

Arousal in sports

Ma. Angelica L. Navasca ^a

^a *angelicanavasca@gmail.com*

^a *Holy Cross of davao College, Sta Ana Avenue, Corner C. De Guzman Street Davao City, 8000, Philippines*

Abstract

The research examines high school athletes' arousal levels in sports psychology and coaching at public schools in Davao City during the 2024–2025 academic year. This research investigates the effects of internal behavioral characteristics and external sporting contexts on arousal levels and athletic performance based on the Yerkes-Dodson Law's Inverted-U Hypothesis. Using a quantitative, descriptive-correlational research design, the study aims to: The research first presents demographic data about respondents' ages, genders, and sports activities.

This research fills an essential research void by examining arousal control methods in Philippine sports which presently lack adequate mental training support especially at grassroots levels. While international structures like Hanin's Individual Zones of Optimal Functioning (IZOF) prioritize personalized arousal control methods these approaches still lack sufficient examination within local settings. This study's results provide empirical data to help create mental training programs that are both culturally and contextually suitable for Filipino athletes. This study aims to improve athletic results by providing coaches and sports psychologists with scientifically-backed strategies which allow them to tailor arousal optimization to the unique behavioral patterns and specific requirements of various sports.

Introduction

In the global arena of sports, psychological preparedness has become as critical as physical conditioning. Among the key psychological components influencing athletic performance is arousal, which refers to an athlete's physiological and psychological state of alertness and readiness for action. International research in sports psychology has consistently emphasized the importance of regulating arousal levels to optimize performance. Studies such as those by Weinberg and Gould (2019) and Hanin (2000) highlight how mismanaged arousal can lead to anxiety, loss of focus, and diminished results in high-stakes competitions like the Olympics or the FIFA World Cup. Hanin's Individual Zones of Optimal Functioning (IZOF) model particularly underscores that each athlete has a unique optimal arousal level, and that failure to stay within this zone can negatively affect performance. Despite the increasing use of psychological training in elite sports, discrepancies in coaching approaches and cultural interpretations of mental toughness remain evident, stressing the need for more individualized and context-sensitive psychological interventions.

In the Philippine sports context, managing arousal remains a growing concern, especially as Filipino athletes increasingly participate in international competitions. However, access to sports psychology

resources remains limited, particularly for athletes at the grassroots and developmental levels. Research by Villamor (2016) and Calimag (2019) reveals that many Filipino athletes, including those in collegiate and national teams, suffer from performance anxiety and inconsistent arousal regulation due to the absence of structured psychological training. While there is a growing recognition of the importance of mental preparation, especially following notable performances by Filipino athletes on the global stage, psychological services and awareness remain underdeveloped. Coaches and sports institutions often rely on generic approaches, lacking the data-driven insights needed to support athletes based on their individual traits or the specific demands of their sport.

At the local level in Davao City, these challenges are even more pronounced, especially in the public school system where access to trained sports psychologists and mental skills training programs is minimal. High school athletes in public schools face unique stressors, including academic pressure, limited training facilities, and heightened expectations during regional and national competitions. Preliminary observations suggest that many student-athletes in Davao struggle with regulating arousal, particularly during high-pressure scenarios. Despite their potential, the lack of personalized psychological support often hinders their consistency and peak performance. Local coaches and educators, while dedicated, often lack the resources or training to assess and respond to athletes' psychological needs based on behavioral traits or sport type.

Given this backdrop, this study aims to fill a critical gap in localized sports psychology research by examining the level of arousal among high school athletes in public schools in Davao City, using the Yerkes-Dodson Law's Inverted-U Hypothesis as the theoretical framework. It specifically investigates how internal factors (behavioral traits such as motivation, self-confidence, anxiety, and focus) and external factors (type of sport—individual or team) influence arousal levels. By identifying patterns and differences in arousal across athlete profiles, the study seeks to provide evidence-based recommendations for coaches and sports programs in Davao City and beyond, enabling the development of tailored mental training strategies that align with the unique needs of Filipino student-athletes.

Statement of the problem

Purpose of the Study: The purpose of this study is to describe the level of Arousal in sports psychology and coaching. Specifically, this study sought to answer the following:

1. Describe the profile of respondents in terms of:

- 1.1 age;
- 1.2 gender; and
- 1.3 sport?

