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Effects of wrestling training on psychological well-being, anxiety, and resilience in adolescent boys

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Abstract

Background Wrestling is a physically and mentally demanding combat sport that requires discipline, focus, and emotional control. Although its physiological effects are well documented, its psychological benefits in adolescents remain underexplored. This study aimed to examine whether a short-term, non-competitive wrestling program could enhance psychological well-being, reduce sport anxiety, and strengthen resilience in adolescent boys.

Methods Thirty sedentary male adolescents (aged 12–15 years) were randomly assigned to a wrestling training group ($n = 15$) or a control group ($n = 15$). The intervention consisted of six weeks of supervised wrestling sessions performed three times per week. Psychological well-being (WHO-5), sport anxiety (SAS-2), and resilience (BPRS) were assessed before and after the intervention using the validated Turkish versions of the scales. Two-way repeated-measures ANOVA was used to analyze group $\times$ time interactions.

Results Participants in the wrestling group demonstrated significant improvements in well-being ($p < 0.001$) and resilience ($p < 0.001$), alongside marked reductions in total sport anxiety and its subdimensions ($p < 0.001$), compared with the control group. All effects were large ($\eta^2 = 0.52$ – 0.94).

Conclusion A structured six-week wrestling program produced meaningful psychological benefits in adolescent boys. Regular participation in non-competitive wrestling may serve as an effective approach to promote well-being, emotional stability, and adaptive coping skills during early adolescence, supporting the preventive and developmental role of combat sports in youth mental health.

Trial registration Effects of wrestling training on psychological well-being, anxiety, and Resilience in Adolescent Boys. NCT07193121, Date: 12-09-2025.

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Keywords Wrestling, Combat sports, Psychological resilience, Well-being, Anxiety, Mental health, Short-term effects, Adolescents

Introduction

Adolescence is a pivotal stage of human development, characterized by rapid physical growth and marked psychosocial transitions. During this period, individuals often experience heightened sensitivity to anxiety, stress, and emotional instability [1, 2]. Recent empirical evidence further supports this view, demonstrating increased emotional reactivity and mental health sensitivity during early and mid-adolescence [3–5]. Moreover, engagement in exercise supports self-esteem, facilitates stress management, and encourages social interaction, all of which contribute to long-term mental well-being [6, 7].

Wrestling is a demanding sport that combines endurance, agility, and self-control. Introducing wrestling at an early age may promote not only physical conditioning but also psychological discipline [8]. Beyond its physical intensity, wrestling emphasizes mental focus and emotional balance, as success often depends on psychological control over one's opponent [9]. This combination of physical and cognitive challenges positions wrestling as a potential tool for fostering self-discipline, confidence, and stress tolerance. Studies on combat sports generally support these benefits, showing that participants experience reduced cognitive and somatic anxiety alongside enhanced self-esteem [10, 11]. In addition, increased sport experience is commonly associated with improved self-regulation and overall psychological robustness [12].

Longitudinal research indicates that continued physical activity during adolescence is linked with fewer symptoms of anxiety and depression, as well as improved psychological well-being [7, 12]. Emerging experimental evidence suggests that the mental health benefits of structured physical activity are mediated by psychosocial factors such as self-esteem, psychological resilience, and perceived social support, which collectively enhance adolescents' adaptive coping capacities [13]. In this context, combat sports may contribute to not only physical development but also emotional control, self-efficacy, and adaptive adjustment [11].

Previous reviews and empirical syntheses indicate that wrestling research has traditionally prioritized physiological, anthropometric, biomechanical, and performance-related outcomes, including strength, endurance, body composition, rapid weight loss, and competition performance [14–20]. Psychological variables have generally been examined as secondary constructs or within broader combat sport samples rather than as primary outcomes in wrestling-specific interventions. In contrast, emerging psychological research in combat sports has

predominantly focused on disciplines such as judo, taekwondo, and muay thai, highlighting a relative scarcity of experimental studies addressing mental health-related outcomes in wrestling, particularly among adolescent and novice populations [21–24].

This study uniquely focuses on sedentary adolescents with no prior wrestling or combat sport experience, allowing examination of the psychological effects of wrestling as an introductory, non-competitive intervention.

