed to win medals). Further, the extent to which grit (consistency of interest and perseverance of goal), gender, age, school standing and number of games played, influenced the athletes' safety behaviours during the competition was analysed. The dependent variables (performance and safety behaviour) were dichotomized to satisfy the requirement for conducting logistic regression analysis (Field, 2009; Lin, & Chang, 2017). Using *enter method*, all independent variables were entered into the regression model one after the other, but with one time analysis. The odds' ratio (OR), at .05 alpha level or 95% confidence interval were reported.

Results

The study involved 644 univerity student-athletes, who comprised 55.4% (357) males and 44.6% (287) females with mean age of 21.97 years (SD = 2.53; Range = 17 - 37). They included 3.4% (202) of students in the first year, 28.4% (183) second years, 25.2% (162) third year and 15.1% (97) in final years. An estimated 83.9% (540) of the athletes played at least a game each while 16.1% (104) played multiple games during the competition. A total of 54.0% (348) did not win any medal, while 46.0% (296) won at least a medal during the Games. While 89.6% (577) of the athletes did not report engaging in any form of negative safety behaviours, 10.4% (67) of them did. Chi-Square test analysis revealed that 19.7% (127) of the male and 26.2% (169) of the female athletes, respectively, won at least a medal, while 37.7% (230) of males and 18.3% (118) of females did not win any medal (See Table 1).

A binomial logistics regression analysis was carried out in which the athletes' sports performance was predicted from their age, gender, the number of games played during the competition, school standing, grit (consistency of interest and perseverance of goal) and competition-related safety behaviour. The result indicated an overall significant prediction (χ^2 = 46.57, p = .001), revealing a variance index between 18% (Cox and Snell R^2) and 25% (Nagelkerke R^2) and yielding a correct classification of about 67% of sports performance outcomes. Further, the increase in age corresponded to winning at least a medal in the competition (χ^2 = 27.29, *OR* = 1.28, p = .001, *C.I.* = 1.166 – 1.402), with female athletes more likely being winners (χ^2 = 43.13, *OR* = 3.41, p = .001, *C.I.* = 2.367 – 4.917), than their male conterparts, and playing multiple games resulting in

greater probability of winning a medal (χ^2 = 6.62, *OR* = 1.86, *p* = .001, *C.I.* = 1.159 – 2.980).

Table 1: Percentage and frequency distribution of athletes' performances and safety behaviours by sex, school standing and number of games played

Variables		Performance				Safety Behaviour			
		Non-Medalist		Medalist		Positive		Negative	
		f	*%*	*f*	*%*	*f*	*%*	*f*	*%*
Sex;	Male	230	37.70	127	19.70	315	48.90	42	6.50
	Female	118	18.39	169	26.20	262	40.70	25	3.90
Sch. Standing;	100	84	13.00	118	18.30	182	28.30	20	3.10
	200	103	16.00	80	12.40	172	26.70	11	1.70
	300	104	16.10	40	6.20	143	22.20	19	3.00
	400+	57	8.9	40	6.20	80	12.40	17	2.60
Games;	Single	309	48.00	231	35.90	478	74.20	62	9.60
	Multiple	39	6.10	65	10.10	99	15.40	5	.80
Safety Bahaviour;	Positive	321	49.80	256	39.80				
		27	4.20	40	6.20				
Negative									
Performance; Non-Medalist						321	49.80	27	4.20
Medalist						256	39.80	40	6.20

The analysis also shows that increase in athletes' consistency of interest (χ^2 = 18.61, *OR* = 1.07, *p* = .001, *C.I.* = 1.036 – 1.099) and perseverance of a goal (χ^2 = 15.91, *OR* = 1.09; *p* = .001, *C.I.* = 1.046 – 1.139) corresponded with 1.1 and 1.1 odds, respectively, i.e. the likelihood of winning a medal at 2018 GUSA championship. Moreover, athletes reporting risky sports-related safety behaviour (χ^2 = 17.41, *OR* = 3.43, *p* = .001, *C.I.* = 1.92 – 6.113) are about 3.4 times more likely to be among medal winners at the competition than those reporting non-risky behaviour (See Table 2). Therefore, university student-athletes recording higher grit and those taking risky sports-reelated safety behaviours are likely to be medal winners at GUSA competitions compared to those reporting low levels of grit.

Furthermore, a binomial logistics regression model was analysed to test the extent to which the safety behaviour of athletes during the competition was influenced by their age, gender, the number of games played, school standing, consistency of interest, and perseverance of goal attainment. The results revealed a significant overall model of safety behaviour of the athletes (χ^2 = 8.6, *p* = .003), revealing a change between 7% (Cox and Snell R^2) and 15% (Nagelkerke R^2), and correctly classifying about 89% of cases of competition-related safety behaviour of the athetes.

