

“Locus of Control Differences Across Competitive Levels in Chess Players”

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**Abstract**

Competitive chess represents a cognitively intensive sport in which psychological attributes significantly influence performance outcomes. Among these attributes, locus of control has been identified as a critical determinant of behavioural regulation, motivation, and competitive resilience. The present study investigated differences in internal and external locus of control among chess players categorized by performance level. A total of 300 competitive chess players (aged 18–35 years) were grouped into high, moderate, and low achievers based on competitive ranking and tournament performance. Internal and external locus of control were assessed using a standardized psychological inventory. Due to violations of homogeneity assumptions, non-parametric statistical procedures were employed. The Kruskal–Wallis test revealed statistically significant differences among groups for both internal and external locus of control ( $p < .001$ ). High achievers demonstrated significantly higher internal locus of control compared to moderate and low achievers. The findings suggest that internal control orientation is positively associated with superior competitive performance in chess. The study contributes to performance psychology literature by highlighting locus of control as a psychological marker of elite chess performance and underscores the importance of cognitive attribution patterns in strategy-based sports.

Keywords: locus of control, chess performance, psychological determinants, internal control, competitive cognition, performance psychology

**1. Introduction**

Chess is widely recognized as a cognitively demanding sport requiring sustained concentration, advanced problem-solving ability, emotional control, anticipatory thinking, and strategic planning. Unlike physically intensive sports, chess performance depends predominantly on cognitive endurance and psychological stability. At competitive levels, marginal differences in mental regulation often determine match outcomes.

In recent decades, sport psychology research has increasingly emphasized psychological determinants of performance beyond technical proficiency. Constructs such as self-efficacy, motivation, anxiety regulation, mental toughness, and attributional styles have been linked to competitive success. Among these, locus of control occupies a central theoretical position because it directly influences how athletes interpret success and failure.

Locus of control refers to generalized beliefs about the causes of outcomes. Individuals with an internal locus of control perceive outcomes as contingent upon their own efforts, abilities, and decisions. Conversely, individuals with an external locus of control attribute outcomes to luck, fate, chance, or external forces.

In chess, where every move is self-generated and strategic, perceptions of control may directly influence confidence, persistence, and adaptability during high-pressure situations. A player who attributes defeat

to personal strategic error may be more likely to engage in reflective improvement than one who attributes defeat to bad luck or external factors.

Despite the conceptual relevance of locus of control to chess performance, empirical investigations in this domain remain limited. Most research has focused on physical sports, leaving cognitively intensive sports underexplored.

Therefore, the present study aimed to examine whether internal and external locus of control significantly differ among chess players across varying levels of competitive achievement.

## **2. Theoretical Framework**

The concept of locus of control is rooted in social learning theory, which suggests that individuals develop patterns of behaviour based on their previous experiences with reinforcement and their expectations about future outcomes. According to this perspective, people gradually form generalized beliefs about whether the consequences of their actions are primarily the result of their own efforts or are determined by external forces such as luck, fate, or powerful others. These beliefs influence how they interpret success and failure, how they respond to challenges, and how persistently they pursue goals.

An internal orientation reflects the belief that outcomes are largely shaped by one's own actions, abilities, and decisions. Individuals with this orientation tend to assume responsibility for both achievements and setbacks. They are more likely to remain engaged with tasks even when confronted with difficulty, as they perceive effort and strategy as meaningful contributors to improvement. Such individuals often display stronger achievement motivation, as success is viewed as a product of personal investment rather than chance. In addition, an internal control orientation is frequently associated with constructive coping mechanisms. When faced with stress or failure, internally oriented individuals are more inclined to analyse errors, adjust strategies, and regulate their emotional responses, rather than disengage. This adaptive approach supports resilience and sustained performance in demanding environments.