Psychological resilience was selected as a key outcome because it represents a central protective factor during adolescence, reflecting the ability to adapt to stress, recover from challenges, and maintain emotional balance. Moreover, it is conceptualized as a primary outcome in the present study due to its central role as a protective factor during adolescence, a developmental period characterized by heightened vulnerability to stress, anxiety, and emotional dysregulation. Resilience reflects the capacity to adapt to physical and psychological challenges, recover from stress, and maintain emotional balance—processes that are theoretically aligned with the cognitive, emotional, and behavioral demands of wrestling. Wrestling training requires sustained effort, repeated exposure to manageable stressors, emotional regulation under physical pressure, and adaptive coping in response to success and failure. These characteristics position resilience as a theoretically proximal outcome of wrestling participation rather than a distal or secondary construct. Moreover, resilience has been identified as a key mediator linking physical activity to mental health outcomes in adolescents, supporting its selection as a primary indicator of psychological adaptation in the context of sport-based interventions.

Given the cognitively and emotionally demanding nature of wrestling, resilience constitutes a theoretically relevant constructs alongside well-being and anxiety. Therefore, the present study aimed to examine the effects of a structured wrestling training program on psychological well-being, anxiety, and resilience in adolescent boys.

Therefore, the present study aimed to investigate how structured wrestling training influences psychological well-being, anxiety, and resilience in adolescent boys. We hypothesized that participants engaged in regular wrestling training would exhibit higher well-being, lower anxiety, and greater psychological resilience compared with a control group.

Materials and methods

Participants

Thirty healthy male adolescents voluntarily participated in this randomized controlled study. Randomization was performed using a computer-generated random sequence (www.randomizer.org) by a researcher not involved in participant assessment or intervention delivery. Allocation concealment was ensured by assigning participants to groups only after completion of baseline measurements. No stratified randomization was applied due to the relatively small sample size. The required sample size was determined using the G*Power program (version 3.1.9.2; Düsseldorf, Germany). A power analysis revealed that at least 12 participants per group would be needed to identify statistically significant effects, with an effect size of 0.80 and actual power of 0.89, focusing on psychological resilience as the primary outcome measure [24]. Consistent with its theoretical centrality, psychological resilience was defined as the primary outcome variable and used to determine sample size. To account for possible dropouts, the sample size was increased by 25%, resulting in 15 participants per group (Wrestling Group (WG; $n = 15$) and Control Group (CG; $n = 15$)), totaling 30 participants. Participants had to meet the inclusion criteria of being between 12 and 15 years of age, having no prior experience in wrestling or organized combat sports, and not having engaged in regular physical training for more than 60 min per week over the preceding six months. The exclusion criteria included any musculo-skeletal injury, chronic illness, or psychological disorder that could interfere with participation. All participants and their parents were fully informed about the study's purpose and procedures, and written informed consent was obtained from the parents or legal guardians. The study protocol was approved by the Ethics Committee of Gümüşhane University (Approval No: 2025/6, June 25,

2025) and conducted in accordance with the principles of the Declaration of Helsinki.

Research design

This study employed a randomized pretest–posttest control group design. Both groups underwent baseline assessments before the intervention and post-tests after six weeks. The Wrestling Group participated in a structured wrestling training program, while the Control Group maintained their usual daily routines without additional exercise. Participants visited the laboratory on three separate occasions. During the first visit, they were informed about the training protocol and completed the familiarization procedures. The second visit (one week later) included baseline testing. The third visit occurred after the six-week intervention, during which all post-training assessments were conducted. All measurements were carried out under identical environmental conditions (temperature 22–24 °C, relative humidity 45%–55%) and supervised by the same research team to ensure consistency. All questionnaires were self-administered in a quiet classroom environment under the supervision of a researcher, who provided standardized instructions but did not influence participants' responses.

The experimental flow is presented in Fig. 1.

Body composition measurement

In the study, body composition (e.g., body fat percentage and muscle mass) was assessed using a Jawon Medical GAIA 359 Plus bioelectrical impedance analyzer (Jawon Medical Co., South Korea), with data managed through the BodyPass software (GAIA 359 Plus version). This device was used to confirm that all participants had comparable baseline body characteristics. Body weight was recorded using the same analyzer, while height (cm) was

