

Competitive Anxiety and Archery Performance: A Systematic Review

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Abstract

Background: Archery is a precision sport requiring optimal integration of physical, technical, and psychological abilities. Competitive anxiety may impair attentional control, physiological regulation, and shooting accuracy, ultimately reducing athletic performance. Although numerous observational studies have investigated this relationship, evidence specific to archery athletes has not been comprehensively synthesized.

Objective: To systematically evaluate the association between competitive anxiety and performance among archery athletes.

Methods: This systematic review was conducted according to the PRISMA 2020 Statement. PubMed and Google Scholar were searched for studies published between January 2016 and March 2026 using a PICO framework. Eligible studies included observational, correlational, cross sectional, or comparative designs involving archery athletes aged 11 to 24 years. Owing to methodological heterogeneity, findings were synthesized narratively.

Results: Six studies met the eligibility criteria. Across studies, competitive anxiety demonstrated a consistently negative association with archery performance, with reported correlation coefficients ranging from weak to moderate negative relationships. Higher cognitive anxiety was associated with impaired concentration and shooting accuracy, whereas somatic anxiety was linked to increased physiological activation, including elevated salivary alpha amylase and cardiovascular responses. Elite athletes generally exhibited lower anxiety levels and superior shooting performance than intermediate athletes.

Conclusion: Competitive anxiety is consistently associated with poorer archery performance through interacting cognitive and physiological mechanisms. Future longitudinal and intervention studies are required to strengthen causal inference and support evidence based psychological interventions for archery athletes.

Keywords

Anxiety; Archery; Athletic Performance; Precision Sports; Sports Psychology

Introduction

Archery is a precision sport that requires the integration of physical capacity, technical proficiency, and psychological readiness to achieve optimal performance. Success in archery depends not only on muscular strength, postural stability, visual motor coordination, and refined shooting techniques but also on the athlete's ability to maintain concentration, emotional regulation, and movement consistency throughout the shooting sequence. Every phase of shooting, including drawing, aiming, holding, and arrow release, demands precise neuromuscular control and sustained attentional focus. Consequently, even subtle disturbances in psychological functioning may reduce shooting accuracy and negatively influence competitive outcomes. For this reason, psychological preparation has become an essential component of athlete development alongside physical conditioning and technical training.¹⁻⁴

Among the psychological factors influencing athletic performance, competitive anxiety has received considerable attention because of its direct effect on cognitive processing and motor execution. Competitive anxiety refers to anxiety experienced in relation to competitive situations and may involve cognitive and physiological responses that can affect athletic performance. This multidimensional construct comprises cognitive anxiety, characterized by excessive worry, fear of failure, and negative performance expectations, and somatic anxiety, reflected by physiological manifestations such as increased heart rate, muscle tension, sweating, and autonomic nervous system activation. Although moderate physiological arousal may facilitate athletic performance, excessive anxiety can impair attentional control, decision making, movement coordination, and motor precision, thereby reducing competitive performance.⁵⁻⁹

The influence of competitive anxiety is particularly important in archery because successful performance depends on exceptional precision, postural stability, and sustained concentration. According to Attentional Control Theory, elevated anxiety reallocates attentional resources from task relevant information toward threat related stimuli and intrusive thoughts, reducing processing efficiency and impairing motor performance.^{8,9} In precision sports such as archery, this attentional disruption may compromise visual fixation, movement timing, and fine motor coordination, ultimately decreasing shooting accuracy.^{8,9} Furthermore, excessive competitive anxiety has been associated with psychological phenomena such as choking under pressure and target panic, both of which substantially impair shooting consistency during competition.¹⁰

In addition to cognitive mechanisms, competitive anxiety produces physiological responses through activation of the hypothalamic pituitary adrenal axis and the sympathoadrenal medullary system. These responses increase cortisol secretion, salivary alpha amylase activity, heart rate, and muscle tension, all of which may interfere with postural control and fine motor execution during shooting. Previous investigations have shown that elite archers generally demonstrate lower anxiety levels, more efficient physiological regulation, and superior shooting performance than less experienced athletes. Nevertheless, the magnitude of these associations varies among studies because of differences in participant characteristics, competitive level, anxiety assessment instruments, physiological measurements, and methodological approaches.^{3,4,11-13}