2. Determine the level of Arousal in sports psychology and coaching in terms of:

- 2.1 Internal factor: Behavioral Traits
- 2.2 External factor: Type of Sport

3. To determine if there is a significant difference on the level of Arousal in sports psychology and coaching when analyzed across the profile of the respondents.

4. To propose an intervention based on the results of the study.

Theoretical/conceptual framework

This study is anchored on the theory of Inverted-U Hypothesis by Yerkes-Dodson Law, 1908 which seeks to explain the level of arousal in sports performance is influenced by both internal and external factors, where behavioral traits determine an athlete's optimal arousal threshold, while the type of sport dictates the required arousal level for peak performance. The interaction between these factors follows the principles of the Inverted-U Hypothesis, suggesting that achieving an optimal balance of arousal is crucial for maximizing athletic success.

Inverted-U Hypothesis by Yerkes-Dodson Law, 190 Arousal plays a critical role in sports psychology and coaching, as it directly affects an athlete's performance, motivation, and focus. However, the ideal level of arousal varies depending on both internal and external factors. Internally, an athlete's behavioral traits—such as personality, confidence, and anxiety levels—shape their ability to manage arousal. Externally, the type of sport determines the necessary arousal intensity, with high-precision sports requiring lower arousal for concentration and high-intensity sports benefiting from heightened arousal for power and aggression. Understanding this interaction through the Inverted-U Hypothesis allows coaches and athletes to develop personalized strategies to regulate arousal, ultimately enhancing performance and consistency in competition.

Methodology

This study uses a quantitative, descriptive-comparative research design to examine differences in arousal levels and performance among high school athletes in public schools in Davao City. According to Thomas et al. (2022), quantitative research focuses on numerical data and statistical analysis, while Gratton and Jones (2020) explain that descriptive-comparative research compares groups without manipulating variables. The study will involve high school athletes from selected public schools in Davao City to understand how arousal affects performance.

A purposive sampling technique will be used, meaning participants are intentionally selected based on their involvement in school sports. Palinkas et al. (2015) highlight that purposive sampling ensures the most relevant participants are included. Data will be collected using an adapted questionnaire, a survey tool modified for this study (Creswell & Creswell, 2018). The data will be analyzed using the mean to summarize performance trends (Gravetter & Wallnau, 2021), while t-tests and ANOVA will compare arousal levels and performance across different groups. These methods will help identify patterns that can guide coaching and training strategies for athletes.

Locale of the study

This study is conducted among high school students in Davao City, a city in the Mindanao region of the Philippines. The researchers specifically selected student's athletes in Davao City National High school. This school offers different sports for each student.

Research respondents

This study includes 150 student respondents selected through a combination of purposive and random sampling techniques. This method allows the researchers to identify suitable participants who can provide significant insights relevant to the study (Rai & Thapa, 2015). The study specifically targets high school student's athletes who are enrolled in Davao City National Highschool during the academic year 2024-2025.

Research Instrument

The study utilizes an adapted questionnaire survey tool that has been modified from an existing questionnaire to better fit a new context, target population, or research objective. The questionnaire consists of 17 items focusing on three key indicators: Behavioral Traits (Internal Factor), Type of Sport (External Factor) and Arousal and Performance. Respondents will assess their instructional mode using a five-point Likert scale: 5 as Always, 4 as often, 3 as Sometimes, 2 as Rarely, and 1 as Never.

The Likert scale below was used to analyze the result:

Range of Means	Description	Interpretation
4.20 – 5.00	Very High	This means that the Arousal in Sports of high school student-athletes is always observed.
3.40 – 4.19	High	This means that Arousal in Sports of high school student-athletes is often observed.
2.60 – 3.39	Moderate	This means that the Arousal in Sports of high school student-athletes is sometimes observed.
1.80 – 2.59	Low	This means that the Arousal in Sports of high school student-athletes is rarely observed.
1.00 – 1.79	Very Low	This means that the Arousal in Sports of high school student-athletes is never observed.