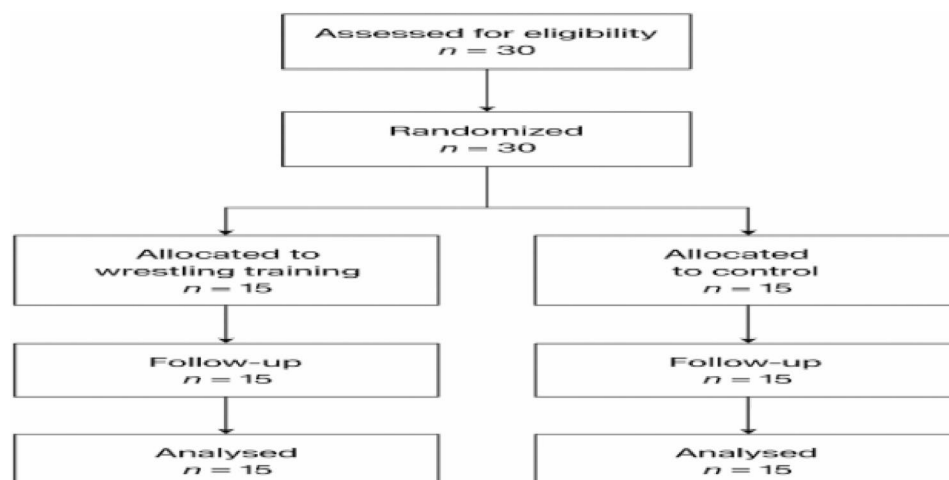


Fig. 1 Experimental design

measured with a portable stadiometer (Seca 213, Seca GmbH & Co. KG, Hamburg, Germany).

Sport anxiety Scale-2 (SAS-2)

The Sport Anxiety Scale-2 (SAS-2) is a revised instrument originally developed to assess competitive anxiety in athletes. The updated version includes 15 items rated on a four-point Likert scale and provides a multi-dimensional view of anxiety symptoms related to sport performance [25, 26]. The Turkish adaptation and validation study by Akman et al. [125] confirmed its reliability and construct validity for adolescent athletes. The scale measures three distinct aspects of competitive anxiety: worry, which refers to outcome-related and self- focused concerns; somatic anxiety, which reflects physiological tension and physical manifestations of stress; and concentration disruption, which describes difficulties in maintaining attentional focus during performance. Higher scores on each subdimension indicated more severe anxiety symptoms in that domain, and all items in this study were evaluated using a four-point response format ranging from “not at all” to “very much.”

The WHO-5 well-being index

The WHO-5 Well-Being Index is a brief and effective screening tool for assessing psychological well-being.

The applicability study of the Turkish version of the WHO-5 was conducted by Eser et al. [27]. Participants were asked to indicate the extent to which each of the five statements has been true for them over the past 14 days. Items are scored on a scale from 0 (at no time) to 5 (all of the time), resulting in a total raw score ranging from 0 (absence of well-being) to 25 (maximal well-being). A standardized 100-point score can also be calculated by multiplying the raw score by four. The WHO-5 can also be used to monitor individual changes over time, with a score change of 10% or more (increase or decrease) considered clinically significant [28].

Brief Psychological Resilience Scale (BPRS)

The Brief Psychological Resilience Scale (BPRS) was originally developed by Smith et al. [29] to assess an individuals’ ability to recover from stress and maintain emotional balance, and it was later adapted for Turkish samples by Doğan [30]. The instrument consists of six items scored on a five-point Likert scale ranging from “strongly disagree” to “strongly agree,” with three of the items (2, 4, and 6) reverse-coded. After adjustment of these items, the total scores may range from 6 to 30, where higher values represent greater psychological resilience. The BPRS offers a practical and time-efficient assessment method with demonstrated reliability and cultural applicability in the Turkish population [30]. In the current study, the internal consistency of the BPRS was found to be acceptable, with a Cronbach’s alpha coefficient of 0.79 (Table 2).

Table 1 Descriptive characteristics of the participants

Period	Training Focus	Exercises/Activities
Week 1	Basic stances and balance	Wrestling stance (low, medium, high); Movement techniques (forward, backward, lateral); Balance exercises; Mobilization and flexibility drills
Week 2	Mobility and basic entries	Opportunity-seeking drills; Single-leg takedown (penetration step); Double-leg takedown; Medicine ball exercises for power development; Basic falling and standing-up techniques
Week 3	Contact and defensive fundamentals	Hand contact drills (grappling games); Defensive stance and counter techniques; Balance disruption exercises (push-pull drills); Short-distance sprints; Resistance band applications
Week 4	Strength, agility, and technical integration	Resistance-based entries (with bands or sparring partner); Technical repetitions (single- and double-leg takedowns); Agility ladder and cone drills; Core strengthening exercises (planks, leg raises); Partner-based technical applications
Week 5	Combined trainings	Each set of combined movements is repeated 3 times for 4 min; 1-minute rest between sets
Week 6	Combined trainings	Each set of combined movements is repeated 3 times for 4 min; 1-minute rest between sets

Weekly training program

The intervention consisted of a six-week wrestling training program conducted three times per week (Tuesday, Thursday, and Saturday), with each session lasting 60 min. Each session incorporated fundamental wrestling components, including basic stances and balance, mobility and entry techniques, contact and defensive fundamentals, strength and agility drills, technical integration, and combined practice sessions (Table 1). Previous literature suggests that a training frequency of at least three sessions per week over six to twelve weeks is critical for achieving meaningful physical and neuromuscular adaptations [31, 32]. Therefore, a six-week program was deemed appropriate for this study.

