

Mind Over Moves: Levels and Links Between Cognitive Function and Psychological Well-Being in Chess Athletes

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ABSTRACT: This study investigated the demographic profile, levels of cognitive functioning, and psychological well-being of chess athlete-respondents, as well as whether these cognitive and psychological variables significantly differ across demographic groupings. A total of 152 chess athletes participated. In terms of age, the majority of respondents were 16–18 years old (46.05%), followed by those aged 13–15 years old (41.45%), with 12.50% aged 22 years and above and no respondents in the 19–21 age bracket. Regarding sex, males comprised most respondents (63.16%), while females accounted for 36.84%. Most athletes had limited chess experience: less than one year (38.16%) and 1–3 years (32.24%), with fewer having 4–6 years (19.08%) and 7 years or more (10.53%). Competition level was primarily school/intramural (42.86%), followed by local club (25.24%) and city/division (21.90%), while only a small proportion competed at regional (5.24%), national (2.86%), and international levels (1.90%). Weekly practice time was generally low, with 42.11% practicing less than one hour and 31.58% practicing 1–3 hours. Cognitive functioning was assessed through memory, concentration, and problem-solving. Overall, the general assessment for memory and concentration both yielded means interpreted as “Agree,” with problem-solving also reflecting “Agree,” indicating that chess athletes demonstrated good cognitive capabilities during gameplay and analysis. Psychological well-being was evaluated through stress management, self-efficacy, and resilience. The general levels also reflected “Agree,” suggesting generally effective emotional regulation, confidence, and persistence among the respondents. To determine group differences, independent t-test results showed no significant differences in cognitive functioning when grouped according to age, sex, years of chess experience, chess practice hours, or—except for one indicator—level of competition. Specifically, only problem-solving showed a significant difference across competition levels ($p = 0.047$), while memory and concentration remained not significant. Similarly, psychological well-being did not significantly differ by age, sex, years of experience, level of competition, or weekly practice hours, as most p-values exceeded 0.05. Finally, correlation analysis revealed significant positive relationships between cognitive functioning and psychological well-being. Memory, concentration, and problem-solving were all significantly and positively correlated with stress management, self-efficacy, and resilience (all $p < 0.05$), indicating that stronger cognitive skills are associated with better psychological outcomes in chess athletes. Overall, the findings suggest that chess athletes in the sample primarily come from adolescent age groups with relatively limited competitive exposure and practice duration, yet they demonstrate generally strong cognitive and psychological functioning. Moreover, the strong interrelationship between cognitive functioning and psychological well-being highlights the value of interventions that simultaneously target memory, concentration, and problem-solving alongside mental skills development to strengthen stress management, confidence, and resilience in competitive chess.

KEYWORDS: cognitive functions, concentration, memory, psychological well-being, problem-solving, resilience, self-efficacy, stress management

I. INTRODUCTION

The passage explains how chess is increasingly recognized as a powerful tool for improving both cognitive abilities and mental health. Beyond being a strategic game, chess enhances memory, concentration, executive function, problem-solving, and working memory by constantly exercising the brain through planning and recall. It may also help reduce anxiety and depression by promoting mindfulness, focus, and a “flow state” that distracts players from negative thoughts and rumination.

The text also highlights how chess can strengthen self-esteem, resilience, discipline, and psychological adaptability, especially among athletes. In the Philippines, the Department of Education (DepEd), through Memorandum No. 162, s. 2009,

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institutionalized chess training in schools to develop higher-order thinking skills, values formation, and cognitive growth among learners. Teachers and school leaders were trained in chess instruction, coaching, and tournament management as part of this initiative.

The researcher, inspired by Filipino chess legend Eugene Torre and drawing from over 15 years of experience as a coach, trainer, and arbiter, aims to examine how chess affects athletes' cognitive performance and psychological well-being. The study seeks to explore the relationship between chess training and mental functions such as executive control and problem-solving, as well as its role in managing stress, anxiety, self-esteem, and resilience. Ultimately, the research hopes to provide insights for educators, coaches, policymakers, and sports psychologists by positioning chess as both a performance-enhancing activity and a holistic mental wellness tool.

RESEARCH QUESTION

This study aims to determine the role of cognitive function and psychological well-being of chess athletes. It seeks to answer the following questions:

1. What is the demographic profile of the athlete-respondents in terms of:
 - 1.1 age;
 - 1.2 sex;
 - 1.3 years of experience in playing;
 - 1.4 level of competition; and
 - 1.5 Typical weekly chess practice hours?
2. What is the level of cognitive functioning of chess athletes in terms of:
 - 2.1 memory;
 - 2.2 concentration; and
 - 2.3 problem-solving?
3. What is the level of psychological well-being of chess athletes in terms of:
 - 3.1 stress management;
 - 3.2 self-efficacy; and
 - 3.3 resilience?
4. Is there a significant difference on the level of cognitive functioning of chess athletes when grouped according to profile?
5. Is there a significant difference on level of psychological well-being of chess athletes when grouped according to profile?
6. Is there a significant relationship between the level of cognitive functioning and level of psychological well-being of chess athletes?
7. Based on the findings, what sports training plan may be proposed to enhance athlete development programs by integrating chess as both a cognitive and mental wellness intervention?

II. SCOPE AND LIMITATION OF THE STUDY

This study was focused on examining the impact of chess participation on the cognitive functions and psychological well-being of athletes. Specifically, it investigates how chess influences memory, concentration, and problem-solving abilities, as well as its effects on stress management, self-efficacy, and resilience. The study is anchored on cognitive, behavioral, humanistic, self-efficacy, and flow theories, which serve as the framework for analyzing the relationship between chess training and mental health outcomes.

The scope of this research was limited to selected chess athletes within the Division of Quezon City who are actively engaged in training and competition, ranging from school-level to district level, district level to division level and division level to regional, national and international-level tournaments.

Data were gathered through a researcher-made survey questionnaire, supported by validated psychological scales where appropriate. The findings were intended to contribute to athlete development programs and to provide insights into how chess can be integrated not only as a sport but also as a cognitive and psychological intervention.

However, the study has certain limitations. First, it was relied on self-reported data, which may be influenced by personal bias, selective memory, or social desirability.

Second, the study does not include clinical psychological assessments; hence, its findings are limited to perceived well-being and cognitive outcomes rather than formal diagnoses.

Third, the research was restricted to athletes in one division, which may have limited the generalizability of the results to broader populations of chess players across the Philippines or internationally.

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Finally, external factors such as academic workload, lifestyle, and personal stressors that may also affect cognitive function and mental well-being are beyond the control of the researcher.

Despite these limitations, the study provides valuable insights into the role of chess in fostering both intellectual growth and psychological resilience, paving the way for its potential inclusion in holistic athlete development programs.

FRAMEWORK

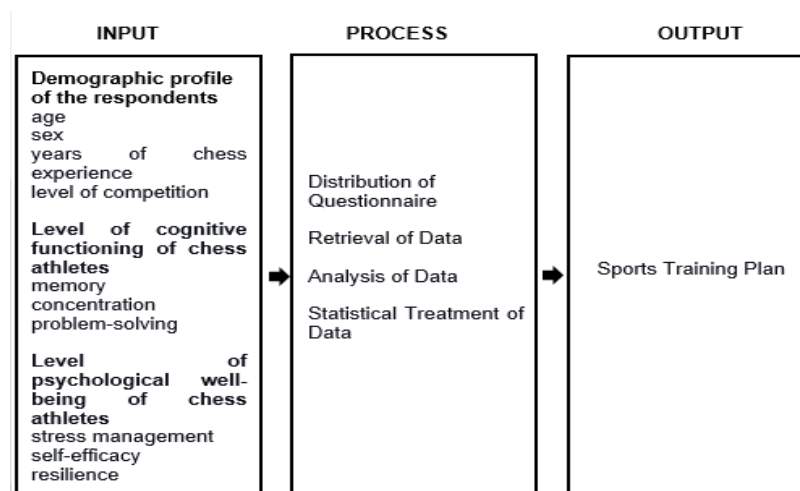


Figure 1. Research Paradigm

The conceptual framework was organized ideas in the research study. It visualizes the problem's position and gives direction to the study of context, which is the Input, Process, and Output.

This study was anchored on the Input–Process–Output (IPO) model, which serves as the guiding structure for the research. The framework illustrates the flow of the investigation, beginning with the respondents' characteristics and measured variables, followed by the research procedures, and culminating in the intended output of the study.

The input consists of the essential variables that form the foundation of the study. These include the demographic profile of the respondents (age, sex, years of chess experience, and level of competition). It also covers the level of cognitive functioning of chess athletes measured in terms of memory, concentration, and problem-solving. Additionally, it includes the level of psychological well-being of athletes as assessed through stress management, self-efficacy, and resilience.

RESEARCH DESIGN

This study will utilize a descriptive-quantitative research design. The descriptive aspect was used to determine the demographic profile, cognitive functioning, and psychological well-being of chess-athletes. Meanwhile, the quantitative aspect aimed to examine the relationship between cognitive functioning and psychological well-being, focusing on variables such as memory, concentration, problem-solving, stress management, self-efficacy, and resilience. This design was chosen because it allows for the analysis of relationships between variables without manipulating them, which is suitable for behavioral and cognitive studies.