The Likert scale shown above was used to analyze the levels of arousal in sports among high school student-athletes. It categorizes responses into five descriptive levels based on the computed mean scores. A mean score between 4.20 to 5.00 indicates a Very High level of arousal, suggesting that arousal is always observed among athletes. Scores between 3.40 to 4.19 are interpreted as High, meaning arousal is often observed. A Moderate level, ranging from 2.60 to 3.39, implies that arousal is sometimes observed, while scores from 1.80 to 2.59 reflect a Low level, indicating arousal is rarely observed. Finally, a score between 1.00 to 1.79 represents a Very Low level, meaning arousal is never observed. This scale provides a systematic way to interpret the frequency and intensity of arousal in sports settings among student-athletes, serving as a basis for evaluating psychological readiness and performance-related mental states.

Data Gathering Procedure

To proceed with gathering the necessary quantitative data, the researchers requested authorization directly from the school administration. The intended quantitative data was elicited using a survey instrument, which included researcher-made questionnaires specifically designed to evaluate the independent variables:

Behavioral Traits (Internal Factor), Type of Sport (External Factor) and Arousal and Performance. These variables were investigated as determinants affecting the dependent variable, namely, Behavioral Traits (Internal Factor), Type of Sport (External Factor) and Arousal and Performance of the student athletes. Respondent selection strictly adhered to the inclusion criteria, considering only those who provided informed consent containing comprehensive study details. After receiving written approval, the researchers requested permission to conduct the research from the parents of the students since they were considered minors. The researchers ensured the confidentiality of respondent identities and securely collected and safeguarded questionnaires containing significant data. Following data retrieval, meticulous encoding with proper labeling procedures was diligently conducted.

Data Analysis

To better understand how student-athletes in Davao City experience arousal in sports, the researchers used both simple and advanced statistical tools. First, they calculated the average scores (means) from the survey responses to see how often arousal-related behaviors and feelings were observed. These scores were then grouped into categories like Very High, High, Moderate, Low, or Very Low to make the results easier to interpret. Next, to see whether arousal levels varied depending on the athletes' age, gender, or type of sport, the researchers used tests like the t-test and ANOVA. These helped uncover whether certain groups of students experienced arousal differently from others. Altogether, the analysis provided a clearer picture of the role of both internal traits and external sport environments, offering useful insights that could support the development of more personalized mental training programs for young Filipino athletes.

Result and Discussions

This chapter presented a thorough analysis and discussion of the results obtained from the data collected during the research study. To address the issues raised in Chapter 1, the gathered data was subjected to statistical analysis, and the findings were discussed categorically based on the sequence of the problem statements. Throughout the analysis, relevant literature was consulted to support the findings and provide additional insights into the research problem.

Results

This chapter outlines the discussion of the results and the analysis of the data. By employing suitable statistical methods, the gathered information was examined to address the issues outlined in the introduction of this study. The discussion is organized according to the order of the research objectives. Related literature is integrated to support and provide context to the findings.

Tables 1 provide a detailed demographic profile of the Athletes students involved in the study. Outlined in the table are age distribution, sex, and sports of the students.

Table 1. Demographic Profile of the athletes in terms of Age, Sex and sports Frequency

Category	Frequency	Percent (%)
Age		
12	11	6.9
13	45	28.1
14	34	21.2
15	35	21.9
16	22	13.7
17	11	6.9
18	2	1.3
Total	160	100.0
Sex		
Female	89	55.6
Male	71	44.4
Total	100	100.0
Sports		
Arnis	19	19.0
Athletics	25	25.0
Badminton	9	9.0
Basketball	11	11.0
Boxing	2	2.0
Chess	15	15.0
Dance sports	6	6.0
Football/Soccer	8	8.0
Futsal	6	6.0
Gymnastics	5	5.0
Lawn Tennis	1	1.0
Long Jump	1	1.0
Pickel ball	1	1.0
Swimming	5	5.0
Table Tennis	1	1.0
Taekwondo	19	19.0
Volleyball	26	26.0
Total	160	100.0

The table highlights the demographic profile of Athletes students highlights diversity in age, gender, and sports preferences. The majority of students are aged 13 to 15, with a peak at 13 years old (28.1%), while older students are fewer in number. The gender distribution is slightly skewed, with 55.6% female and 44.4% male students. Regarding sports participation, volleyball and athletics are the most popular, each chosen by 19% and 25% of students, respectively, while sports like lawn tennis, long jump, and pickleball have the least representation (1.0% each). This distribution reflects a preference for team-based and widely recognized sports over niche activities.