The protocol was structured into three progressive phases under the supervision of three certified wrestling experts. Each session began with a 15-minute warm-up, including a five-minute low-intensity run followed by a 10-minute agility and coordination circuit (side steps, crossover steps, two-foot jumps, single-leg hops, squat jumps, high knees, lunges, cut kicks, and backward steps). This was followed by a five-minute dynamic stretching routine targeting the major muscle groups to enhance flexibility and reduce muscle stiffness.

Table 2 Mean, reliability, skewness, and kurtosis values of the scales

Scales	Sub- dimensions	Number of items	Mean	S.D	α	Kurtosis	Skewness
Short Psychological Resilience Scale		6	19.52	4.40	0.778	0.709	0.850
Sport Anxiety Scale-2	Worry	5	7.07	1.52	0.772	0.624	0.941
	Somatic Anxiety	5	7.23	1.17	0.752	-0.034	-0.313
	Concentration Disruption	5	8.18	2.12	0.828	0.288	-1.124
WHO-5 Well-Being Index		5	20.17	3.35	0.698	-0.683	-0.371

Note. α : Cronbach's Alpha, Mean, SD Standard deviation, Skewness and kurtosis values within ± 2 indicate acceptable normality

The remaining 40 min constituted the main training phase, focusing on wrestling-specific drills integrating stances, mobility, contact and defensive techniques, as well as strength and agility exercises combined with technical applications to improve overall performance. All sessions were supervised to ensure correct execution and progression [33].

No injuries occurred during the intervention. All participants in the wrestling group completed the full program, attending all 18 scheduled sessions (100% adherence). Similarly, the control group completed all pre- and posttest assessments with no attrition.

Competitive elements were deliberately excluded from the training program to minimize performance pressure and evaluative stress, thereby aligning the intervention with a preventive mental health framework focused on psychological safety, enjoyment, and adaptive skill development.

Statistical analysis

All statistical procedures were conducted using IBM SPSS Statistics (Version 21.0, Chicago, IL, USA). The level of significance was set at $p < 0.05$. The Shapiro–Wilk test was used to assess the normality of data distribution across variables (see Table 2). To examine the interaction between time (pre- and posttest) and group (wrestling vs. control), a two-way repeated-measures ANOVA was performed, followed—when appropriate—by Bonferroni-adjusted post hoc comparisons. Partial eta-squared (η^2) values were also calculated to estimate effect size. In accordance with Richardson's guidelines [34], effect sizes were interpreted as small ($\eta^2 \approx 0.01$), moderate ($\eta^2 \approx 0.06$), or large ($\eta^2 \geq 0.14$).

Results

The study sample consisted of 30 healthy adolescent males divided into two random groups: the wrestling group and the control group. Table 1 provides a comprehensive summary of the subjects' demographic and physical characteristics.

In summary, baseline characteristics were comparable between groups. The six-week wrestling intervention led to significant improvements in psychological well-being and resilience, along with marked reductions in total sport anxiety and its subdimensions in the wrestling

Table 3 Descriptive characteristics of the participants

Parameters	Wrestling		Control	
	Mean	S.D.	Mean	S.D
Age (years)	13.33	1.35	13.38	1.18
Height (cm)	158.80	11.70	156.93	9.93
Weight (kg)	48.60	16.23	49.07	12.09

Note. WG Wrestling Group, CG Control Group, Mean arithmetic mean, SD = standard deviation

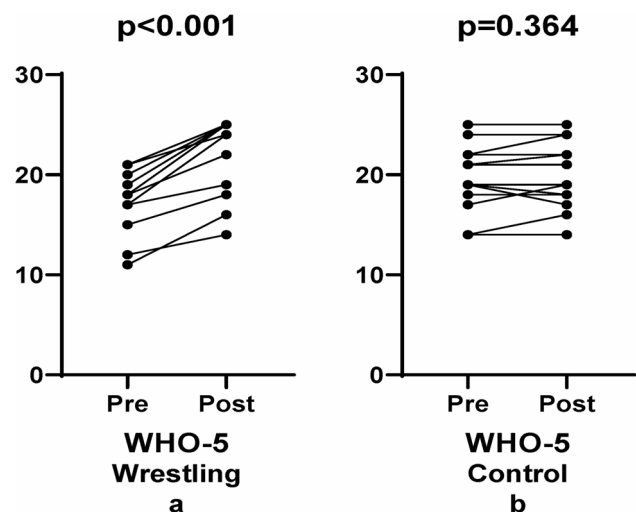


Fig. 2 Comparison of well-being levels before and after wrestling training. Panel (a) shows WHO-5 well-being scores before and after the intervention in the wrestling group (WG), demonstrating a significant improvement ($p < 0.001$). Panel (b) presents the corresponding comparison in the control group, where no significant change was observed ($p = 0.364$). Overall group $\times$ time interaction was significant ($\eta^2 = 0.717$, $p < 0.001$). Figure 2a–b)