Several observational studies have investigated the relationship between competitive anxiety and archery performance using correlational and cross-sectional designs. However, previous review articles have predominantly examined anxiety across multiple sports or evaluated psychological interventions for athletes without specifically synthesizing evidence related to archery. Existing systematic reviews mainly focus on athlete mental health, stress management, or intervention effectiveness rather than directly examining the association between competitive anxiety and shooting performance among archery athletes. Consequently, evidence regarding the cognitive and physiological mechanisms through which competitive anxiety influences archery performance remains fragmented and has not been comprehensively synthesized.^{5,14-16}

The present review focuses on competitive archery athletes aged 11 to 24 years, as this age range was defined a priori as an eligibility criterion to capture youth, junior, university, and young adult athletes participating in structured training and official competitions. During this stage, athletes continue to experience psychological maturation while facing progressively greater competitive demands, making them particularly vulnerable to the influence of competitive anxiety on performance. Restricting the review to this age range was intended to improve population homogeneity and enhance the comparability of findings across the included studies.

Therefore, this systematic review was conducted to synthesize current evidence regarding the association between competitive anxiety and performance among archery athletes. Specifically, this review aims to evaluate the influence of cognitive and somatic anxiety on athletic performance, summarize the psychological and physiological mechanisms underlying this relationship, identify consistent patterns across the available literature, and provide evidence that may inform future psychological assessment and intervention strategies for optimizing performance in competitive archery athletes.

Methods

This study was conducted as a systematic review following the Preferred Reporting Items for Systematic Reviews and Meta Analyses (PRISMA) 2020 Statement to ensure transparent identification, selection, critical appraisal, and synthesis of the available evidence.¹⁷ The review aimed to synthesize observational evidence regarding the association between competitive anxiety and performance among archery athletes. Because substantial methodological heterogeneity was anticipated across the eligible studies, including differences in participant characteristics, anxiety assessment instruments, performance outcomes, and statistical reporting, a narrative synthesis was considered more appropriate than a quantitative meta-analysis.

The review question was formulated using the Population, Exposure, Comparison, and Outcome (PECO) framework, which is recommended for systematic reviews of observational studies.⁷ The population comprised competitive archery athletes aged 11 to 24 years, including youth, junior, university, regional, national, and elite competitors. This age range was selected because it represents a developmental period during which athletes commonly participate in structured competitive training while continuing psychological maturation, thereby improving population homogeneity and facilitating comparison across studies. The exposure of interest was competitive anxiety, including cognitive anxiety, somatic anxiety, trait anxiety, and sport related anxiety assessed using standardized psychological instruments or validated physiological biomarkers. No comparison group was specified because the review synthesized observational evidence. The primary outcome was archery performance, measured using shooting scores, shooting accuracy, competition performance, or other validated indicators of athletic performance.

A comprehensive literature search was conducted in PubMed and Google Scholar to identify studies published between January 2016 and March 2026. The final search was performed on 13 March 2026. These databases were selected because they were considered relevant to the scope of this review. Additional databases, including Scopus, Web of Science, Embase, and SPORTDiscus, were not searched because of institutional access limitations and the predefined scope of the review. Consequently, potentially relevant studies indexed exclusively in these databases may not have been identified, and this limitation was considered during interpretation of the findings.

The search strategy combined Medical Subject Headings (MeSH), free text terms, Boolean operators, and truncation techniques to maximize retrieval sensitivity.¹² The PubMed search strategy was as follows: *("anxiety"[MeSH] OR "competitive anxiety") AND ("athletic performance"[MeSH] OR performance OR "game record") AND (archery OR "archery athlete")*. For Google Scholar, English and Indonesian keywords were combined using the following strategy: *("anxiety" OR kecemasan) AND ("performance" OR performa) AND ("archery athlete" OR atlet panahan)*. In addition, the reference lists of all eligible articles were manually screened to identify potentially relevant studies that were not retrieved through electronic database searching. However, grey literature, conference proceedings, dissertations, theses, preprints, and unpublished studies were excluded because the review focused exclusively on peer reviewed publications.