RESEARCH INSTRUMENT

The primary instrument that was utilized in this study is a researcher-made survey questionnaire specifically designed to gather data on both the cognitive and psychological dimensions of chess-athletes. The questionnaire was structured into three main parts.

Part I dealt with the demographic profile of the respondents, which included age, sex, years of chess experience, and level of competition. This section provided essential background information to contextualize the findings.

Part II focused on the level of cognitive functioning, measured through situational and self-assessment items that assessed memory, concentration, and problem-solving skills. These indicators were selected based on their direct relevance to chess performance and mental sharpness.

Part III assessed the level of psychological well-being of the respondents. This section consisted of items measured on a four-point Likert scale, addressing stress management, self-efficacy, and resilience. These factors were considered crucial in understanding how chess participation contributes to athletes' psychological balance and coping strategies.

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Overall, the questionnaire was designed not only to capture the intellectual aspects of chess but also to evaluate the psychological strengths that influence both performance and personal growth.

DATA GATHERING

To ensure the smooth conduct of the study, several systematic steps were undertaken. First, a formal request for permission was sent to the Schools Division Office of Quezon City and the concerned school principal to secure approval for the administration of the research instrument. Only upon receiving official consent did the researcher proceed with data collection.

Following approval, the validated questionnaires were distributed to the respondents. Depending on their accessibility and convenience, the instrument was administered in printed copies. This flexible approach allowed the researcher to maximize response rates while accommodating the schedules of chess-athletes.

After distribution, the collection of responses were carried out within the agreed-upon time frame. The researcher ensured that the retrieval process was conducted responsibly, maintaining confidentiality and encouraging honest responses from participants.

Finally, the tabulation of data was performed, where all responses were carefully encoded, organized, and prepared for statistical treatment. This step ensured accuracy and reliability, laying the groundwork for meaningful analysis and interpretation of results.

STATISTICAL TREATMENT

To analyze the data gathered, a range of statistical tools was employed in line with the objectives of the study. Frequency and percentage distribution were used to describe and summarize the demographic profile of the respondents in terms of age, sex, years of chess experience, and level of competition. To determine the level of cognitive functioning (memory, concentration, and problem-solving) and the level of psychological well-being (stress management, self-efficacy, and resilience), the weighted mean was computed.

To examine the association between the two major variables, the Pearson Correlation Coefficient (r) was utilized, establishing whether a significant relationship exists between cognitive functioning and psychological well-being of chess-athletes. Furthermore, Analysis of Variance (ANOVA) and t-test were applied to test for significant differences in the variables when the respondents were grouped according to their demographic profile, particularly age, sex, years of chess experience, and level of competition.

All statistical analyses were carried out using the Statistical Package for the Social Sciences (SPSS) version 25, with the level of significance set at 0.05 to ensure accuracy and reliability in interpreting the results.

III. RESULTS

Chapter 4 presents the presentation, analysis, and interpretation of quantitative data on public secondary schools: tables and figures summarize the sample and core variables, and the results are linked to the research questions.

1.What is the demographic profile of the athlete-respondents in terms of:

1.1 age;

Age	Frequency	Percentage
13-15 years old	63	41.45
16-18 years old	70	46.05
19-21 years old	0	0.00
22 years old and above	19	12.50
Total	152	100%

The results show that the majority of the chess athlete-respondents are within the 16–18 years old age group (46.05%), followed by those aged 13–15 years old (41.45%), while 12.50% are 22 years old and above, and none belong to the 19–21 years old category. This indicates that most of the respondents are in their mid to late teenage years, suggesting that chess participation in the sample is largely concentrated among secondary-level students. The presence of older participants may represent individuals who continue competitive chess beyond basic schooling.

The findings indicate that a substantial proportion of the chess athlete-respondents are within the 16–18 years old age group, followed closely by those aged 13–15, while a smaller percentage belongs to the 22 years old and above category, and none fall within the 19–21 age range. This distribution suggests that chess participation is highly concentrated among adolescents,

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particularly those in secondary education. The absence of respondents aged 19–21 may imply a transitional gap where individuals either discontinue participation or shift priorities due to higher education or other life demands. Overall, the data highlight that engagement in chess is most prominent during the formative teenage years, where cognitive development and academic involvement are at their peak.

The implications of these findings point to the importance of strengthening chess programs at the secondary school level, as this is the stage where interest and participation are most evident. Schools and educational institutions may capitalize on this by integrating structured chess training into co-curricular or extracurricular activities to enhance students' critical thinking, problem-solving, and strategic skills. Furthermore, the low representation of participants beyond adolescence suggests a need for initiatives that encourage continuity in chess involvement, such as university-based clubs or community leagues. Sustaining engagement beyond high school could support lifelong cognitive development and even open pathways for competitive or professional opportunities in chess.

These results are supported by recent studies which emphasize that adolescence is a critical period for developing higher-order thinking skills through activities such as chess. According to research by Sala and Gobet (2020), engagement in chess during school years is associated with improvements in cognitive abilities, particularly in problem-solving and reasoning. Similarly, a study by Trinchero (2021) highlights that structured chess instruction significantly benefits students' academic performance and intellectual development. These findings reinforce the observed age distribution, suggesting that the dominance of teenage participants reflects both accessibility and the developmental advantages of chess during this stage of life.

1.2sex;

Sex	Frequency	Percentage
Male	96	63.16
Female	56	36.84
Total	152	100%

In terms of sex, the findings reveal that male respondents comprise the majority of the chess athletes with 63.16%, while 36.84% are female. This distribution suggests that chess participation among the respondents is more prevalent among male athletes than female athletes. The result reflects a gender imbalance in the sample, although female participation still represents a substantial proportion of the respondents.

The findings reveal that male respondents comprise the majority of the chess athletes, accounting for 63.16%, while female respondents make up 36.84% of the sample. This indicates that chess participation among the respondents is more prevalent among males than females. Although there is a noticeable gender imbalance, the presence of a considerable proportion of female participants suggests that chess is not exclusively male-dominated within the group. Instead, it reflects a growing involvement of female athletes, albeit still lower compared to their male counterparts.

The implications of this result highlight the need to promote gender inclusivity in chess programs and competitions. Educational institutions and sports organizers may consider implementing targeted initiatives, such as training programs, mentorship opportunities, and awareness campaigns, to encourage greater female participation in chess. Addressing potential barriers—such as stereotypes, limited exposure, or lack of support—can help create a more balanced and inclusive environment. Increasing female representation not only fosters equality but also enriches the competitive landscape by bringing diverse perspectives and strategies into the game.

These findings are supported by recent studies indicating that gender disparities in chess participation remain evident, though efforts to close the gap are increasing. According to FIDE (2022), female participation in competitive chess globally remains significantly lower than that of males, largely due to social and cultural factors. Similarly, research by Maia Charness and Janet Hyde (2021) suggests that while cognitive abilities between genders are comparable, differences in participation are often influenced by environmental and societal expectations rather than inherent ability. These studies reinforce the current findings, emphasizing the importance of inclusive strategies to support and sustain female engagement in chess.

1.3 years of chess experience;

Years of Chess Experience	Frequency	Percentage
less than 1 Year	58	38.16
1 to 3 Years	49	32.24
4 to 6 Years	29	19.08
7 years and above	16	10.53
Total	152	100%

The data indicate that most respondents have relatively limited chess experience, with 38.16% having less than one year of experience and 32.24% having played for one to three years. Meanwhile, 19.08% reported four to six years of experience, and only 10.53% have been playing for seven years or more. This suggests that a large portion of the athletes are relatively new to competitive chess, which may reflect growing interest or recent engagement in the sport among the participants.

The data indicate that a large proportion of the respondents have relatively limited chess experience, with the highest percentage having less than one year of experience, followed by those with one to three years. In contrast, only a smaller group reported four to six years of experience, and an even smaller percentage have been playing for seven years or more. This distribution suggests that most of the chess athletes in the sample are still in the early stages of their development, indicating that participation is largely composed of beginners and relatively new entrants to competitive chess.

The implications of these findings highlight the need for structured training programs and continuous skill development opportunities tailored to novice and intermediate players. Since a majority of the respondents are still gaining experience, coaches and institutions should focus on foundational skill-building, strategic thinking, and consistent practice to support their growth. Additionally, the increasing number of new players may reflect a rising interest in chess, which institutions can further nurture by organizing competitions, workshops, and mentorship programs. Providing sustained support can help retain these players and gradually develop them into more advanced and competitive athletes over time.

These results are supported by recent studies emphasizing that early-stage engagement plays a crucial role in long-term skill acquisition in chess. According to FIDE (2022), many competitive chess players begin with limited experience and gradually improve through structured practice and exposure to tournaments. Furthermore, research by Anders Ericsson (2020) on deliberate practice highlights that expertise in complex domains like chess develops over time through sustained effort and guided training rather than initial experience alone. This supports the finding that although many respondents are relatively new, they have strong potential for growth with proper guidance and continuous engagement.

1.4 level of competition; and

Level of Competition	Frequency	Percentage
School/Intramurals	90	42.86
Local Club	53	25.24
City/Division	46	21.90
National	6	2.86
Regional	11	5.24
International	4	1.90
Total	210	100%

The results show that school or intramural competitions account for the largest share of participation (42.86%), followed by local club competitions (25.24%) and city/division tournaments (21.90%). Only a small proportion of respondents reported competing at higher levels such as regional (5.24%), national (2.86%), and international competitions (1.90%). This distribution suggests that most athletes primarily compete at the school or local level, while only a limited number have advanced to higher competitive stages.