group. In contrast, the control group showed no improvement or unfavorable changes across most psychological outcomes. Significant group $\times$ time interactions and large effect sizes across primary outcomes indicate that the observed changes were systematically associated with participation in the wrestling program (see Table 3). Fig. 2, 3, 4, 5, 6, and Fig. 7.

Discussion

This research examined the psychological effects of a six-week wrestling training program on well-being, sport anxiety, and psychological resilience in sedentary adolescent boys. The findings supported the primary

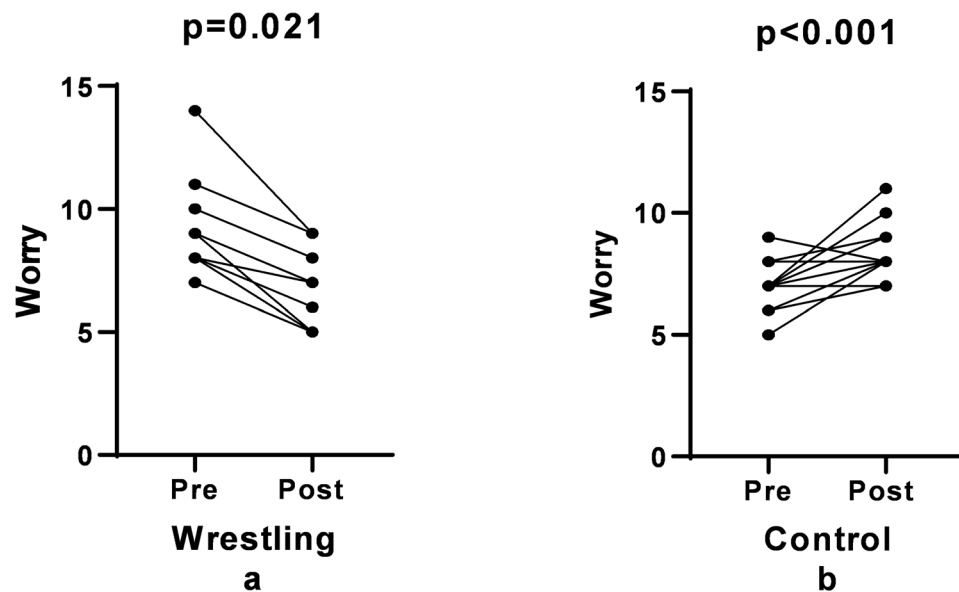


Fig. 3 Comparison of worry levels before and after wrestling training. When worry scores before and after the intervention were compared, a significant decrease was observed in the wrestling group ($p = 0.021$), while a significant increase was found in the control group ($p < 0.001$). Panel (a) illustrates changes in worry levels in the wrestling group, and panel (b) illustrates changes in worry levels in the control group. Figures 3a–b)