Studies were considered eligible if they were published between January 2016 and March 2026, written in English or Indonesian, involved competitive archery athletes aged 11 to 24 years, employed observational, correlational, analytical cross sectional, or comparative study designs, evaluated competitive anxiety using standardized psychological instruments or validated physiological biomarkers, and reported quantitative measures of archery performance. Studies investigating sports other than archery, experimental or intervention studies, review articles, conference abstracts, editorials, dissertations, theses, and studies that did not evaluate the association between competitive anxiety and performance or failed to report participant age were excluded. Study selection followed the four stages recommended by PRISMA 2020, comprising identification, screening, eligibility assessment, and final inclusion.¹⁷ After duplicate records and inaccessible publications had been removed, titles and abstracts were independently screened by two reviewers according to the predefined eligibility criteria. Potentially eligible studies subsequently underwent full text assessment by the same reviewers. Any disagreement regarding study eligibility was resolved through discussion until consensus was reached. When consensus could not initially be achieved, a third reviewer acted as an independent adjudicator. Although inter-reviewer agreement statistics, such as Cohen's kappa coefficient, were not calculated, duplicate screening was conducted by two reviewers to support consistency in study selection and reduce the potential for selection errors.¹⁸

Data extraction was independently performed by two reviewers using a standardized extraction form. Extracted information included author, publication year, country, participant characteristics, sample size, athlete level, anxiety assessment instrument, type of anxiety evaluated, performance outcomes, principal findings, and reported effect estimates when available. Following independent extraction, the extracted data were compared between reviewers, and any discrepancies were resolved through discussion and verification against the original publication before the final dataset was established.

The methodological quality of the included studies was independently assessed by two reviewers using the Joanna Briggs Institute (JBI) Critical Appraisal Checklist for Analytical Cross Sectional Studies.¹⁹ The checklist comprises eight methodological domains evaluating participant selection, exposure measurement, outcome measurement, identification and management of confounding factors, and statistical analysis. Each domain was rated as "Yes," "No," "Unclear," or "Not Applicable" according to the

JB1 guidance. Studies fulfilling at least 70% of the applicable criteria were classified as having moderate to high methodological quality and were retained for qualitative synthesis. The overall methodological quality assessment is presented in the Results section, whereas the complete domain by domain appraisal for each included study should be provided as supplementary material to enhance reporting transparency.

Because only six studies fulfilled the eligibility criteria and substantial heterogeneity was observed in participant characteristics, anxiety assessment instruments, physiological biomarkers, performance outcomes, and statistical reporting, quantitative meta-analysis was not considered appropriate. Therefore, the findings were synthesized narratively, following guidance for synthesis without meta-analysis.²⁰ Therefore, findings were synthesized narratively by grouping evidence according to the principal dimensions of competitive anxiety, psychological and physiological mechanisms, and performance outcomes. Reported effect estimates, including correlation coefficients, were summarized descriptively whenever available. The methodological quality of the included studies was considered during evidence interpretation, with greater emphasis placed on findings derived from studies with stronger methodological quality. Formal subgroup analysis, sensitivity analysis, meta regression, and publication bias assessment were not performed because the limited number of included studies precluded reliable quantitative exploration of between study heterogeneity. This limitation is further discussed in the Discussion section.²¹

Finally, the review protocol was not prospectively registered in PROSPERO or the Open Science Framework before literature screening commenced. Accordingly, the absence of protocol registration is acknowledged as a methodological limitation and should be considered when interpreting the findings.

Results

The literature search identified 7,029 records, comprising 6,904 records retrieved from Google Scholar and 125 records identified through PubMed. Following the removal of duplicate and inaccessible records, the remaining studies underwent title and abstract screening according to the predefined eligibility criteria. Ten articles were subsequently assessed through full text review. Three studies were excluded because one employed a non-observational design, one did not evaluate the association between competitive anxiety and archery performance, and one did not report participant age. Consequently, six studies fulfilled all eligibility criteria and were included in the qualitative synthesis.