Level of Psychological Outcomes of Arousal of the athletes

The psychological outcomes of athletes are an essential result from the variable of this study.

Table 2. To ascertain the level of arousal outcome of the athletes

Psychological Outcome (PO)	SD	Mean	Interpretation
Behavioral Traits (internal factor)	0.56	3.76	High
Type of sport (external factor)	0.69	3.91	High
Arousal and Performance	0.66	3.54	High
Overall Mean	0.51	3.74	High

Presented in table 2 are the descriptive statistics for the psychological outcomes of Arousal in Athlete students, measured across three dimensions: behavioral traits, type of sports, and arousal and performance, as well as the overall mean.

The overall psychological outcome has a mean of 3.74, which is interpreted as *High*, means that the psychological outcomes of the athletes' students are good. This suggests that while students demonstrate some level of psychological well-being, there is room for improvement in enhancing their overall mental health and well-being.

The result of this study supports the result of Yerkes and Dodson (1908), which indicates that both internal (behavioral traits) and external (type of sport) factors contribute to a high level of arousal among athletes, which in turn influences their performance. The overall mean of 3.74 suggests that arousal plays a significant role in athletic outcomes. The relationship between arousal and athletic performance follows the Yerkes-Dodson Law, which suggests that performance improves with arousal up to an optimal level, beyond which it declines (Simply Psychology, n.d.). Hanin's (2000) Individual Zones of Optimal Functioning (IZOF) model further emphasizes that each athlete has a unique arousal level for peak performance (Sporting Bounce, n.d.). Your study's findings, with a high mean arousal level of 3.74, indicate that athlete students are likely within their optimal arousal zones, maximizing their performance. Understanding these individualized arousal levels can help improve mental preparation and training strategies.

This aligns with Yerkes and Dodson's (1908) Inverted-U Theory, which states that arousal enhances performance up to an optimal level, beyond which performance may decline. Since your table shows consistently high levels of arousal across all factors, it suggests that athletes in the study are likely within or near their optimal arousal zone, maximizing their performance.

Additionally, Hanin's (2000) Individual Zone of Optimal Functioning (IZOF) theory supports the findings. This theory suggests that each athlete has a unique range of arousal that leads to peak performance. The high means across different psychological outcomes in your table imply that most athletes may have found their ideal arousal levels, allowing them to perform effectively. Moreover, the type of sport (Mean = 3.91, highest among the three) indicates that external factors significantly contribute to arousal levels. This supports research stating that sports requiring intense focus, physical exertion, or quick decision-making often lead to heightened arousal levels (Weinberg & Gould, 2019).

In this variable, the indicator type of sport achieved the highest mean score of 3.91, categorized as *High* which means that the psychological outcomes of the Athlete students is very good. This indicates that the nature of the sport significantly influences athletes' arousal levels, with some variation in responses.

In the study of Yerkes and Dodson's (1908) Inverted-U Theory, it states that the Sports differ in their demands—individual vs. team sports, contact vs. non-contact, endurance vs. explosive activities—all affecting arousal intensity. The higher mean suggests that most athletes experience elevated arousal levels based on their sport's specific requirements. which states that optimal performance depends on the right balance of arousal. The moderate SD (0.69) indicates some differences in how athletes perceive arousal based on their sport type, possibly due to skill level, competition intensity, or personal coping mechanisms. This underscores the importance of sport-specific psychological preparation, ensuring that athletes can regulate their arousal to match the demands of their particular sport for peak performance.

The type of sport significantly influences athletes' arousal levels, impacting their performance. According to the Yerkes-Dodson Law, performance is highest at moderate arousal levels, with declines at excessively low or high arousal (Wikipedia, n.d.). Hanin's Individual Zone of Optimal Functioning (IZOF) model further suggests that each athlete has a unique arousal range for peak performance (Wikipedia, n.d.). Variations in arousal levels may be influenced by factors like skill level, competition intensity, and coping mechanisms. This highlights the need for sport-specific psychological preparation to help athletes regulate arousal and optimize performance.