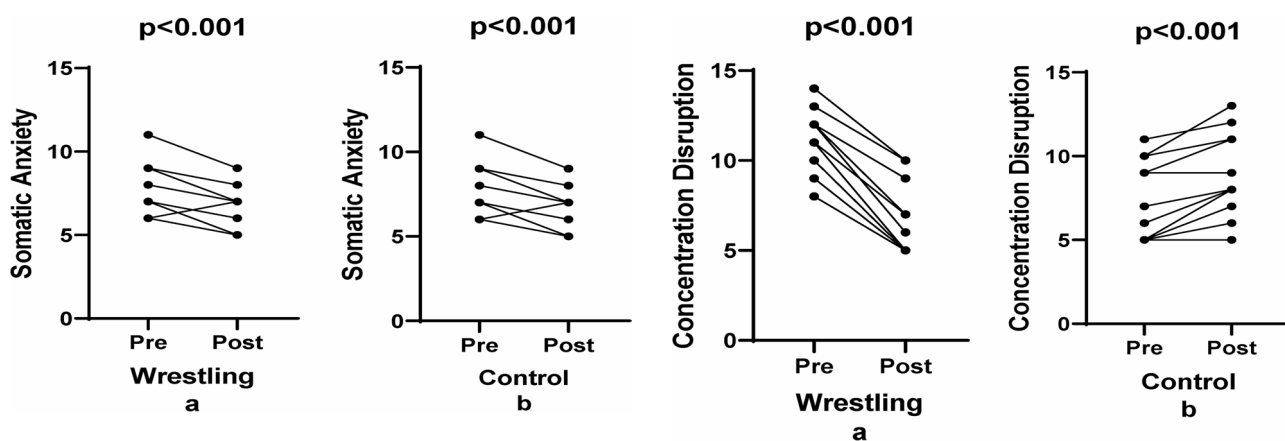


Fig. 4 Comparison of somatic anxiety levels before and after wrestling training. When comparing the somatic anxiety subscale scores of the Sport Anxiety Scale-2 before and after the intervention, significant improvements were observed in both the WG group ($p < 0.001$) and the control group ($p < 0.001$) ($\eta^2 = 0.928$, $p < 0.001$). Panel (a) illustrates changes in somatic anxiety levels in the wrestling group (WG), and panel (b) illustrates changes in somatic anxiety levels in the control group. Figure 4a–b)

hypothesis, indicating that a structured, beginner-level wrestling intervention led to increases in psychological well-being and resilience, together with reductions in sport-related anxiety symptoms.

In particular, significant improvements were observed in the WHO-5 well-being scores and psychological resilience measures in the wrestling group, while anxiety subscales (worry, somatic anxiety, and concentration disruption) showed notable decreases. These results suggest that regular participation in structured wrestling sessions may promote more positive emotional states and enhance adolescents' ability to manage stress. Although

Fig. 5 Comparison of concentration disruption levels before and after wrestling training. When comparing the concentration disruption subscale scores of the Sport Anxiety Scale-2 before and after the intervention, a significant decrease was observed in the WG group ($p < 0.001$), whereas a significant increase was detected in the control group ($p < 0.001$) ($\eta^2 = 0.880$, $p < 0.001$). Panel (a) illustrates changes in concentration disruption levels in the wrestling group (WG), and panel (b) illustrates changes in concentration disruption levels in the control group. Figure 5a–b)

anxiety reductions were also observed in the control group; these changes may be attributed to non-specific influences such as familiarization with the testing process, social interaction, or expectancy effects.

The present findings align with previous research showing that wrestling and other combat sports support psychological resilience and emotional stability in teenagers [35–39]. The large effect sizes obtained for well-being ($\eta^2 = 0.717$), resilience ($\eta^2 = 0.519$), and anxiety ($\eta^2 = 0.938$) emphasize the practical significance of these

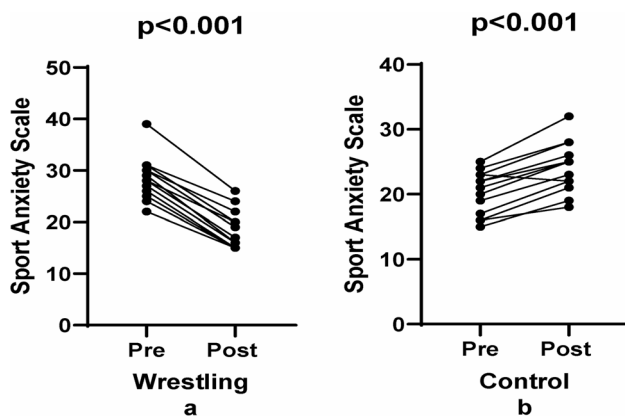


Fig. 6 Comparison of the Sport Anxiety Scale-2 levels before and after wrestling training. A significant decrease was observed in the Sport Anxiety Scale-2 scores of the WG group following the intervention ($p < 0.001$), whereas a significant increase was found in the control group ($p < 0.001$) ($\eta^2 = 0.938$, $p < 0.001$). Panel (a) illustrates changes in Sport Anxiety Scale-2 scores in the wrestling group (WG), and panel (b) illustrates changes in Sport Anxiety Scale-2 scores in the control group. Figure 6a–b)