The results show that the majority of respondents participate in school or intramural competitions, followed by involvement in local club and city or division tournaments. Only a small proportion have reached higher levels such as regional, national, and international competitions. This distribution indicates that most chess athletes remain within the foundational levels

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of competition, with limited progression to more advanced stages. It reflects that competitive exposure among the respondents is largely localized, and only a few have gained opportunities to compete beyond their immediate environments.

The implications of these findings suggest the need to strengthen pathways for athlete development and progression in chess. Schools and local organizations play a crucial role as entry points; however, there should be more structured systems that identify promising players and support their advancement to higher levels of competition. This may include providing access to advanced training, sponsorships, and participation in larger tournaments. Enhancing competitive exposure can help improve players' skills, confidence, and experience, ultimately preparing them for higher-level competitions. Additionally, bridging the gap between local and elite levels may encourage more athletes to pursue long-term engagement in chess.

These findings are supported by organizations such as FIDE, which emphasizes the importance of grassroots competitions as the foundation for developing future elite players. According to United States Chess Federation (2021), most competitive players begin at school and local levels before gradually advancing through structured tournament systems. This progression model highlights that early exposure to localized competitions is essential, but sustained support and opportunities are necessary for athletes to reach higher competitive stages, reinforcing the pattern observed in the results.

1.5 Typical weekly chess practice hours?

Typical weekly chess practice hours	Frequency	Percentage
Less than 1 Hour	64	42.11
1 - 3 Hours	48	31.58
4 - 6 Hours	31	20.39
7 - 10 Hours	3	1.97
More than 10 hours	6	3.95
Total	152	100%

The findings reveal that most chess athletes spend relatively limited time practicing each week, with 42.11% practicing less than one hour and 31.58% practicing between one and three hours. A smaller portion reported practicing four to six hours weekly (20.39%), while only 1.97% practice seven to ten hours and 3.95% practice more than ten hours per week. This indicates that the majority of respondents engage in chess practice on a relatively moderate or occasional basis rather than intensive training schedules.

The findings reveal that the majority of chess athletes dedicate relatively limited time to practice each week, with most spending less than three hours, and only a very small proportion engaging in more intensive training schedules. This indicates that chess involvement among the respondents is generally moderate or occasional rather than highly rigorous. The low percentage of athletes practicing beyond seven hours per week suggests that only a few are deeply immersed in structured or competitive-level preparation, while most may treat chess as a supplementary or recreational activity rather than a primary focus.

The implications of these results point to the need for increased emphasis on regular and structured practice to enhance skill development. Since consistent and deliberate practice is essential in mastering complex cognitive tasks like chess, limited practice time may hinder players' ability to improve and compete at higher levels. Schools, coaches, and chess organizations may consider implementing guided training programs, scheduled practice sessions, and performance monitoring to encourage more disciplined engagement. Additionally, motivating athletes to allocate more time to practice could help bridge the gap between beginner-level participation and advanced competitive performance.

These findings are supported by the work of Anders Ericsson, whose theory of deliberate practice emphasizes that expertise is developed through sustained, focused, and effortful practice over time. Moreover, FIDE (2022) highlights that successful chess players typically undergo extensive and consistent training to refine their strategic thinking and decision-making skills. These perspectives reinforce the idea that while initial participation may be moderate, increased practice intensity is crucial for achieving higher levels of competence and competitive success in chess.

2. What is the level of cognitive functioning of chess athletes in terms of:

2.1 memory;

Indicators	MEAN	VI
1. During a game, I recall an opponent's earlier moves when planning my next move.	3.31	SA
2. I recall lines of play from recent study sessions during games or analysis.	2.99	A
3. I remember positions and patterns I have practiced.	3.24	A
4. I remember the opening lines I have prepared during play.	3.24	A
5. I retain multi-move tactical sequences in mind while evaluating a position.	3.16	A
6. I recall endgame techniques I have learned when analyzing or playing.	3.18	A
General Assessment	3.18	Agree
Legend:		
3.25 – 4.00 Strongly Agree (SA) 2.50 – 3.24 Agree (A) 1.75 – 2.49 Disagree (D) 1.00 – 1.74 Strongly Disagree (SD)		

The General Assessment Mean of 3.18 with Verbal Interpretation Agree indicates that chess athletes generally demonstrate a good level of memory functioning during games and analysis. This suggests that the respondents are capable of recalling previously studied patterns, opening lines, and tactical sequences when evaluating positions. The highest mean is 3.31 with Verbal Interpretation Strongly Agree for the indicator “During a game, I recall an opponent’s earlier moves when planning my next move.”, which implies that athletes strongly rely on recalling prior moves as part of their strategic thinking. Meanwhile, the lowest mean is 2.99 with Verbal Interpretation Agree for the indicator “I recall lines of play from recent study sessions during games or analysis.”, indicating that although athletes still agree with this statement, recalling recently studied variations during play is slightly less evident compared to other memory-related skills.

The General Assessment Mean of 3.18, interpreted as Agree, indicates that chess athletes generally exhibit a good level of memory functioning during games and analysis. This suggests that respondents are able to effectively recall previously studied patterns, opening lines, and tactical sequences when evaluating positions, demonstrating that memory plays a critical role in their overall gameplay. The capacity to remember and apply prior knowledge reflects the cognitive engagement required in chess and highlights the athletes’ ability to integrate past experiences into current decision-making processes.

The highest mean of 3.31 (Strongly Agree) was observed for the indicator, “During a game, I recall an opponent’s earlier moves when planning my next move,” implying that athletes rely heavily on remembering opponents’ past actions as a strategic tool. This underscores the importance of memory not just in recognizing patterns but also in anticipating and countering an opponent’s strategies.

In contrast, the lowest mean of 2.99 (Agree) for the indicator, “I recall lines of play from recent study sessions during games or analysis,” suggests that recalling newly learned variations is slightly less developed compared to recalling past moves or general patterns. This indicates that while athletes possess solid memory skills, there may be room to enhance the integration of recent learning into live gameplay.

These findings are consistent with recent research emphasizing the role of memory in chess expertise. According to Charness (2021), memory for positions and prior moves is a key predictor of chess performance, particularly in anticipating opponents’ strategies. Similarly, FIDE (2022) highlights that effective recall of studied openings and tactical sequences is crucial for competitive play. These studies reinforce that memory functioning is a central cognitive skill for chess athletes, and structured exercises aimed at improving recall of both past and recently learned lines can further enhance strategic performance

2.2 concentration; and

Indicators	MEAN	VI
1. I maintain focus during long games	3.35	SA
2. I keep my attention on the board despite external distractions (noise, movement).	3.22	A
3. I refocus on the board after a break or a loss	3.13	A
4. I sustain mental effort during complex forcing sequences.	3.11	A
5. I sustain attention across multiple rounds in a day.	3.10	A
6. I regain focus after brief interruptions.	3.21	A
General Assessment	3.18	Agree
Legend:		
3.25 – 4.00 Strongly Agree (SA) 2.50 – 3.24 Agree (A) 1.75 – 2.49 Disagree (D) 1.00 – 1.74 Strongly Disagree (SD)		

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The General Assessment Mean of 3.18 with Verbal Interpretation Agree shows that chess athletes possess a generally strong level of concentration during matches and training. This indicates that the respondents are able to maintain attention on the chessboard despite the presence of various distractions and demanding situations. The highest mean is 3.35 with Verbal Interpretation Strongly Agree for the indicator “I maintain focus during long games.”, which suggests that athletes strongly demonstrate sustained attention throughout extended matches. Conversely, the lowest mean is 3.10 with Verbal Interpretation Agree for the indicator “I sustain attention across multiple rounds in a day.”, indicating that maintaining concentration across several games in a single day may be slightly more challenging for the respondents.

The General Assessment Mean of 3.18, interpreted as Agree, indicates that chess athletes generally demonstrate a strong level of concentration during matches and training. This suggests that respondents are capable of maintaining focus on the chessboard even in the presence of distractions or under challenging situations, highlighting the importance of sustained attention in their overall performance. Effective concentration allows athletes to carefully analyze positions, anticipate opponents’ strategies, and make informed decisions throughout the course of a game.

The highest mean of 3.35 (Strongly Agree) was observed for the indicator, “I maintain focus during long games,” suggesting that athletes are particularly adept at sustaining attention over extended periods of play. This reflects their ability to remain mentally engaged and strategically vigilant, which is essential for navigating complex positions. In contrast, the lowest mean of 3.10 (Agree) for the indicator, “I sustain attention across multiple rounds in a day,” indicates that maintaining concentration across several games consecutively may present a slight challenge for some respondents. This highlights that while athletes generally possess strong focus, endurance and mental stamina across long tournament sessions could benefit from targeted development.

These findings are supported by research emphasizing the role of concentration in chess performance. According to Sala and Gobet (2020), sustained attention is critical for high-level chess performance, enabling players to process complex positions and anticipate multiple moves ahead. Likewise, FIDE (2022) notes that mental stamina and the ability to focus over extended periods are distinguishing factors between novice and advanced players. These studies reinforce the current results, suggesting that while chess athletes demonstrate strong concentration, strategies to enhance endurance across multiple rounds can further optimize competitive outcomes.