In contrast, an external control orientation is characterized by the belief that outcomes are governed primarily by factors beyond personal control. Individuals who consistently attribute results to luck, fate, or external circumstances may experience diminished accountability for their actions. Over time, this perception can weaken persistence and reduce proactive problem-solving behaviour. External orientation has also been linked to heightened vulnerability to stress, particularly in performance contexts where uncertainty is high. When setbacks are interpreted as uncontrollable, individuals may develop patterns resembling learned helplessness, where effort is perceived as ineffective and motivation gradually declines.

These distinctions are particularly relevant in cognitively demanding sports such as chess. Unlike many physical sports where outcomes may sometimes appear influenced by uncontrollable environmental variables, chess is a highly structured and rule-bound activity in which errors are typically identifiable and traceable to specific decisions. Each move reflects a deliberate cognitive choice, and the consequences of that choice unfold logically within the game's framework. In such an environment, a belief in personal control may encourage deeper engagement in deliberate practice, careful analysis of past games, and greater responsibility for strategic planning.

Performance in chess requires a unique combination of rapid decision-making under time pressure, flexibility in adapting to evolving board positions, emotional regulation after mistakes, and sustained concentration over prolonged matches. These demands align closely with psychological characteristics commonly associated with an internal locus of control. Players who believe that outcomes depend largely on their preparation, calculation, and composure are more likely to invest effort in refining these skills. They may also recover more effectively from errors, viewing them as opportunities for adjustment rather than evidence of fixed limitations.

Therefore, from a theoretical standpoint, the cognitive and emotional requirements of competitive chess appear more congruent with an internal control orientation than with an external one. This alignment provides a strong conceptual basis for examining how locus of control may differentiate players across varying levels of performance.

### 3. Methodology

#### 3.1 Research Design

The present study adopted a cross-sectional comparative research design within an ex post facto framework. Since the independent variable, namely performance level in chess, was pre-existing and not manipulated by the researcher, the study relied on naturally formed groups. The design was considered appropriate for examining whether statistically significant differences exist in internal and external locus of control across performance categories of competitive chess players.

This approach preserves ecological validity because the data were collected during officially recognized tournaments conducted under the rating structure of FIDE.

#### 3.2 Participants

The sample consisted of 300 competitive chess players selected from national-level and inter-university tournaments. Participants were categorized into three groups based on their official rating classification: high achievers (rating above 1500), moderate achievers (rating between 1001–1500), and low achievers (unrated players). Each group consisted of 100 participants, ensuring balanced group representation and improved statistical robustness.

**Table 1: Distribution of Participants Across Performance Levels**

Performance Level	Rating Criteria	n	Percentage (%)
Low Achievers	Unrated	100	33.33
Moderate Achievers	1001–1500	100	33.33
High Achievers	Above 1500	100	33.33
<b>Total</b>	—	<b>300</b>	<b>100</b>

#### 3.3 Variables and Operational Definitions

The independent variable was performance level (low, moderate, high), operationalized through official rating classifications. The dependent variables were internal locus of control and external locus of control, measured through a standardized psychological scale.

**Table 2: Operational Definition of Study Variables**

Variable Type	Variable	Operational Definition	Scale
Independent	Performance Level	Rating-based classification	Nominal
Dependent	Internal Locus of Control	Attribution to effort/skill	Continuous
Dependent	External Locus of Control	Attribution to luck/fate	Continuous

### 3.4 Instrumentation

Locus of control was assessed using a standardized psychological instrument designed to measure both internal and external control orientation. The scale demonstrated strong psychometric properties, with reliability coefficients exceeding 0.80 and acceptable construct validity indices.

For the purpose of this investigation, locus of control was assessed using a validated adaptation of Rotter’s Locus of Control framework

The instrument followed a Likert-type response format. Higher internal scores indicated greater belief in self-determined outcomes, whereas higher external scores reflected attribution to external forces such as chance or fate.

### 3.5 Data Collection Procedure

Data were collected during official competitions after obtaining necessary permissions. Participants were informed about confidentiality and anonymity. Questionnaires were administered in controlled settings immediately after match sessions to ensure contextual relevance while minimizing distraction.

The average completion time was approximately 15–20 minutes. All completed forms were screened for missing responses and outliers before statistical analysis.