The study selection process followed the PRISMA 2020 framework to ensure transparent reporting of article identification, screening, eligibility assessment, and final inclusion. Figure 1 illustrates the complete study selection process, including the number of records identified, screened, excluded, and included at each stage.

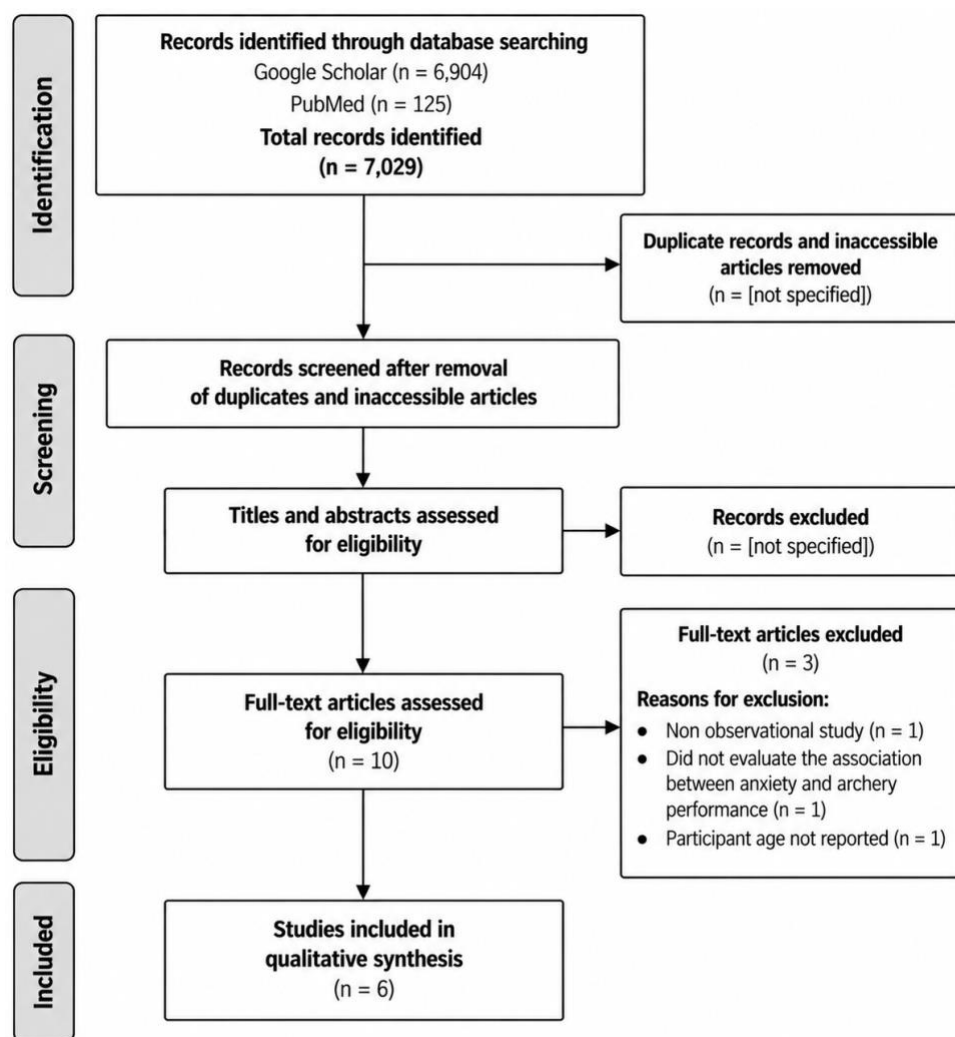


Figure 1. PRISMA Flow Diagram of the Study Selection Process

As illustrated in Figure 1, most records were excluded during the title and abstract screening stage because they did not meet the predefined eligibility criteria. Full text assessment further excluded studies with inappropriate study designs, outcomes unrelated to archery performance, or insufficient participant information, resulting in six studies eligible for qualitative synthesis.