Table 2: Binomial logistics regression predicting athletes' performances from their age, sex, no. of games played, school standing, safety behaviour and level of grit

Variables	*B*	*Wald*	*Sig.*	*Odds Ratio*	*95% C.I.*
Age	.27	27.29	.001	1.28	1.166 – 1.402
Sex Male	*ref.*				
Female	1.23	43.13	.001	3.41	2.367 – 4.917
No. of Games; Single	ref.				
Multiple	.62	6.62	.001	1.86	1.159 – 2.980
Sch. Std. 100	*ref.*	37.93	.001		
200	-.82	12.51	.001	.44	.282 – .396
300	-1.53	32.04	.001	.22	.216 – .367
400+	-1.71	25.80	.001	.18	.181 – .350
Consistency of Interest	.07	18.61	.001	1.07	1.036 – 1.099
Perseverance of Goal	.09	15.91	.001	1.09	1.046 – 1.139
Safety Behaviour; Non Risk	*ref.*				
Risky	1.23	17.41	.001	3.43	1.922 – 6.113

The results further revealed that increase in age corresponded with the likelihood of not practising sports-related risky behaviour ($\chi^2 = 7.61$ *OR* = .81; $p = .006$; *C.I.* = .693 –.940), with females being less likely to engage in such behaviour compared to the males ($\chi^2 = 4.76$, *OR* = .53; $p = .001$; *C.I.* = .296 – .940). Moreover, grittier (consistency of interest; $\chi^2 = 2.95$ *OR* = .09; $p = .001$; *C.I.* = .907 – 1.006; perseverance of goal $\chi^2 = 13.64$, *OR* = .89; $p = .001$; *C.I.* = .829 – .944) athletes were less likely to report risky sports-related safety behaviour during the competition. However, interestingly, athletes in the third year ($\chi^2 = 4.68$, *OR* = 2.37; $p = .031$; *C.I.* = 1.082 – 5.186) were about 2.4 times more likely to have practised risky sports-related safety behaviour during the competition than their counterparts in the other years (See Table 3). Thus, female university athletes and all others with high grit scores were more likely not to engage in risky sports-related safety behaviour during such competition except those in the third year of their study.

Table 3: Binomial logistics regression predicting athletes' safety behaviour from their age, sex, number of games played, level, level of grit

Variables	*B*	*Wald*	*Sig.*	*Odds Ratio*	*95% C.I.*
Age	-.22	7.61	.006	.81	.693 – .940
Sex; Male	*ref.*				
Female	-.64	4.76	.029	.53	.296 – .944
No. of Games; Single	ref.				
Multiple	-.99	3.93	.047	.37	.141 – .989
Sch. Std.; 100	*ref.*	15.89	.001		
200	-.16	.15	.698	.85	.382 – .1.905
300	.68	4.68	.031	2.37	1.082 – 5.186
400+	1.65	11.78			
Consistency of Interest	-.05	2.95	.001	.09	.907 – 1.006
Perseverance of Goal	-.12	13.64	.001	.89	.829 – .944

Discussion

The objective of this study was to measure the influence of university student-athletes' act of perseverance and passion for long-term goal attainment (grit) on their safety behaviour and performance during sports competition. The findings showed that older female athletes who played multiple games were more likely to win medals at the competition than their male counterparts. Moreover, athletes with higher levels of grit, reported consistency of interest and perseverance in goal attainment, had the likelihood of winning a medal at the championship. Conversely, athletes who reported risky sport-related safety behaviour were thrice more likely to be medal winners.

Based on the results of this study it could be argued that older student-athletes are probably more experienced, and demonstrate improved skills, tactics and techniques, and are psychologically more mature in their chosen games (Kubiak, 2012) than their younger counterparts. For example, in investigating the relationship between deliberate practice (skill improvement) and performance in sports, Macnamara, Moreau and Hambrick (2016) were of the view that deliberate practice accounted for as much as 18% of the variance in sports performance. Similarly, age became the best predictor of self-competence, behavioural regulation, self-liking, self-competence, intrinsic motivation and the challenge-skill balance among some elite athletes (Bebetsos, 2015). In other words, as these athletes age, they are better able to control their emotions such as being free from worries which results in feeling of less distress (Capranica, Piacentini, Halson & Millard-Stafford, 2013), and that this may lead to a higher probability of winning a medal in such championships.

Though male and female athletes did not compete in the same sports events, and gender differences in performance were not analysed by universities, it is important to highlight that the females won more medals than their male counterparts. Despite the fact that fewer females than males participate in sport worldwide (Fink, 2013; Altavilla, Di Tore, Riela & D'isanto, 2017), both sexes were given equal opportunities to participate at the same level and in various sports disciplines at the GUSA games. However, perhaps, the female athletes are winning more medals in GUSA games because they are likely to be less risk takers, and are probably more disciplined. The current finding further buttresses the point that the females are less likely to engage in sport-related risky behaviours during such competitions, given the same kind of sporting environment, including supervision. For example, evidence shows that females choose their own ways and develop better technical expertise (Raiola, 2014). They are also more reliable, time conscious and react more sensitively to technical details during sports participation. These give female athletes a better ability to adapt to sports-related technical skills (Ghana University Sports Association, 2018). Therefore, with the

existing gender inequalities in sport participation, it is prudent that much more attention is given to female sports participation, especially where it was found in the current study that female participants won more medals than their male peers.