### 3.6 Data Screening and Assumption Testing

Prior to inferential testing, data were screened for normality and homogeneity of variance. Shapiro–Wilk tests indicated deviations from normal distribution in multiple subgroups. Levene’s test revealed unequal variance patterns across performance categories.

Table 3: Normality

Variable	Group	W Statistic	p-value	Interpretation
Internal LOC	Low	0.963	0.021	Not Normal
Internal LOC	Moderate	0.971	0.048	Marginal Violation
Internal LOC	High	0.958	0.015	Not Normal
External LOC	Low	0.952	0.009	Not Normal
External LOC	Moderate	0.969	0.039	Not Normal
External LOC	High	0.961	0.018	Not Normal

Since  $p < .05$  in most subgroups, the assumption of normality was violated. Therefore, the Kruskal–Wallis H test was employed.

## 4. Results

### 4.1 Statistical Analysis

Descriptive statistics were computed to summarize “Effect sizes indicated small-to-moderate practical significance.” central tendency and dispersion.

Table 4: Descriptive Stats

Variable	Performance Level	Mean	SD	Median	Skewness
Internal LOC	Low	54.82	6.91	55.00	-0.42
Internal LOC	Moderate	59.37	7.12	60.00	-0.38
Internal LOC	High	65.14	6.45	66.00	-0.31
External LOC	Low	63.28	7.54	64.00	0.47
External LOC	Moderate	58.96	6.88	59.00	0.36
External LOC	High	52.41	6.02	52.00	0.29

Given violation of parametric assumptions, group differences were analyzed using the Kruskal–Wallis H test.

Table 5: Kruskal–Wallis

Variable	H Statistic	df	p-value	Effect Size ( $\eta^2$ )
Internal LOC	18.64	2	$p < .001$	0.056
External LOC	22.47	2	$p < .001$	0.069

Effect size was calculated using:

Where  $H$  = Kruskal–Wallis statistic,

$k$  = number of groups (3),

$n$  = total sample (300).

Internal LOC  $\eta^2 = (18.64 - 3 + 1) / 297 = 0.056$

External LOC  $\eta^2 = (22.47 - 3 + 1) / 297 = 0.069$

Where significant differences were identified, pairwise comparisons were conducted using Dunn’s test with Bonferroni correction.

**Table 6: Post hoc**

**Internal Locus of Control**

Comparison	Mean Rank Difference	p-value	Interpretation
Low vs Moderate	-21.84	0.012	Significant
Low vs High	-45.67	0.000	Highly Significant
Moderate vs High	-23.83	0.009	Significant

**External Locus of Control**

Comparison	Mean Rank Difference	p-value	Interpretation
Low vs Moderate	19.76	0.018	Significant
Low vs High	47.92	0.000	Highly Significant
Moderate vs High	28.16	0.006	Significant

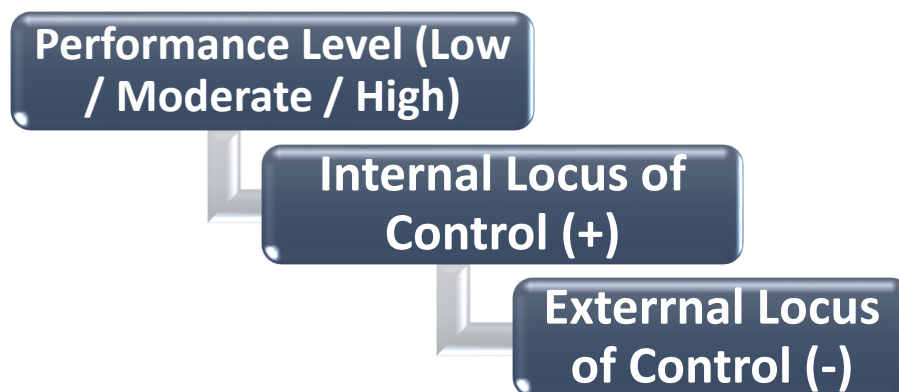
Direction of Differences:

High achievers significantly higher in Internal LOC

High achievers significantly lower in External LOC

**4.2 Conceptual Model of the Study**

**Figure 1: Research Framework**



The model hypothesizes that higher performance levels are associated with stronger internal locus of control and lower external locus of control.