To facilitate interpretation of the synthesized evidence, the characteristics of the included studies are summarized in Table 1. The included studies originated from Malaysia, Türkiye, South Korea, and Indonesia, representing athletes with different competitive levels, including youth, university, intermediate, national, and elite competitors. Sample sizes ranged from 19 to 44 participants. All studies employed observational designs, primarily cross sectional and correlational approaches, to investigate the relationship between competitive anxiety and archery performance using validated psychological instruments and, in some studies, physiological biomarkers.

Table 1. Characteristics of the Included Studies

Study	Participants	Anxiety Assessment	Main Findings
Tokmakci et al., 2023	22 licensed youth archers	ASI-3, TSST-C	Trait anxiety was negatively associated with shooting performance.
Shaari et al., 2023	44 Malaysian archers	SAS-2	Moderate negative correlation between competitive anxiety and performance.
Lim, 2018	24 female university archers	Likert scale, salivary α -amylase, cortisol	Cognitive anxiety negatively correlated with performance; salivary α -amylase increased with anxiety.
Salleh et al., 2023	20 compound archers	CSAI-2R	Elite athletes demonstrated lower anxiety and higher shooting scores than intermediate athletes.
Faqiha et al., 2023	30 female archers	SAS	Significant negative association between sport anxiety and performance.
Lim, 2016	19 female archers	Likert scale, salivary α -amylase	Higher anxiety was associated with lower competition scores.

Abbreviations: ASI-3, Anxiety Sensitivity Index-3; TSST-C, Trier Social Stress Test for Children; SAS-2, Sport Anxiety Scale-2; CSAI-2R, Competitive State Anxiety Inventory-2 Revised.

Overall, the included studies demonstrated substantial methodological diversity regarding participant characteristics, competitive level, anxiety assessment instruments, physiological measurements, and performance outcomes. Nevertheless, all studies consistently investigated the association between competitive anxiety and archery performance using observational designs, thereby supporting qualitative evidence synthesis.

The methodological quality of the included studies was evaluated using the Joanna Briggs Institute (JBI) Critical Appraisal Checklist for Analytical Cross Sectional Studies. Overall quality scores ranged from 6/8 to 7/8, indicating that all included studies met the predefined threshold for qualitative synthesis. The overall methodological quality assessment is summarized in Table 2, whereas the detailed domain by domain appraisal should be provided as supplementary material.

Table 2. Methodological Quality Assessment of the Included Studies Using the JBI Critical Appraisal Checklist

Study	JBI Score	Quality Classification
Tokmakci et al., 2023	7/8	Moderate
Shaari et al., 2023	7/8	Moderate
Lim, 2018	7/8	Moderate
Salleh et al., 2023	7/8	Moderate
Faqiha et al., 2023	6/8	Moderate
Lim, 2016	6/8	Moderate

As presented in Table 2, all included studies demonstrated moderate methodological quality. Most studies clearly defined participant selection criteria, used validated anxiety assessment instruments, and applied appropriate statistical analyses. However, several studies provided limited information regarding potential confounding variables and strategies used to minimize residual bias. These methodological considerations were taken into account during interpretation of the synthesized findings.

Because considerable heterogeneity was observed across participant characteristics, anxiety assessment methods, physiological biomarkers, and outcome measures, quantitative meta-analysis was not feasible. Therefore, the evidence was synthesized narratively to identify consistent patterns regarding the relationship between competitive anxiety and archery performance.