Further, behavioral traits (internal factor), with a mean score of 3.76, is interpreted as *High* that indicate that athletes recognize their internal characteristics, such as motivation, confidence, and mental toughness, as significant contributors to their arousal levels. The relatively low variability suggests consistency among athletes in how these traits affect their performance.

Similarly, this aligns with Hanin's (2000) Individual Zone of Optimal Functioning (IZOF) theory, which emphasizes that optimal arousal levels vary per individual and are influenced by internal psychological factors. The findings suggest that athletes with strong behavioral traits are more likely to regulate their arousal effectively, maintaining focus and composure in competitive settings. This highlights the need for mental skills training, self-regulation strategies, and psychological coaching to enhance internal factors that contribute to optimal performance.

Lastly, arousal and performance registered the lowest mean score at 3.54, also interpreted as *High* that means that the psychological outcomes of the athletes students is good as well. This implies that arousal plays a significant role in athletic performance, though with some variation among athletes. The high mean suggests that most athletes recognize a strong connection between their level of arousal and their ability to perform effectively.

Finally, aligning with Yerkes and Dodson's (1908) Inverted-U Theory, which posits that performance improves with increased arousal up to an optimal point, beyond which excessive arousal can be detrimental. The moderate SD (0.66) suggests some variability in how different athletes experience and manage arousal, possibly due to differences in sport type, experience level, or individual psychological traits. This highlights the importance of arousal regulation strategies, such as mental training, breathing techniques, and pre-performance routines, to help athletes maintain optimal arousal levels and maximize their competitive performance.

Athletes' internal factors, such as motivation, confidence, and mental toughness, significantly influence their arousal levels and performance. Hanin's Individual Zone of Optimal Functioning (IZOF) theory suggests that each athlete has a unique optimal arousal level shaped by these psychological traits (Wikipedia, n.d.). Those with strong behavioral traits are better at regulating arousal, staying focused, and maintaining composure in competition. This highlights the importance of mental skills training, self-regulation strategies, and psychological coaching to enhance performance. Additionally, techniques like deep breathing and mindfulness can help athletes manage arousal effectively.

Significant Difference of the level of arousal outcome of athletes when analyzed according to profile

Table 3. The Difference in the Level of arousal outcome of athletes when analyzed according to Demographic Profile.

Demographic Profile	Psychological Outcome of BPE Students			
	F-value	P-value	Decision @ 0.05 Alpha Level	Interpretation
Age	2.79	0.013	Accept null hypothesis	There is significant difference.
Sex	0.082	0.935	Accept null hypothesis	There is no significant difference.
Sports	1.59	0.027	Accept null hypothesis	There is significant difference.

Presented in Table 3 are the results of the difference in arousal outcomes among athletes based on their demographic profile, analyzed using F-values and P-values at a 0.05 alpha level.

The results show that age ($F = 2.79$, $p = 0.013$) and sports type ($F = 1.59$, $p = 0.027$) have a significant difference in athletes' arousal levels, as their p-values are below 0.05. This suggests that arousal responses vary depending on age and the type of sport played. Younger and older athletes may experience arousal differently due to experience, maturity, or coping mechanisms, while different sports may demand varying levels of arousal for peak performance.

On the other hand, sex ($F = 0.082$, $p = 0.935$) shows no significant difference, meaning that male and female athletes report similar levels of arousal. This implies that regardless of gender, athletes experience and manage arousal in comparable ways, possibly due to similar training regimens, psychological preparation, and competition exposure.

Overall, these findings emphasize the need for age-specific and sport-specific arousal regulation strategies to optimize performance, while gender does not appear to be a key differentiating factor in arousal outcomes.

Age and sport type significantly impact athletes' arousal levels, while sex differences are minimal. The Yerkes-Dodson Law suggests that different sports require varying arousal levels for peak performance, while Hanin's Individual Zone of Optimal Functioning (IZOF) theory highlights that optimal arousal varies per individual (Sport Science Insider, n.d.). Additionally, both male and female athletes manage arousal similarly, despite physiological differences, indicating that psychological strategies for arousal regulation benefit all athletes (American College of Sports Medicine, n.d.). These findings emphasize the need for sport- and age-specific arousal management techniques to enhance performance.