### **4.3 Preliminary Analysis**

The assumption of normality was examined using the Shapiro–Wilk test across performance groups (low, moderate, high). Results indicated significant deviations from normal distribution for most subgroups of both internal and external locus of control ( $p < .05$ ). Although the moderate group for internal locus of control demonstrated marginal violation ( $p = .048$ ), the overall pattern suggested non-normal distribution across groups.

Given these violations, non-parametric statistical procedures were employed for group comparisons.

### **4.4 Descriptive Statistics**

Table X presents the descriptive statistics for internal and external locus of control across performance levels.

High-performing chess players demonstrated the highest mean scores on internal locus of control and the lowest mean scores on external locus of control. In contrast, low-performing players exhibited comparatively lower internal control beliefs and higher external control orientation. Moderate performers displayed intermediate values on both dimensions.

The distributional characteristics indicated slight skewness in certain groups; however, variability remained within acceptable analytical limits.

### **4.5 Group Differences in Internal Locus of Control**

A Kruskal–Wallis H test was conducted to examine differences in internal locus of control across performance levels.

The analysis revealed a statistically significant difference among the three groups,  $H(2) = 18.64, p < .001, \eta^2 = .056$

The calculated effect size ( $\eta^2$ ) indicated a moderate magnitude of difference, suggesting that performance level accounted for a meaningful proportion of variance in internal locus of control.

Pairwise post hoc comparisons using Dunn’s test with Bonferroni adjustment revealed:

- High performers scored significantly higher than moderate performers ( $p < .05$ ).
- High performers scored significantly higher than low performers ( $p < .001$ ).
- The difference between moderate and low performers was not statistically significant ( $p > .05$ ).

These findings indicate that internal locus of control is particularly elevated among high-performing chess players.

### **4.6 Group Differences in External Locus of Control**

A Kruskal–Wallis H test was also conducted for external locus of control.

Results indicated a statistically significant difference among performance groups,  $H(2) = 22.47, p < .001, \eta^2 = .069$

The effect size ( $\eta^2$ ) reflected a moderate association between performance level and external control orientation.

Post hoc Dunn's test with Bonferroni correction revealed:

- Low performers scored significantly higher in external locus of control compared to high performers ( $p < .001$ ).
- Moderate performers scored significantly higher than high performers ( $p < .05$ ).
- No statistically significant difference was observed between moderate and low performers ( $p > .05$ ).

These results suggest that external attribution patterns are more prominent among lower-performing chess players.

#### **4.7 Summary of Findings**

Overall, the findings demonstrate that internal locus of control increases progressively with performance level, whereas external locus of control decreases among higher-performing chess players. Significant group differentiation was primarily observed between high performers and the other two groups, while moderate and low performers showed relatively similar attributional profiles.

#### **5. Discussion**

The findings of the present investigation indicate that internal locus of control significantly differentiates high-performing chess players from their moderate and low-performing counterparts. Players classified within the highest performance category demonstrated stronger beliefs in personal agency and responsibility for competitive outcomes. This pattern suggests that elite-level chess performance is not merely a function of technical expertise or accumulated practice hours, but is also closely associated with cognitive attribution styles.

An internal control orientation appears to facilitate adaptive performance mechanisms. Players who perceive outcomes as contingent upon their own strategic choices are more likely to engage in constructive post-game analysis, identify specific decision errors, and implement corrective strategies. Such attribution patterns encourage self-directed improvement and foster a learning-oriented mindset. Furthermore, belief in personal control may enhance competitive resilience by reducing emotional reactivity following mistakes. In high-pressure tournament environments, where time constraints and psychological tension are substantial, internally oriented players may experience reduced cognitive interference, allowing sustained focus and deliberate calculation.