2.3 problem-solving?

Indicators	MEAN	VI
1. I generate candidate moves and evaluate them before choosing.	3.32	SA
2. I identify tactical resources in complex positions.	3.23	A
3. I plan move sequences when facing new positions.	3.24	A
4. I adapt my plan when an opponent makes an unexpected move.	3.27	SA
5. I choose to simplify or complicate the position according to the position's demands.	3.18	A
6. I evaluate long-term positional advantages.	3.11	A
General Assessment	3.22	Agree
Legend:		
3.25 – 4.00 Strongly Agree (SA) 2.50 – 3.24 Agree (A) 1.75 – 2.49 Disagree (D) 1.00 – 1.74 Strongly Disagree (SD)		

The General Assessment Mean of 3.22 with Verbal Interpretation Agree indicates that the chess athletes demonstrate a strong capacity for problem-solving during gameplay. This suggests that respondents are able to analyze positions, consider different candidate moves, and adjust strategies when faced with challenging situations. The highest mean is 3.32 with Verbal Interpretation Strongly Agree for the indicator “I generate candidate moves and evaluate them before choosing.”, highlighting that systematic evaluation of possible moves is a prominent problem-solving behavior among the athletes. On the other hand, the lowest mean is 3.11 with Verbal Interpretation Agree for the indicator “I evaluate long-term positional advantages.”, implying that long-term strategic evaluation may be somewhat less emphasized compared to immediate tactical considerations.

The General Assessment Mean of 3.22, interpreted as Agree, indicates that chess athletes generally exhibit a strong capacity for problem-solving during gameplay. This suggests that respondents are capable of analyzing positions, considering multiple candidate moves, and adapting their strategies when confronted with challenging situations. The findings highlight the importance of critical thinking and strategic reasoning as central cognitive skills in chess, enabling athletes to respond effectively to dynamic game scenarios.

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The highest mean of 3.32 (Strongly Agree) was observed for the indicator, “I generate candidate moves and evaluate them before choosing,” demonstrating that systematic evaluation of possible moves is a key problem-solving behavior among the athletes. This reflects a methodical approach to decision-making, where players carefully weigh options before committing to a move. In contrast, the lowest mean of 3.11 (Agree) for the indicator, “I evaluate long-term positional advantages,” suggests that while athletes are proficient at immediate tactical problem-solving, long-term strategic evaluation may be somewhat less emphasized. This indicates potential areas for development in planning deeper positional strategies during games.

These results are supported by research highlighting the relationship between chess expertise and problem-solving skills. According to Charness (2021), effective problem-solving in chess involves both evaluating candidate moves and anticipating future positional outcomes. Similarly, FIDE (2022) emphasizes that advanced players distinguish themselves by balancing tactical calculations with long-term strategic planning. These studies reinforce the current findings, suggesting that while the athletes demonstrate strong problem-solving abilities, targeted training to enhance long-term positional evaluation could further improve overall performance.

3. What is the level of psychological well-being of chess athletes in terms of:

3.1 stress management;

Indicators	MEAN	VI
1. I stay calm and make decisions under time pressure.	3.30	SA
2. I use breathing or routines to calm myself during tense moments.	3.08	A
3. I recover emotionally after making a blunder.	3.09	A
4. I manage pre-game nerves so they do not affect my play.	3.20	A
5. I control my nerves during important matches.	3.14	A
6. I perform at my best when the stakes are high.	3.32	SA
General Assessment	3.19	Agree

Legend:

3.25 – 4.00 Strongly Agree (SA) 2.50 – 3.24 Agree (A) 1.75 – 2.49 Disagree (D) 1.00 – 1.74 Strongly Disagree (SD)

The General Assessment Mean of 3.19 with Verbal Interpretation Agree indicates that the chess athletes generally demonstrate effective stress management during competitions and training. This means that respondents are capable of controlling their emotions and maintaining composure while playing under pressure. The highest mean is 3.32 with Verbal Interpretation Strongly Agree for the indicator “I perform at my best when the stakes are high.”, suggesting that athletes tend to thrive in competitive situations. In contrast, the lowest mean is 3.08 with Verbal Interpretation Agree for the indicator “I use breathing or routines to calm myself during tense moments.”, indicating that while respondents manage stress effectively, structured coping techniques such as breathing or routines are used slightly less frequently.

The General Assessment Mean of 3.19, interpreted as Agree, indicates that chess athletes generally demonstrate effective stress management during competitions and training. This suggests that respondents are capable of regulating their emotions and maintaining composure under pressure, which is essential for making sound decisions and performing consistently during games. Effective stress management allows athletes to focus on strategy and execution rather than being hindered by anxiety or tension.

The highest mean of 3.32 (Strongly Agree) was observed for the indicator, “I perform at my best when the stakes are high,” suggesting that athletes often excel in competitive situations and are motivated by high-pressure scenarios. Conversely, the lowest mean of 3.08 (Agree) for the indicator, “I use breathing or routines to calm myself during tense moments,” indicates that while respondents generally manage stress well, the use of structured coping strategies such as breathing techniques or pre-game routines is somewhat less frequent. This highlights a potential area for development in formal stress-coping methods to enhance performance consistency.

These findings are consistent with recent research emphasizing the role of emotional regulation in chess performance. According to Bartlett and Gobet (2020), the ability to manage stress and maintain composure is closely linked to higher performance in complex cognitive tasks like chess. Likewise, FIDE (2022) underscores that top players often employ structured stress-management techniques to optimize focus and decision-making under pressure. These studies support the current findings, suggesting that while chess athletes demonstrate effective stress management, incorporating systematic coping strategies could further strengthen their competitive resilience.

3.2 self-efficacy; and

Indicators	MEAN	VI
1. I am confident finding good moves under pressure.	3.28	SA
2. I improve my chess skills through practice.	3.37	SA
3. I am confident in my preparation against any opponent.	3.17	A
4. I am capable of handling difficult positions.	3.13	A
5. I execute the plans I set during a game.	3.14	A
6. I take responsibility for my decisions on the board with confidence.	3.35	SA
General Assessment	3.24	Agree

Legend:
3.25 – 4.00 Strongly Agree (SA) 2.50 – 3.24 Agree (A) 1.75 – 2.49 Disagree (D) 1.00 – 1.74 Strongly Disagree (SD)

The General Assessment Mean of 3.24 with Verbal Interpretation Agree indicates that chess athletes generally possess a strong sense of confidence in their playing abilities and decision-making on the board. This suggests that respondents believe in their capability to handle challenging positions and improve through practice.

The highest mean is 3.37 with Verbal Interpretation Strongly Agree for the indicator “I improve my chess skills through practice.”, emphasizing that athletes strongly recognize the importance of consistent training for skill development. Meanwhile, the lowest mean is 3.13 with Verbal Interpretation Agree for the indicator “I am capable of handling difficult positions.”, indicating that although athletes feel confident, facing highly complex positions may still pose some level of challenge.

The General Assessment Mean of 3.24, interpreted as Agree, indicates that chess athletes generally exhibit a strong sense of confidence in their playing abilities and decision-making on the board. This suggests that respondents trust their capability to navigate challenging positions and view practice as a means for continuous improvement. Confidence in one’s skills is crucial in chess, as it supports decisive thinking, risk-taking, and resilience when confronting complex or unfamiliar situations.

The highest mean of 3.37 (Strongly Agree) was observed for the indicator, “I improve my chess skills through practice,” highlighting that athletes strongly acknowledge the role of consistent training in enhancing their abilities. Conversely, the lowest mean of 3.13 (Agree) for the indicator, “I am capable of handling difficult positions,” indicates that while athletes generally feel confident, they may still encounter challenges when faced with highly complex or unfamiliar scenarios. This points to potential areas for further skill development and strategic training to strengthen confidence in handling advanced gameplay situations.

These findings align with research on the relationship between confidence and chess performance. According to Sala and Gobet (2020), self-confidence positively influences decision-making and problem-solving in chess, supporting more accurate and timely moves. Additionally, FIDE (2022) emphasizes that consistent practice not only develops technical skills but also reinforces a player’s belief in their strategic capabilities. These studies reinforce the current findings, suggesting that while chess athletes maintain strong confidence overall, targeted exposure to complex positions can further bolster their self-assurance during high-level play.

3.3 resilience?

Indicators	MEAN	VI
1. I regain focus and confidence after consecutive losses.	3.31	SA
2. I view losses as opportunities to learn.	3.27	SA
3. I try new strategies when my usual approach stops working.	3.26	SA
4. I stay motivated to train after setbacks.	3.24	A
5. I adjust my approach when an opponent exploits a weakness.	3.28	SA
6. I persist in difficult positions.	3.09	A
General Assessment	3.24	Agree

Legend:
3.25 – 4.00 Strongly Agree (SA) 2.50 – 3.24 Agree (A) 1.75 – 2.49 Disagree (D) 1.00 – 1.74 Strongly Disagree (SD)

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The General Assessment Mean of 3.24 with Verbal Interpretation Agree indicates that the chess athletes demonstrate a high level of resilience when facing challenges and setbacks in competitive play.