Across the six included studies, competitive anxiety was consistently associated with poorer archery performance, although the strength of the negative association varied across studies, ranging from weak to moderate. This pattern was supported by significant negative associations reported by Shaari et al. (2023) ($r = -0.45$, $p = 0.002$) and Faqiha et al. (2023) ($r = -0.372$, $p = 0.04$), as well as by findings from Lim et al. (2018) and Lim (2016), which reported negative relationships between anxiety and archery performance.^{11,12,22,23} Higher levels of cognitive anxiety were generally associated with impaired concentration, reduced attentional control, and lower shooting accuracy.^{8,9} In contrast, somatic anxiety was primarily reflected by physiological responses, including increased salivary alpha amylase activity, elevated heart rate, and autonomic nervous system activation. These physiological changes were consistently associated with reduced motor precision during shooting.^{11,13}

Several studies further demonstrated that elite archers generally exhibited lower levels of cognitive and somatic anxiety together with superior shooting performance compared with intermediate athletes.³ Although some between group comparisons did not reach statistical significance, the overall trend consistently suggested that greater competitive experience was associated with more effective psychological regulation and improved performance.³ Collectively, these findings indicate that competitive anxiety influences archery performance through interacting cognitive and physiological mechanisms.

Discussion

This systematic review synthesized the available observational evidence regarding the association between competitive anxiety and performance among archery athletes. Overall, the included studies consistently indicated that higher competitive anxiety was associated with poorer shooting performance, although the strength of the association varied across studies and was influenced by differences in participant characteristics, competitive level, and anxiety assessment methods. Although the magnitude of the reported associations ranged from weak to moderate, the direction of the relationship remained remarkably consistent across studies. These findings indicate that competitive anxiety represents an important psychological factor influencing performance in precision sports and should be considered alongside physical conditioning and technical preparation.^{5,6}

One of the most consistent findings identified in this review was the detrimental influence of cognitive anxiety on shooting performance. Athletes experiencing excessive worry, fear of failure, and negative performance expectations generally demonstrated lower shooting accuracy than those reporting lower anxiety levels. This observation is consistent with Attentional Control Theory, which proposes that anxiety reduces processing efficiency by shifting attentional resources from task relevant information toward threat related thoughts and environmental distractions.⁸ As attentional control deteriorates, athletes become less capable of maintaining stable visual fixation, regulating movement timing, and executing accurate motor responses during aiming and arrow release. Because archery requires sustained concentration and precise visuomotor coordination, even subtle disruptions in attentional regulation may substantially impair competitive performance.^{8,9}

Beyond cognitive processes, the present review demonstrated that somatic anxiety contributes to performance deterioration through physiological mechanisms. Increased anxiety activates the hypothalamic pituitary adrenal axis and the sympathoadrenal medullary system, leading to elevated cortisol secretion, increased salivary alpha amylase activity, accelerated heart rate, and greater muscle tension.^{11,12} These physiological responses may compromise postural stability, fine motor coordination, and movement consistency, all of which are essential during the drawing, aiming, and release phases of shooting. Similar findings have been reported in previous studies of precision sports, which indicate that excessive autonomic activation reduces movement precision and negatively influences shooting performance.^{10,13,24}

Interestingly, several studies included in this review reported that elite archers generally exhibited lower cognitive and somatic anxiety together with higher shooting scores than intermediate athletes.³ Although some between group differences were not statistically significant, the overall pattern consistently suggested that greater competitive experience enhances psychological resilience and emotional regulation during competition. Elite athletes are more likely to possess effective coping strategies, stronger self-confidence, and superior attentional control, enabling them to maintain stable performance despite competitive pressure. These findings support previous literature indicating that psychological expertise develops alongside technical proficiency through repeated exposure to high level competition.^{3,4,25}

Despite the consistency of the overall findings, several methodological considerations should be acknowledged. First, all included studies employed observational designs, predominantly cross sectional and correlational approaches. Consequently, causal relationships between competitive anxiety and performance cannot be established with certainty because reciprocal influences and residual confounding remain possible. Poor competitive performance may increase anxiety, just as elevated anxiety may impair subsequent performance. Future longitudinal and prospective studies are therefore required to clarify the temporal relationship between these variables.^{17,26}

Second, considerable methodological heterogeneity was observed across the included studies. Differences in participant characteristics, competitive level, anxiety assessment instruments, physiological biomarkers, performance outcomes, and statistical reporting precluded quantitative synthesis through meta analysis. Although narrative synthesis enabled identification of consistent trends, the absence of pooled effect estimates limited the precision of the overall conclusions. Furthermore, the methodological quality assessment indicated that all included studies were of moderate quality, with several studies providing limited information regarding confounding variables and strategies used to minimize residual bias. These methodological limitations should therefore be considered when interpreting the available evidence.