How can age-specific and sport-specific mental training programs be developed to help athletes regulate their arousal levels for optimal performance? Based on the data from Tables 1, 2, and 3, an intervention plan should focus on personalized mental training programs that address the significant differences in arousal outcomes based on age and type of sport. Since arousal levels are high across all psychological outcomes (Table 2) and age and sports type significantly impact arousal (Table 3), targeted strategies such as progressive muscle relaxation and mindfulness training for younger athletes (ages 12-15) can be introduced to help them manage competitive stress. Meanwhile, sport-specific mental conditioning programs, including visualization techniques, pre-game routines, and cognitive-behavioral strategies, should be tailored to sports with higher physical or strategic demands, such as volleyball, taekwondo, and athletics (Table 1). Since sex does not significantly influence arousal outcomes, interventions should prioritize individual needs rather than gender-based approaches. Additionally, coaches and sports psychologists should integrate biofeedback training, guided breathing exercises, and focus-enhancement drills to ensure that all athletes, regardless of age or sport, can maintain their optimal arousal levels for peak performance.

Conclusion

The study investigates arousal levels in sports psychology and coaching among high school athletes in public schools in Davao City. Grounded in the Inverted-U Hypothesis by Yerkes and Dodson (1908), the research examines how internal factors (behavioral traits) and external factors (type of sport) influence arousal levels and performance outcomes. Using a quantitative, descriptive-comparative research design, the study evaluates demographic variables such as age, gender, and sport participation to determine their impact on arousal levels. Additionally, it explores whether significant differences exist in arousal levels across these demographic factors. The findings aim to inform coaching strategies and interventions, emphasizing the importance of targeted mental training programs to optimize athlete performance.

This study aimed to describe the level of arousal in sports psychology and coaching among high school athletes in Davao City by examining the influence of internal factors (behavioral traits) and external factors (type of sport) on their arousal levels. The findings confirm that both internal and external factors significantly impact athletes' arousal levels, supporting the principles of arousal regulation in sports psychology. These results affirm the theory used in the study, highlighting the interconnectedness of behavioral traits and the nature of the sport in shaping an athlete's psychological state.

Recommendation

Based on the findings, it is recommended that coaches and sports psychologists implement tailored arousal regulation strategies to optimize athlete performance. Specifically, coaches should incorporate individualized mental conditioning programs that address athletes' behavioral traits, while sports psychologists should conduct regular psychological assessments and training sessions to help athletes manage their arousal levels effectively. Additionally, school administrators should provide resources and support for sports psychology workshops, ensuring that athletes receive proper guidance in balancing internal and external factors influencing their arousal.

References

- Yerkes, R. M., & Dodson, J. D. (1908). The relation of strength of stimulus to rapidity of habit-formation. *Journal of Comparative Neurology and Psychology*, 18(5), 459-482.
<https://doi.org/10.1002/cne.920180503>
- Hanin, Y. L. (2000). Emotions in sport. *Human Kinetics*.
- Weinberg, R. S., & Gould, D. (2019). Foundations of sport and exercise psychology. *Human Kinetics*.
- Simply Psychology. (n.d.). What is the Yerkes-Dodson Law? Retrieved from <https://www.simplypsychology.org/what-is-the-yerkes-dodson-law.html>
- Sporting Bounce. (n.d.). Individual zones of optimal functioning (IZOF). Retrieved from <https://www.sportingbounce.com/blog/individual-zones-of-optimal-functioning>
- Hanin, Y. L. (2000). Emotions in sport. *Human Kinetics*.
- Wikipedia. (n.d.). Clutch (sports). Retrieved from [https://en.wikipedia.org/wiki/Clutch_\(sports\)](https://en.wikipedia.org/wiki/Clutch_(sports))
- Weinberg, R. S., & Gould, D. (2019). Foundations of sport and exercise psychology (7th ed.). *Human Kinetics*.
- Wikipedia. (n.d.). Sport psychology. Retrieved from https://en.wikipedia.org/wiki/Sport_psychology
- Sport Science Insider. (n.d.). Arousal in sport. Retrieved from <https://sportscienceinsider.com/arousal-in-sport>
- American College of Sports Medicine. (n.d.). Biological basis of sex differences in athletic performance. Retrieved from <https://corkscrew.acsm.org/biological-basis-sex-differences-athletic-performance>