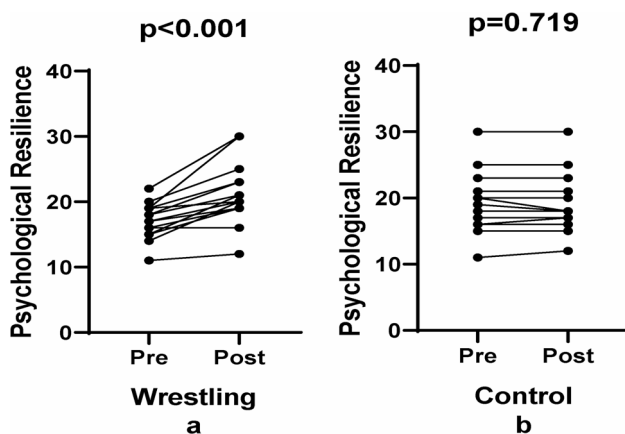


Fig. 7 Comparison of psychological resilience levels before and after wrestling training. When comparing the psychological resilience scale scores before and after the intervention, significant improvements were observed in the WG group ($p < 0.001$), whereas no significant changes were detected in the control group ($p = 0.719$) ($\eta^2 = 0.519$, $p < 0.001$). Panel (a) illustrates changes in psychological resilience levels in the wrestling group (WG), and panel (b) illustrates changes in psychological resilience levels in the control group. Figure 7a–b)

improvements. Earlier studies similarly indicate that wrestling participation contributes to long-term mental health through increased confidence, self-regulation, and coping skills—benefits that may extend beyond the intervention period [38]. Furthermore, research exploring training load and psychological responses in young wrestlers has shown that well-structured and consistent training helps maintain mental and physical balance, whereas excessive or poorly managed load can elevate fatigue and stress levels [36, 39]. The current results are in line with this evidence, suggesting that appropriately designed

wrestling programs can function as effective psychophysiological interventions during adolescence.

Regarding sport anxiety, reductions in both cognitive and somatic components are consistent with studies demonstrating that participation in organized sports is linked to lower anxiety and depressive symptoms among youth [40]. Strength-oriented training modalities, including wrestling, have also been associated with decreased anxiety and improved emotional regulation [41]. These changes appear to reflect both psychological and physiological processes; moderate training intensity enhances emotional control, whereas excessive stress may diminish it [42]. This reinforces the importance of balancing training demands and providing psychological support in youth sports practice.

Beyond outcome-level changes, several psychological mechanisms may help explain the observed benefits of the wrestling intervention. Wrestling requires sustained attention, emotional control, and adaptive responses under physical and cognitive demands, which may promote self-regulation skills in adolescents. Repeated exposure to manageable challenges and mastery experiences can also strengthen self-efficacy, enhancing confidence in coping with stressors. Together, these processes may contribute to improved emotional stability and resilience observed in the wrestling group.

An interesting finding of the present study was the reduction in somatic anxiety observed not only in the wrestling group but also in the control group. This pattern suggests that factors other than the intervention itself may have contributed to changes in somatic anxiety. One possible explanation is increased familiarity with the assessment process, as repeated exposure to self-report questionnaires may reduce physiological tension and stress responses associated with initial testing. Additionally, adolescents may experience natural fluctuations in somatic symptoms over short periods due to contextual factors such as school routines, social adaptation, or seasonal influences. These non-specific effects should be considered when interpreting changes in somatic anxiety, indicating that improvements in this dimension may not be solely attributable to the wrestling intervention. Importantly, the group $\times$ time interaction remained significant, indicating that overall anxiety reduction was more pronounced and systematic in the wrestling group.

Several adolescent sport and physical activity studies report decreases in anxiety symptoms in both intervention and control groups, especially in school-based or typical PE settings [43, 44]. Reviews note that many “non-significant” intervention effects actually reflect parallel reductions or slowed age-related increases in anxiety for both groups, suggesting strong contextual or maturation effects [43, 44]. Meta-analyses of exercise for anxiety in children and adolescents generally find

small-to-moderate overall reductions in anxiety compared with controls [45, 47]. However, some network/meta-analyses report no statistically significant advantage of specific exercise modalities over controls for anxiety, even when depressive symptoms improve [48, 49]. This is consistent with scenarios where both groups improve, shrinking between-group differences.

Prior studies suggest that repeated exposure to psychological assessments may lead to decreased physiological arousal due to familiarization with the testing environment and reduced anticipatory stress. In addition, short-term fluctuations in somatic symptoms among adolescents have been attributed to contextual factors such as school-related stress, daily routines, and natural developmental variability [43–49]. Similar non-intervention-related decreases in somatic anxiety have been documented in youth sport studies employing repeated-measures designs, indicating that such changes may partially reflect measurement reactivity or time effects rather than specific Training adaptations.

Improvements in psychological resilience in the wrestling group also correspond with prior evidence showing that ongoing engagement in wrestling fosters adaptability, self-efficacy, and perseverance [37, 50]. These outcomes align with broader exercise literature, indicating that physical activity enhances resilience through better emotional stability, confidence, and social connectedness [5, 51]. Overall, the findings suggest that wrestling-based training may offer an effective means of supporting psychological growth during adolescence.