This means that respondents are generally capable of maintaining motivation, learning from losses, and adapting their strategies when necessary. The highest mean is 3.31 with Verbal Interpretation Strongly Agree for the indicator “I regain focus and confidence after consecutive losses.”, suggesting that the athletes show strong emotional recovery after defeats. Conversely, the lowest mean is 3.09 with Verbal Interpretation Agree for the indicator “I persist in difficult positions.”, implying that maintaining persistence in highly unfavorable positions may be slightly more challenging compared to other aspects of resilience.

The General Assessment Mean of 3.24, interpreted as Agree, indicates that chess athletes generally exhibit a high level of resilience when confronted with challenges and setbacks in competitive play. This suggests that respondents are capable of maintaining motivation, learning from defeats, and adjusting their strategies when situations demand. Resilience is a key attribute in chess, allowing players to recover emotionally, remain focused, and continue making effective decisions even after experiencing losses or setbacks.

The highest mean of 3.31 (Strongly Agree) was observed for the indicator, “I regain focus and confidence after consecutive losses,” highlighting that athletes demonstrate strong emotional recovery and the ability to bounce back after disappointing outcomes. In contrast, the lowest mean of 3.09 (Agree) for the indicator, “I persist in difficult positions,” suggests that sustaining persistence during highly unfavorable scenarios may pose a greater challenge for some respondents. This indicates that while resilience is generally strong, targeted strategies to enhance perseverance in complex or losing positions could further strengthen overall mental toughness.

These findings are supported by research on resilience and performance in competitive environments. According to Bartlett and Gobet (2020), resilient chess players are better able to recover from mistakes, maintain focus, and adapt strategies, which directly contributes to long-term performance improvement. However, FIDE (2022) emphasizes that mental toughness and emotional recovery are critical for sustaining high-level performance in tournaments. These studies reinforce the current findings, suggesting that while chess athletes exhibit strong resilience overall, fostering persistence in difficult positions can further enhance competitive success.

4. Is there a significant difference on the level of cognitive functioning of chess athletes when grouped according to profile?

Demographic Profile	Level of Cognitive functioning of Chess Athletes	t-value	df	p-value	Remarks	Decision
Age	Memory	-0.267	150	0.790	Not Significant	Accept the Ho
	Concentration	-0.217	150	0.828	Not Significant	Accept the Ho
	Problem-Solving	-0.340	150	0.734	Not Significant	Accept the Ho

The results reveal that age does not significantly influence the level of cognitive functioning of chess athletes. The computed p-values for memory ($p = 0.790$), concentration ($p = 0.828$), and problem-solving ($p = 0.734$) are all greater than the 0.05 level of significance, indicating no statistically significant difference across age groups. Consequently, the null hypothesis is accepted. This implies that chess athletes across different age categories demonstrate relatively similar levels of memory recall, concentration during gameplay, and problem-solving abilities.

The results reveal that age does not significantly influence the level of cognitive functioning among chess athletes. The computed p-values for memory ($p = 0.790$), concentration ($p = 0.828$), and problem-solving ($p = 0.734$) are all greater than the 0.05 level of significance, indicating that there are no statistically significant differences in these cognitive skills across different age groups. As a result, the null hypothesis is accepted, suggesting that age is not a determining factor in the cognitive performance of the respondents.

The implications of these findings suggest that cognitive abilities such as memory, concentration, and problem-solving are consistently developed across age groups in chess athletes. This indicates that engagement in chess, rather than age alone, may play a more critical role in fostering these cognitive skills. Coaches and educators can therefore focus on providing structured training and practice opportunities to athletes of all ages, knowing that these interventions are likely to enhance cognitive functioning regardless of the player's age.

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Narrative of Participant 12 – “The Adaptable Athlete”

Participant 12, referred to as The Adaptable Athlete, described fatigue as a signal that requires adjustment in playing style. When exhaustion occurs, he becomes more cautious and focuses on teamwork rather than individual effort. He explained that communicating with teammates and supporting each other helps reduce the impact of fatigue during matches. For him, adaptability and cooperation are essential for maintaining performance under physically demanding conditions.

Narrative of Participant 13 – “The Resilient Performer”

Participant 13, referred to as The Resilient Performer, described fatigue as something that builds up gradually during tournaments or consecutive training sessions. He explained that when multiple games are played within a short period of time, the body becomes increasingly tired. Despite this, he emphasized that resilience and discipline help athletes continue performing despite accumulated exhaustion.

Narrative of Participant 14 – “The Composed Competitor”

Participant 14, referred to as The Composed Competitor, explained that fatigue often challenges an athlete’s ability to remain calm during intense situations. During demanding matches, he sometimes feels physical exhaustion and reduced focus. However, he emphasized the importance of staying composed and maintaining emotional control. By keeping a clear mind, he is able to continue making effective decisions even when tired.

Narrative of Participant 15 – “The Dedicated Athlete”

Participant 15, referred to as The Dedicated Athlete, described fatigue as a normal part of being a competitive athlete. He explained that the physical demands of futsal require constant effort and endurance. During training and matches, he often experiences muscle soreness and exhaustion. Despite these challenges, he emphasized that dedication to the sport motivates him to continue training and improving. For him, overcoming fatigue is part of the journey of becoming a stronger and more disciplined athlete.

Across the narratives of the participants, several common patterns emerged regarding how futsal athletes experience exertion and fatigue during training and competition. These patterns highlight the multidimensional nature of fatigue, which affects physical capacity, cognitive functioning, emotional responses, and overall performance. Through thematic analysis of the participants’ accounts, the researcher identified several recurring themes that describe the lived experiences of futsal athletes. These themes are presented in Table 1.

Demographic Profile	Level of Cognitive functioning of Chess Athletes	t-value	df	p-value	Remarks	Decision
Sex	Memory	-0.687	150	0.493	Not Significant	Accept the Ho
	Concentration	-0.683	150	0.496	Not Significant	Accept the Ho
	Problem-Solving	-0.125	150	0.901	Not Significant	Accept the Ho

These findings are supported by recent research highlighting that cognitive skills in chess are more influenced by experience and deliberate practice than by age. According to Sala and Gobet (2020), sustained chess practice contributes significantly to memory, concentration, and problem-solving skills, independent of age. Similarly, FIDE (2022) notes that cognitive performance in chess is closely tied to engagement and training intensity rather than chronological age, reinforcing the current observation that players across different age groups demonstrate comparable cognitive functioning.

The findings show that there is no significant difference in the level of cognitive functioning when chess athletes are grouped according to sex. The p-values for memory ($p = 0.493$), concentration ($p = 0.496$), and problem-solving ($p = 0.901$) all exceed the 0.05 significance threshold, leading to the acceptance of the null hypothesis. This suggests that both male and female chess athletes exhibit comparable cognitive functioning in terms of recalling game patterns, maintaining focus during matches, and analyzing chess positions.

The findings show that there is no significant difference in the level of cognitive functioning between male and female chess athletes. The computed p-values for memory ($p = 0.493$), concentration ($p = 0.496$), and problem-solving ($p = 0.901$) all

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exceed the 0.05 significance threshold, resulting in the acceptance of the null hypothesis. This indicates that cognitive abilities, including recalling game patterns, sustaining attention during matches, and analyzing positions, are comparable between male and female respondents.

The implications of these results suggest that sex does not influence the cognitive performance of chess athletes, highlighting that both male and female players possess similar capabilities in memory, focus, and problem-solving. Consequently, training programs and coaching strategies can be designed inclusively, without differentiation based on sex, allowing all athletes equal opportunities to develop their skills and maximize their cognitive potential. This reinforces the importance of access to quality practice and competition over demographic factors in fostering chess expertise.

These findings are supported by existing research emphasizing that cognitive skills in chess are largely independent of sex. According to Charness (2021), male and female chess players demonstrate comparable memory and strategic problem-solving abilities when provided similar levels of training and experience. Likewise, FIDE (2022) notes that gender does not inherently affect cognitive performance in chess, reinforcing the current results that both male and female athletes exhibit equivalent cognitive functioning in gameplay and analysis.

Demographic Profile	Level of Cognitive functioning of Chess Athletes	t-value	df	P-value	Remarks	Decision
Years of Chess Experience	Memory	-0.768	150	0.444	Not Significant	Accept the Ho
	Concentration	-0.210	150	0.834	Not Significant	Accept the Ho
	Problem-Solving	-0.602	150	0.548	Not Significant	Accept the Ho

The analysis indicates that years of chess experience do not significantly affect the cognitive functioning of the athletes. The p-values obtained for memory ($p = 0.444$), concentration ($p = 0.834$), and problem-solving ($p = 0.548$) are greater than 0.05, indicating no statistically significant differences among respondents with varying years of playing experience. Therefore, the null hypothesis is accepted. This suggests that cognitive functioning skills in chess, such as remembering patterns, maintaining attention, and solving complex positions, are relatively consistent regardless of the length of playing experience.

The analysis indicates that years of chess experience do not significantly affect the cognitive functioning of the athletes. The p-values for memory ($p = 0.444$), concentration ($p = 0.834$), and problem-solving ($p = 0.548$) are all greater than the 0.05 significance level, leading to the acceptance of the null hypothesis. This suggests that there are no statistically significant differences in cognitive skills among respondents with varying lengths of playing experience, indicating that memory recall, sustained attention, and problem-solving abilities are relatively consistent across all experience levels.