Another important limitation concerns the comprehensiveness of the literature search. This review included only PubMed and Google Scholar, and relevant studies indexed exclusively in databases such as Scopus, Web of Science, Embase, or SPORTDiscus may not have been identified. In addition, grey literature and unpublished studies were excluded, which may have increased the risk of publication bias, as studies with statistically significant or favorable findings may be more likely to be published than studies reporting nonsignificant or unfavorable findings.²⁷ Owing to the inclusion of only six studies and the absence of quantitative synthesis, formal assessment of publication bias was not feasible and therefore was not performed. This limitation should be considered when interpreting the consistency of the available evidence.

Despite these limitations, the present review provides meaningful implications for sports medicine, physiotherapy, and sports psychology. Routine assessment of competitive anxiety using standardized psychological instruments may facilitate early identification of athletes at risk of performance deterioration. Furthermore, integrating evidence based psychological interventions, including cognitive behavioral strategies, relaxation training, mindfulness based interventions, attentional control training, and biofeedback, into routine athletic preparation may improve emotional regulation and competitive performance.^{6,8} These interventions should complement conventional physical and technical training, particularly in precision sports where psychological stability is essential for optimal performance.

Overall, the evidence synthesized in this review supports the concept that competitive anxiety is associated with archery performance through interacting cognitive and physiological responses.^{11,22–24} Cognitive anxiety primarily disrupts attention, concentration, and decision making, whereas somatic anxiety interferes with autonomic regulation, postural control, and fine motor execution.^{8,9} Although stronger evidence from prospective and intervention studies remains necessary, the consistency of the available literature suggests that effective anxiety management should be regarded as an integral component of athlete development and high performance training.

Conclusion

This systematic review demonstrated a consistent negative association between competitive anxiety and performance among archery athletes. Across the included studies, higher levels of cognitive anxiety were associated with impaired attentional control, reduced concentration, and lower shooting accuracy, whereas somatic anxiety was related to physiological responses that may compromise postural stability, fine motor control, and movement precision during shooting. Although differences existed in participant characteristics, competitive level, and anxiety assessment methods, the overall evidence consistently supported the detrimental influence of competitive anxiety on archery performance.

These findings highlight the importance of incorporating routine psychological assessment and evidence based anxiety management strategies into athlete development programs. Integrating psychological interventions with conventional physical and technical training may enhance emotional regulation and optimize competitive performance, particularly in precision sports such as archery.

The available evidence remains limited by the predominance of observational study designs, methodological heterogeneity, the inclusion of only two electronic databases, and the relatively small number of eligible studies. Future research should prioritize well designed longitudinal, prospective, and intervention studies using standardized anxiety assessment instruments and

performance outcome measures to strengthen causal inference and provide more robust evidence for psychological strategies aimed at improving athletic performance.

Author Contribution

Putu Bulan Permatadewi: Conceptualization, Methodology, Literature Search, Study Selection, Data Extraction, Data Analysis, Writing Original Draft, Writing Review and Editing.

Ni Made Swasti Wulanyani: Conceptualization, Methodology, Data Interpretation, Critical Review, Supervision, Writing Review and Editing.

I Gusti Ayu Putu Wulan Budisetyani: Methodology, Data Interpretation, Critical Review, Supervision, Writing Review and Editing.

All authors have read and approved the final version of the manuscript.

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Conflict of Interest Statement

The authors declare that there are no conflicts of interest regarding the publication of this article.

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Ethics Statement

Ethical approval was not required for this study because it is a systematic review based exclusively on previously published literature and did not involve direct participation of human subjects or the collection of identifiable personal data. All studies included in this review were assumed to have been conducted in accordance with the ethical standards of their respective institutions.

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