Nevertheless, the large effect sizes observed across all primary outcomes suggest that the intervention produced robust within-sample effects, warranting further investigation in larger trials.

Several limitations should be acknowledged. First, the relatively small sample size ($n=15$ per group) limits the generalizability of the findings. Although an a priori power analysis indicated adequate statistical power to detect meaningful effects for the primary outcome, sufficient power does not fully compensate for limitations related to external validity. Therefore, the present results should be interpreted as preliminary and exploratory rather than definitive. The relatively small sample size limits the generalizability of the results, and the short duration of the intervention and lack of follow-up assessments prevent the evaluation of long-term psychological adaptations.

Although the six-week wrestling program was sufficient to elicit significant short-term improvements in well-being, anxiety, and psychological resilience, it remains unclear whether these benefits persist beyond the intervention period. Without longitudinal follow-up data, conclusions regarding the sustainability or maintenance of psychological gains cannot be drawn. Therefore,

the present findings should be interpreted as reflecting short-term adaptations. Future studies should incorporate longer intervention periods and post-intervention follow-up assessments to examine the stability and long-term clinical relevance of these psychological outcomes.

Additionally, the sample included only male adolescents from a single cultural context, which restricts external validity. Future studies should include larger and more diverse cohorts, integrate follow-up assessments, and examine potential gender differences. Further exploration of neurophysiological mechanisms, such as hormonal or autonomic markers, could also deepen understanding of the pathways linking wrestling participation and psychological resilience.

Conclusions

This study shows that a short, structured, non-competitive wrestling program can enhance psychological well-being, increase resilience, and reduce sport-related anxiety in sedentary adolescent boys. These outcomes suggest that even beginner-level wrestling, when delivered in a safe and supportive environment, can offer meaningful psychological benefits during early adolescence. Despite these, the observed short-term effects provide a meaningful foundation for future longitudinal investigations.

From a practical perspective, the findings indicate that implementing similar programs in school or community settings may provide adolescents with an accessible way to develop emotional control, confidence, and healthier coping strategies. Such benefits appear most likely when training emphasizes safety, gradual progression, and positive coach–athlete communication.

At the same time, the present results open several avenues for further inquiry. Future research should examine whether these psychological gains persist over longer periods, include more diverse samples, and explore potential gender differences. Moreover, investigations into neurophysiological or hormonal markers such as cortisol or heart-rate variability could clarify the mechanisms that drive these adaptations. Comparative studies across various combat and team sports may also help determine whether the observed benefits are specific to wrestling or reflect broader effects of structured physical activity.

Taken together, the study provides preliminary but compelling evidence that non-competitive wrestling can serve as a supportive and psychologically enriching form of physical activity for adolescents. From a preventive mental health perspective, these findings suggest that introductory, non-competitive wrestling programs may serve as a feasible and developmentally appropriate strategy to support emotional well-being and adaptive coping during early adolescence.

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s40359-026-03962-3>.

Supplementary Material 1.

Supplementary Material 2.

Supplementary Material 3.

Supplementary Material 4.

Supplementary Material 5.

Supplementary Material 6.

Supplementary Material 7.

Supplementary Material 8.

Authors' contributions

Conceptualization: R. Ö., R. N. U., C. Y., S. B.; Methodology: R. N. U., Ö. O. A.; Software: R. Ö., F. Ö., A. Ç.; Validation: S. B., R. Ö., A. Ç.; Formal analysis: V. A. G., C. Y., V. E. U.; Investigation: R. Ö., Ö. O. A., S. D.; Resources: R. Ö., V. E. U.; Data curation: A. Ç., A. Ç.; Writing—original draft preparation: R. Ö., R. N. U., C. Y., S. B.; Writing—review and editing: C. Y., V. A. G.; Visualization: F. Ö., S. D.; Supervision: V. A. G., R. Ö.; Project administration: R. N. U., Ö. O. A., S. B.; Funding acquisition: R. Ç., C. Y., V. E. U. All authors have read and agreed to the published version of the manuscript.

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Data availability

[<https://doi.org/10.6084/m9.figshare.30444677>] (<https://doi.org/10.6084/m9.figshare.30444677>).

Declarations

Ethics approval and consent to participate

The study protocol was reviewed and approved by the Ethics Committee of Gümüşhane University (Approval No: 2025/6, dated June 25, 2025). The research was conducted in accordance with institutional guidelines, national legislation, and the ethical principles outlined in the Declaration of Helsinki. Written informed consent was obtained from all participants and their legal guardians prior to participation.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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