Health is key to every aspect of human life, both in the immediate term and the distant future (Meyer et al., 2016). Then, it becomes expedient that attention is given to the behaviours of athletes, some of which have great potential to influence their performance, safety and health, particularly after their competitive careers. It was also found out that the athletes' ages, being a female and recording higher consistency of interest were demotivating for athletes to engage in risky sport-related behaviours during the 2018 GUSA Games. Besides, female athletes are gritty, which increases their self-control and discipline and acts as a buffer for reducing the tendency to engage in health risk behaviours during such sporting competitions (Fite et al., 2017). For instance, empirical evidence suggests that gritty individuals usually exhibit high self-control and self-protection (Fite et al., 2017; Suzuki et al., 2015), and such individuals are also more safety conscious.

However, it is evident that being in year three at the university holds a higher propensity for taking risky sport-related behaviours during such competitions. This behaviour includes the intake of alcohol, energy drinks, a mixture of alcohol and energy drink and other hard drugs such as tramadol, maurijuana, morphine, fentanyl, and others. This situation may be hidden and could have persisted over the years. This phenomenon could be attributed to the athletes' attitude to win-at-all-cost. A mindset that has a high potential of affecting the safety of performers during competition and their health later when off the field (Ansah et al., 2014; Peretti-Watel et al., 2003). Moreover, athletes at third year at the universities risk their health and safety because they probably playing their last competition before leaving school because the competition is held bi-annially. Besids, these third year level student-athletes have more than a year to still spend at their universities. Thus, athletes who do not win a medal in that year's competition would have no other opportunity to do so before they graduate. The issue is further complicated by the fact that, GUSA does not have practical means of testing athletes for doping, though it has a code of conduct which encourages athletes to pay more attention to their health, safety and well-being, and discourages the use of performance enhancing drugs (Aith, 2013).

Athletes take various substances to enhance their performance despite that they are aware of the health consequences (Bird, Goebel, Burke & Greaves, 2016). Evidence suggests that the use of doping agents such as anabolic androgenic steroids, and other anabolic agents, and stimulants result in considerable health risks such as cardiovascular disease, diabetes, cancer, mental health issues, complicated fertilization in females, and the suppression of naturally produced androgens in males - a situation that could cause infertility. The public health

implications of illicit substance use by athletes can be challenging if nothing is done to curb it early (Hartgens & Kuipers, 2004).

Conclusions

The aim of the study was to evaluate the influence of university student-athletes' act of perseverance and passion for long-term goal attainment on their safety behaviour and level of sports performance during the 2018 GUSA games. The study showed that increase in age and playing multiple games predicted athletes' medal winning ability during the competition, with the female athletes winning more medals than their male counterparts. Athletes' consistency of interest and perseverance at goal attainment led to the likelihood of winning a medal at the university championship. Interestingly, it was observed that athletes reporting risky sport-related safety behaviour are more likely to be among medal winners, a situation which raises the question whether or not these athletes were doping. However, such behaviour could be costly on the health and safety of the athletes during competition and after their competitive years.

Further, the athletes' age, being female, recording higher consistency of interest and perseverance towards the attainment of long-term goal were demotivating factors to engaging in risky sport-related safety behaviour at the 2018 GUSA competition. However, being in the third year holds a higher propensity of exhibiting such risky sport-related behaviours during the GUSA competitions. This is an indication that when student-athletes are not in their final year of study, but are participating in their last major university sports competition, they are likely to take actions they deem vital to winning laurels, to the detriment of their health and safety.

Implications for Health, Safety and Sports

Grit is a psychological act that can be taught. The various Sports Directorates andUnits, and their coaches are encouraged to teach athletes how to set realistic goals, focus on them and persevere to attain such goals, even in the face of daunting challenges. It is advocated that the various Sports Directorates and Units, whose athletes took part in this research, and GUSA Games give more priority to female-only games such as Netball in all their competitions. This would promote the interest of female participation in the games.

It is time that GUSA begins to look critically at introducing anti-doping measures as part of the organization of its competitions. Such activity will prevent the use of banned substances and/or those deemed detrimental to the health and safety of the athletes and prevent addiction and its deleterious effects. Generally, GUSA needs to encourage the healthy practice of sports and regulates its sporting

practices to ensure they pose no risk to athletes as a results of the use of performance-enhancing substances. Moreover, student-athletes in the third year level need more education on the philosophy and spirit of sports participation, beyond winning medals. This needs to be provided by the various Sports Directorates and Units, as well as coaches of the various university teams.

Limitations

Although this study seems to be one of the few to analyse the associations among grit, sports performance and sport-related risky behaviour among university athletes, it has some limitations. As this is a cross-sectional study of conveniently sampled student-athletes causal inferences could not be drawn because the athletes are not truly representative of the entire 2018 GUSA participants. The gender difference in the athletes' performances highlighted in this research should be interpreted with caution since the study only took into consideration the medals won, thereby excluding other parameters like time made and distances covered.

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