The implications of these findings suggest that cognitive functioning in chess is not solely dependent on the duration of experience. Instead, factors such as engagement, quality of practice, and structured training may play a more significant role in developing memory, concentration, and problem-solving skills. Coaches and educators can therefore focus on providing effective learning strategies and deliberate practice opportunities to players of all experience levels, ensuring that cognitive skills are nurtured consistently regardless of how long an athlete has been playing.

These findings are supported by research emphasizing that cognitive skill development in chess is influenced more by focused practice and deliberate learning than by mere years of experience. According to Sala and Gobet (2020), players' memory, concentration, and problem-solving abilities improve through structured engagement and exposure to challenging positions, rather than through passive experience alone. Similarly, FIDE (2022) notes that quality of practice, strategic training, and active problem-solving are key determinants of cognitive performance in chess, reinforcing the finding that years of playing experience alone do not significantly affect cognitive functioning.

Demographic Profile	Level of Cognitive functioning of Chess Athletes	t-value	df	p-value	Remarks	Decision
Level of Competition	Memory	1.904	150	0.059	Not Significant	Accept the Ho
	Concentration	1.601	150	0.111	Not Significant	Accept the Ho
	Problem-Solving	1.998	150	0.047	Significant	Reject the Ho

The results indicate that level of competition significantly influences one aspect of cognitive functioning, specifically problem-solving ability. While memory ($p = 0.059$) and concentration ($p = 0.111$) showed no significant differences across competition levels, problem-solving yielded a significant result ($p = 0.047$), leading to the rejection of the null hypothesis for this component. This suggests that athletes competing at higher levels may develop stronger problem-solving skills due to increased exposure to more complex and competitive chess situations.

The results indicate that the level of competition significantly influences one aspect of cognitive functioning, specifically problem-solving ability. While memory ($p = 0.059$) and concentration ($p = 0.111$) showed no significant differences across competition levels, problem-solving yielded a statistically significant result ($p = 0.047$), leading to the rejection of the null hypothesis for this component. This suggests that participation in higher-level competitions may be associated with enhanced problem-solving skills, as athletes are exposed to more complex and strategically demanding game situations.

The implications of these findings highlight the importance of competitive exposure in developing advanced cognitive skills in chess. Athletes who participate in higher-level tournaments likely encounter a greater variety of challenging positions and opponent strategies, which can foster critical thinking, adaptability, and analytical skills. Coaches and trainers may therefore consider encouraging players to engage in progressively more competitive environments as part of their skill development, providing opportunities to refine problem-solving abilities that are less impacted at lower competition levels.

According to FIDE (2022) notes that participation in regional, national, and international tournaments challenges players to apply strategic thinking and anticipate opponents' moves more effectively, reinforcing the finding that problem-solving ability improves with increased competition level.

Demographic Profile	Level of Cognitive functioning of Chess Athletes	t-value	df	p-value	Remarks	Decision
Chess Practice Hours	Memory	-0.186	150	0.852	Not Significant	Accept the Ho
	Concentration	-0.436	150	0.663	Not Significant	Accept the Ho
	Problem-Solving	0.121	150	0.904	Not Significant	Accept the Ho

The findings show that the number of chess practice hours does not significantly affect the cognitive functioning of the athletes. The p-values for memory ($p = 0.852$), concentration ($p = 0.663$), and problem-solving ($p = 0.904$) are all greater than the 0.05 significance level, leading to the acceptance of the null hypothesis. This indicates that variations in weekly chess practice time among the respondents do not significantly influence their cognitive performance in terms of memory, focus, or analytical thinking.

The findings show that the number of chess practice hours does not significantly affect the cognitive functioning of the athletes. The computed p-values for memory ($p = 0.852$), concentration ($p = 0.663$), and problem-solving ($p = 0.904$) all exceed the 0.05 significance threshold, resulting in the acceptance of the null hypothesis. This indicates that differences in weekly practice time among the respondents do not lead to significant variations in cognitive performance, including memory recall, sustained attention, or analytical thinking.

The implications of these results suggest that merely increasing the quantity of practice hours may not be sufficient to enhance cognitive functioning in chess. Instead, the quality of practice, engagement in deliberate problem-solving, and structured

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training may play a more critical role in developing memory, concentration, and strategic thinking. Coaches and educators should therefore emphasize focused, goal-oriented practice methods over sheer duration to maximize cognitive development among chess athletes.

These findings are supported by research emphasizing the importance of deliberate and structured practice over total practice time. According to Anders Ericsson (2020), expertise and cognitive growth in complex domains like chess are largely driven by purposeful practice that targets specific skills rather than cumulative hours alone. In parallel, FIDE (2022) notes that consistent, high-quality engagement with challenging positions and strategic exercises is more influential on performance than the overall weekly practice duration. These studies reinforce the observation that cognitive functioning in chess is more dependent on the nature and focus of practice rather than its length.

5. Is there a significant difference on level of psychological well-being of chess athletes when grouped according to profile?

Demographic Profile	Level of Psychological Well-being of Chess Athletes	t-value	df	p-value	Remarks	Decision
Age	Stress Management	-0.295	150	0.768	Not Significant	Accept the Ho
	Self-efficacy	-0.654	150	0.514	Not Significant	Accept the Ho
	Resilience	-0.476	150	0.634	Not Significant	Accept the Ho

The analysis shows that age does not significantly affect the psychological well-being of chess athletes. The p-values for stress management ($p = 0.768$), self-efficacy ($p = 0.514$), and resilience ($p = 0.634$) are all greater than the 0.05 significance level. As a result, the null hypothesis is accepted. This suggests that chess athletes from different age groups display comparable levels of emotional regulation, confidence in their playing ability, and resilience when facing competitive challenges.

The analysis shows that age does not significantly affect the psychological well-being of chess athletes. The computed p-values for stress management ($p = 0.768$), self-efficacy ($p = 0.514$), and resilience ($p = 0.634$) all exceed the 0.05 significance level, leading to the acceptance of the null hypothesis. This indicates that chess athletes across different age groups demonstrate similar levels of emotional regulation, confidence in their playing abilities, and resilience when facing competitive challenges.

The implications of these findings suggest that psychological well-being in chess is largely independent of age. Factors such as experience, training, and exposure to competitive play may play a more substantial role in shaping emotional regulation, self-efficacy, and resilience than chronological age. Coaches and educators can, therefore, design mental skills training programs that cater to athletes of all ages, ensuring equal opportunities to develop coping strategies, confidence, and perseverance regardless of age group.

These results are supported by recent research emphasizing the influence of engagement and experience over age in psychological performance. According to Bartlett and Gobet (2020), consistent exposure to competitive chess and deliberate practice fosters emotional regulation and resilience, independent of age. Correspondingly, FIDE (2022) notes that confidence, stress management, and mental toughness are cultivated through structured training and competition rather than chronological age, reinforcing the current finding that psychological well-being is comparable across different age groups.

Demographic Profile	Level of Psychological Well-being of Chess Athletes	t-value	df	p-value	Remarks	Decision
Sex	Stress Management	-0.638	150	0.525	Not Significant	Accept the Ho
	Self-efficacy	-0.135	150	0.893	Not Significant	Accept the Ho
	Resilience	0.306	150	0.760	Not Significant	Accept the Ho

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The findings indicate that psychological well-being among chess athletes does not significantly differ when grouped according to sex. The computed p-values for stress management ($p = 0.525$), self-efficacy ($p = 0.893$), and resilience ($p = 0.760$) exceed the 0.05 level of significance, leading to the acceptance of the null hypothesis. This implies that male and female chess athletes experience similar levels of emotional control, confidence in their abilities, and ability to recover from setbacks during competitions.

The findings indicate that psychological well-being among chess athletes does not significantly differ based on sex. The computed p-values for stress management ($p = 0.525$), self-efficacy ($p = 0.893$), and resilience ($p = 0.760$) all exceed the 0.05 level of significance, resulting in the acceptance of the null hypothesis. This suggests that male and female chess athletes demonstrate comparable levels of emotional regulation, confidence in their playing abilities, and capacity to recover from setbacks during competitions.

The implications of these findings highlight that sex does not influence key aspects of psychological well-being in chess. Both male and female athletes possess similar capabilities in managing stress, maintaining self-efficacy, and exhibiting resilience under competitive conditions. Consequently, coaching programs and mental skills interventions can be applied inclusively, ensuring that strategies for enhancing emotional control, confidence, and recovery are equally effective for all athletes regardless of sex.

Demographic Profile	Level of Psychological Well-being of Chess Athletes	t-value	df	p-value	Remarks	Decision
Years of Chess Experience	Stress Management	-0.817	150	0.415	Not Significant	Accept the Ho
	Self-efficacy	-0.606	150	0.545	Not Significant	Accept the Ho
	Resilience	-0.723	150	0.471	Not Significant	Accept the Ho

These results are supported by research emphasizing the equality of psychological capacities between male and female chess players. According to Bartlett and Gobet (2020), emotional regulation, resilience, and confidence in competitive settings are shaped more by practice, experience, and exposure to challenges than by sex. Similarly, FIDE (2022) notes that male and female players exhibit comparable mental toughness and stress management when provided with equivalent training and competitive opportunities, reinforcing the finding that psychological well-being is similar across sexes.

The results demonstrate that years of chess experience do not significantly influence the psychological well-being of the athletes. The p-values for stress management ($p = 0.415$), self-efficacy ($p = 0.545$), and resilience ($p = 0.471$) are all greater than 0.05. Consequently, the null hypothesis is accepted. This indicates that regardless of how long athletes have been playing chess, their levels of emotional stability, confidence, and resilience remain relatively similar.