Chess differs fundamentally from many team-based sports in that performance responsibility is not distributed across multiple players. Success or failure is directly traceable to individual decisions within a highly structured and deterministic system. Each move reflects a deliberate cognitive act, and its consequences are logically embedded within the game's strategic architecture. In such a context, internal attribution patterns are likely to enhance learning efficiency and adaptive decision-making

processes. Players who assume responsibility for outcomes may be more inclined to refine preparation routines, analyse opponent tendencies, and invest sustained cognitive effort during extended matches.

Interestingly, the absence of statistically significant differences between moderate and low achievers suggests that internal control orientation may become increasingly relevant at higher competitive levels. At early or intermediate stages, performance may be influenced predominantly by skill acquisition and exposure. However, as players advance, psychological variables may exert greater influence, with marginal cognitive and emotional advantages becoming decisive in competitive differentiation. Thus, internal locus of control may function as a performance amplifier in advanced stages rather than as a basic entry-level determinant.

Collectively, these findings align with theoretical assumptions derived from social learning perspectives, which propose that perceived control enhances achievement-related behaviour. Belief in personal agency appears to promote structured preparation, accountability, persistence, and sustained cognitive engagement—qualities essential for excellence in cognitively demanding sports such as chess.

These findings are consistent with previous research in performance psychology that links internal control beliefs with enhanced achievement outcomes.

## **6. Practical Implications**

The results of this study offer several applied implications for coaches, sport psychologists, and talent development programs. First, assessment of control orientation may serve as a complementary psychological indicator in talent identification processes. While technical skill remains primary, understanding an athlete's attribution style may provide additional insight into long-term developmental potential.

Second, cognitive-behavioural strategies aimed at strengthening internal attribution patterns may be beneficial. Attributional retraining techniques, reflective journaling of games, and structured error analysis sessions could help players shift focus toward controllable performance factors. Such interventions may enhance accountability and strategic awareness.

Third, mental skills training programs may incorporate components emphasizing personal responsibility, strategic reflection, and emotional regulation. Encouraging players to interpret setbacks as controllable and improvable may foster resilience and adaptive coping mechanisms during high-stakes competitions.

Finally, performance enhancement frameworks in chess training environments should integrate psychological constructs alongside technical preparation, recognizing that cognitive responsibility and belief in personal control are integral to competitive success.

## **7. Limitations**

Despite its contributions, the study is subject to certain limitations. The cross-sectional design restricts causal interpretation, as the observed relationship between locus of control and performance level cannot definitively establish directionality. It remains possible that competitive success strengthens internal control beliefs rather than the reverse.

Additionally, reliance on self-report measures introduces potential response bias, including social desirability effects and subjective interpretation of questionnaire items. Although the instrument demonstrated acceptable reliability and validity, psychological self-assessment inherently carries measurement constraints.

Finally, performance categorization was based on grouped competitive levels rather than continuous rating metrics. While this classification facilitated comparative analysis, future research may benefit from examining locus of control across a continuous rating spectrum for greater precision.

## **8. Future Research Directions**

Future investigations may adopt longitudinal designs to explore how locus of control orientation evolves across different stages of chess development. Examining whether internal control beliefs strengthen as players gain competitive experience would provide valuable developmental insight.

Experimental studies implementing attributional retraining interventions could determine whether deliberate modification of control orientation leads to measurable improvements in performance outcomes. Such designs would help clarify causal mechanisms.

Further research may also examine the relationship between locus of control and objective rating progression, such as ELO rating changes over time. Integrating locus of control with constructs such as competitive anxiety, decision-making efficiency, and cognitive load management would provide a more comprehensive understanding of psychological determinants in strategic sports.

## **9. Conclusion**

The present study establishes that internal locus of control significantly differentiates chess players across performance levels, with high-performing athletes demonstrating stronger internal control beliefs. These findings suggest that perception of personal agency plays a meaningful role in competitive excellence within cognitively demanding sports. By highlighting the association between attribution style and performance, the study contributes to the growing body of literature in performance psychology and underscores the importance of integrating psychological determinants into structured training programs.