The results demonstrate that years of chess experience do not significantly influence the psychological well-being of the athletes. The computed p-values for stress management ($p = 0.415$), self-efficacy ($p = 0.545$), and resilience ($p = 0.471$) all exceed the 0.05 significance level, leading to the acceptance of the null hypothesis. This indicates that, regardless of how long athletes have been playing chess, their levels of emotional stability, confidence in their abilities, and resilience in the face of setbacks remain relatively consistent.

The implications of these findings suggest that the duration of chess experience alone does not determine psychological well-being. Instead, factors such as engagement in competitive play, quality of practice, and exposure to challenging situations may play a more substantial role in shaping stress management, self-efficacy, and resilience. Coaches and trainers can therefore focus on providing structured mental skills training and supportive environments for all players, regardless of their years of experience, to foster emotional stability and confidence.

These findings align with research emphasizing that psychological skills in chess are developed through deliberate practice and exposure rather than cumulative experience alone. According to Bartlett and Gobet (2020), consistent engagement in competitive and mentally demanding chess scenarios enhances emotional regulation and resilience across players of varying experience levels.

Likewise, FIDE (2022) notes that confidence and mental toughness are cultivated through structured training and strategic challenges, reinforcing the observation that years of experience do not significantly affect psychological well-being in chess athletes.

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Demographic Profile	Level of Psychological Well-being of Chess Athletes	t-value	df	p-value	Remarks	Decision
Level of Competition	Stress Management	1.775	150	0.078	Not Significant	Accept the Ho
	Self-efficacy	1.672	150	0.097	Not Significant	Accept the Ho
	Resilience	1.508	150	0.134	Not Significant	Accept the Ho

The analysis reveals that level of competition does not significantly affect the psychological well-being of chess athletes. The p-values for stress management ($p = 0.078$), self-efficacy ($p = 0.097$), and resilience ($p = 0.134$) are all higher than the 0.05 significance level, leading to the acceptance of the null hypothesis. This suggests that athletes competing at different competitive levels experience comparable psychological conditions in terms of managing stress, maintaining confidence, and adapting to competitive pressures.

The analysis reveals that the level of competition does not significantly affect the psychological well-being of chess athletes. The computed p-values for stress management ($p = 0.078$), self-efficacy ($p = 0.097$), and resilience ($p = 0.134$) all exceed the 0.05 significance level, resulting in the acceptance of the null hypothesis. This indicates that athletes competing at various competitive levels experience similar psychological conditions, demonstrating comparable abilities in managing stress, maintaining confidence, and adapting to competitive pressures.

The implications of these findings suggest that participation in higher-level tournaments does not necessarily confer greater psychological advantages over lower-level competitions. Instead, factors such as personal coping strategies, mental preparation, and exposure to challenges may play a more significant role in shaping psychological well-being. Coaches and trainers can therefore implement mental skills development programs that support all athletes equally, regardless of their competitive level, to strengthen stress management, self-efficacy, and resilience.

These findings are supported by research highlighting that psychological well-being in chess is influenced more by deliberate mental training and experience than by the level of competition. According to Bartlett and Gobet (2020), consistent engagement with challenging positions and structured practice enhances confidence, emotional regulation, and resilience across players of all competitive levels. Consequently, FIDE (2022) emphasizes that mental toughness is cultivated through preparation and strategy rather than tournament ranking, reinforcing the observation that psychological well-being is comparable across different levels of competition.

Demographic Profile	Level of Psychological Well-being of Chess Athletes	t-value	df	p-value	Remarks	Decision
Chess Practice Hours	Stress Management	-0.203	150	0.839	Not Significant	Accept the Ho
	Self-efficacy	-0.670	150	0.504	Not Significant	Accept the Ho
	Resilience	0.046	150	0.964	Not Significant	Accept the Ho

The results indicate that the amount of time spent practicing chess weekly does not significantly influence the psychological well-being of the athletes. The p-values obtained for stress management ($p = 0.839$), self-efficacy ($p = 0.504$), and resilience ($p = 0.964$) are all greater than the 0.05 threshold, resulting in the acceptance of the null hypothesis. This implies that varying practice durations do not significantly impact the athletes' emotional control, self-confidence, or resilience in chess performance.

The results indicate that the amount of time spent practicing chess weekly does not significantly influence the psychological well-being of the athletes. The computed p-values for stress management ($p = 0.839$), self-efficacy ($p = 0.504$), and resilience ($p = 0.964$) all exceed the 0.05 significance level, leading to the acceptance of the null hypothesis. This suggests that differences in weekly practice duration do not significantly affect the athletes' ability to regulate emotions, maintain self-confidence, or exhibit resilience during chess performance.

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The implications of these findings highlight that psychological well-being in chess is less dependent on the quantity of practice and more influenced by factors such as mental preparedness, coping strategies, and the quality of engagement during practice or competition. Coaches and trainers may therefore focus on fostering effective mental skills, structured training, and deliberate practice methods rather than emphasizing longer practice hours alone to support emotional control, confidence, and resilience among players.

These results are supported by research emphasizing the importance of deliberate and focused practice for psychological development in competitive chess. According to Bartlett and Gobet (2020), consistent mental engagement and exposure to challenging game situations cultivate emotional regulation and resilience regardless of practice duration. In addition, FIDE (2022) notes that mental toughness and self-efficacy are enhanced through strategic and purposeful training rather than simply increasing the number of practice hours, reinforcing the observation that weekly practice time alone does not significantly impact psychological well-being in chess athletes.

6. Is there a significant relationship between the level of cognitive functioning and level of psychological well-being of chess athletes?

Level of Cognitive functioning of Chess Athletes	Level of Psychological Well-being of Chess Athletes	R-value	N	P-value	Remarks	Decision
Memory	Stress Management	0.774	152	0.000	Significant	Reject the Ho
	Self-efficacy	0.739	152	0.000	Significant	Reject the Ho
	Resilience	0.631	152	0.000	Significant	Reject the Ho

The results reveal that memory has a significant and strong relationship with the psychological well-being of chess athletes. Significant positive correlations were found between memory and stress management ($r = 0.774$), self-efficacy ($r = 0.739$), and resilience ($r = 0.631$), with all p-values equal to 0.000. Since these values are lower than the 0.05 level of significance, the null hypothesis is rejected. This suggests that athletes who demonstrate stronger memory skills in recalling moves, patterns, and strategies also tend to exhibit higher levels of emotional control, confidence, and resilience during chess competitions.

The results reveal that memory has a significant and strong relationship with the psychological well-being of chess athletes. Significant positive correlations were found between memory and stress management ($r = 0.774$), self-efficacy ($r = 0.739$), and resilience ($r = 0.631$), with all p-values equal to 0.000. Since these values are below the 0.05 significance threshold, the null hypothesis is rejected. This indicates that athletes with stronger memory skills, such as the ability to recall moves, patterns, and strategies, also tend to demonstrate higher levels of emotional control, confidence, and resilience during competitive play.

The implications of these findings suggest that enhancing memory skills may contribute directly to improved psychological well-being in chess athletes. Strong memory not only aids in strategic decision-making but also supports mental stability and self-confidence, helping athletes manage stress and recover from setbacks more effectively. Coaches and trainers can therefore incorporate memory-focused exercises, such as tactical drills, pattern recognition training, and recall practice, as part of both cognitive and psychological development programs.

These findings are supported by research emphasizing the interplay between cognitive abilities and psychological resilience in chess. According to Charness (2021), memory skills in recalling positions and moves enhance decision-making and reduce cognitive load, which contributes to better stress management and confidence. Consistently, FIDE (2022) notes that players with well-developed memory abilities exhibit greater mental composure and resilience under competitive pressure, reinforcing the observed strong relationship between memory and psychological well-being.

Level of Cognitive functioning of Chess Athletes	Level of Psychological Well-being of Chess Athletes	R-value	N	p-value	Remarks	Decision
Concentration	Stress Management	0.728	152	0.000	Significant	Reject the Ho
	Self-efficacy	0.826	152	0.000	Significant	Reject the Ho
	Resilience	0.667	152	0.000	Significant	Reject the Ho

The analysis shows that concentration is significantly related to the psychological well-being of chess athletes. Strong positive correlations were observed between concentration and stress management ($r = 0.728$), self-efficacy ($r = 0.826$), and resilience ($r = 0.667$), with all p-values equal to 0.000. As a result, the null hypothesis is rejected. This indicates that athletes who maintain better focus and sustained attention during games also tend to possess stronger confidence, emotional stability, and ability to recover from competitive setbacks.

The analysis shows that concentration is significantly related to the psychological well-being of chess athletes. Strong positive correlations were observed between concentration and stress management ($r = 0.728$), self-efficacy ($r = 0.826$), and resilience ($r = 0.667$), with all p-values equal to 0.000. Since these values are below the 0.05 significance level, the null hypothesis is rejected. This indicates that athletes who maintain better focus and sustained attention during games also tend to exhibit higher levels of confidence, emotional stability, and the ability to recover from competitive setbacks.

The implications of these findings suggest that developing concentration skills can enhance both cognitive and psychological performance in chess. Sustained attention allows athletes to process complex positions, anticipate opponent moves, and make strategic decisions, while simultaneously supporting emotional regulation and self-confidence during high-pressure situations. Coaches and trainers can therefore incorporate exercises that improve focus, such as concentration drills, timed practice sessions, and mindfulness techniques, to strengthen both gameplay and psychological resilience.

These findings are supported by research highlighting the connection between cognitive focus and mental well-being in competitive chess. According to Sala and Gobet (2020), sustained attention is closely linked to better decision-making, stress control, and self-efficacy in chess players. FIDE (2022) emphasizes that high levels of concentration enable players to maintain composure and adapt effectively to challenges during tournaments, reinforcing the observed strong relationship between concentration and psychological well-being.

Level of Cognitive functioning of Chess Athletes	Level of Psychological Well-being of Chess Athletes	R-value	N	p-value	Remarks	Decision
Problem-Solving	Stress Management	0.709	152	0.000	Significant	Reject the Ho
	Self-efficacy	0.714	152	0.000	Significant	Reject the Ho
	Resilience	0.699	152	0.000	Significant	Reject the Ho

The findings demonstrate that problem-solving ability is significantly associated with the psychological well-being of chess athletes. Significant correlations were found with stress management ($r = 0.709$), self-efficacy ($r = 0.714$), and resilience ($r = 0.699$), all with p-values equal to 0.000. Consequently, the null hypothesis is rejected. This suggests that chess athletes who exhibit stronger analytical and decision-making skills during gameplay also tend to show higher levels of confidence, emotional resilience, and effective stress management.

The findings demonstrate that problem-solving ability is significantly associated with the psychological well-being of chess athletes. Strong positive correlations were found between problem-solving and stress management ($r = 0.709$), self-efficacy ($r = 0.714$), and resilience ($r = 0.699$), with all p-values equal to 0.000. Since these values are below the 0.05 significance threshold, the null hypothesis is rejected. This indicates that chess athletes who exhibit stronger analytical and decision-making skills during gameplay also tend to demonstrate higher levels of confidence, emotional resilience, and effective stress management.

Mind Over Moves: Levels and Links Between Cognitive Function and Psychological Well-Being in Chess Athletes

The implications of these findings suggest that enhancing problem-solving skills can directly contribute to improved psychological well-being in chess athletes. The ability to evaluate positions, generate candidate moves, and make strategic decisions not only supports performance on the board but also strengthens self-efficacy, stress management, and the capacity to recover from setbacks. Coaches and trainers can therefore integrate problem-solving exercises, scenario-based practice, and critical thinking drills into training programs to simultaneously develop cognitive and psychological competencies.

According to FIDE (2022) notes that players who excel in analytical decision-making exhibit stronger mental composure and resilience under pressure, reinforcing the observed strong relationship between problem-solving ability and psychological well-being in chess athletes.

7. Based on the findings, what sports training plan may be proposed to enhance athlete development programs by integrating chess as both a cognitive and mental wellness intervention?

Chess Sports Training Plan: Enhancing Cognitive Skills, Psychological Resilience, and Competitive Performance

Rationale

Chess is a cognitively demanding sport that requires high levels of memory, concentration, and problem-solving skills, as well as strong psychological resilience. The findings from the study indicate that the majority of chess athletes are adolescents aged 13–18 years, with varying levels of experience and practice hours. Most participants engage in school or local competitions, suggesting that early exposure and consistent practice are critical to skill development.

The structured chess training program integrates cognitive skill development, psychological well-being, and competitive exposure to address these needs. Memory training, concentration drills, and problem-solving exercises aim to strengthen critical cognitive skills, while stress management, self-efficacy enhancement, and resilience training support the athletes' psychological growth. Tiered competitions and high-pressure simulations provide a gradual progression toward competitive readiness, allowing athletes to apply cognitive and psychological skills in real-world scenarios.

The rationale for this program is supported by the results showing that chess athletes demonstrate moderate to strong levels of memory, concentration, and problem-solving, as well as effective stress management, self-confidence, and resilience. However, the data also reveal areas for improvement, particularly in long-term strategic planning, consistent practice hours, and exposure to higher levels of competition. Implementing a structured and holistic training framework ensures that athletes not only develop technical proficiency but also strengthen their mental and emotional capacities, ultimately enhancing their performance in tournaments and fostering lifelong engagement with chess.

In essence, the program is designed to create a balanced environment where cognitive, psychological, and competitive aspects are simultaneously developed, reflecting the holistic needs of adolescent chess athletes and supporting their progression from beginners to advanced competitors.

Component	Focus Area	Activities / Strategies	Session Integration	Expected Outcome
Cognitive Skill Development	Memory Training	Recall moves, opening lines, tactical patterns	Main Chess Activity	Enhanced memory retention
	Concentration Drills	Timed problem-solving, multi-game analysis, blindfold chess	Warm-up / Main Activity	Improved focus and attention
	Problem-Solving Exercises	Tactical puzzles, scenario-based decisions, long-term evaluation	Main Activity	Stronger critical thinking
Psychological Well-Being	Stress Management	Breathing routines, mindfulness, mental rehearsal	Warm-up / Reflection	Better stress control
	Self-Efficacy Enhancement	Goal-setting, reflective analysis,	Reflection	Increased confidence

		confidence-building		
	Resilience Training	Post-loss recovery, adaptive strategies, peer support	Reflection	Improved mental toughness
Competitive Exposure	Tiered Competitions	School → Local → City/Division → Regional tournaments	Program Progression	Gradual competitive readiness
	High-Pressure Simulations	Timed matches, tournament conditions, strategic challenges	Main Activity	Improved performance under pressure
Program Structure	Duration	8–12 weeks	Overall Program	Sustained development period
	Frequency	2–3 sessions per week	Weekly Schedule	Consistent skill practice
	Session Flow	Warm-up → Chess Activity → Reflection	Every Session	Balanced learning approach
Overall Outcomes	Cognitive	Memory, concentration, problem-solving improvements	Program Result	Enhanced thinking skills
	Psychological	Stress management, confidence, self-efficacy	Program Result	Stronger mental state
	Performance	Resilience, competitive readiness	Program Result	Better performance in competitions

This chapter presents a synthesis of the results derived from the study, highlighting the key findings, drawing meaningful conclusions, and offering practical recommendations based on the analysis.

1. The majority of chess athletes are aged 16–18 years and are predominantly male. Most respondents have limited chess experience, with less than one to three years of playing. Demographic factors such as age, sex, years of experience, and weekly practice hours do not significantly affect cognitive or psychological outcomes.
2. Athletes primarily participate in school or intramural competitions, while fewer compete at higher levels such as regional, national, or international tournaments. Weekly chess practice is generally limited, with most athletes practicing less than three hours per week.
3. In terms of cognitive functioning, chess athletes demonstrated good levels of memory, concentration, and problem-solving.
4. Significant positive correlations exist between cognitive skills (memory, concentration, problem-solving) and psychological well-being indicators, including stress management, self-efficacy, and resilience.
5. Participation in higher-level competitions significantly enhances problem-solving abilities, while memory and concentration remain unaffected by competition level.

The study concludes that chess athletes exhibit consistently strong cognitive skills, including memory, concentration, and problem-solving, regardless of age, sex, or years of playing experience.

This suggests that cognitive development through chess is broadly attainable and not limited to a particular demographic group. These cognitive abilities significantly support psychological well-being, as athletes with stronger memory, focus, and problem-solving skills demonstrate higher levels of emotional control, self-confidence, and resilience, allowing them to maintain composure during competitions and recover effectively from setbacks.

Furthermore, exposure to higher-level competitions was found to enhance problem-solving abilities, highlighting the value of challenging and complex gameplay in developing analytical thinking and strategic decision-making under pressure. The

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findings also indicate that the quantity of weekly practice does not significantly impact cognitive or psychological outcomes, emphasizing that quality and deliberate practice, rather than mere hours spent, are crucial for meaningful development.

Overall, the results suggest that a holistic approach integrating cognitive skill training, mental wellness strategies, and structured competitive exposure is essential for developing well-rounded chess athletes who can excel both mentally and competitively.

Based on the findings of this study, several recommendations are proposed:

1. Chess Athletes may have encouraged to continue engaging in regular chess practice while incorporating mental skill development techniques to enhance memory, concentration, problem-solving, and resilience. Recognizing the psychological benefits of chess may further motivate athletes to pursue personal growth alongside competitive success.
2. Coaches and Trainers may design training programs that integrate cognitive and psychological development with technical skill-building. Chess can serve as both a performance-enhancing tool and a support system for mental resilience, stress management, and self-efficacy.
3. Educators and School Administrators may have recommended to strengthen the integration of chess into academic and co-curricular programs. Doing so can support higher-order thinking, cognitive development, and mental health among students, aligning with the Department of Education's objectives.
4. Sports Psychologists and Mental Health Professionals may consider incorporating chess-based interventions to manage stress, anxiety, and self-esteem, particularly in student-athletes and other youth populations.
5. Policy Makers and Program Planners may promote holistic development programs that combine competitive excellence with psychological wellness. Integrating chess into youth and athlete development initiatives can cultivate more resilient and well-rounded individuals.
6. Future Researchers may have encouraged to explore the effects of chess on other populations, including non-athletes, younger learners, and individuals with special needs, to further expand understanding of chess-based cognitive and psychological interventions.

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