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Attitudes Towards Sport in Early Adolescence: A Scale Adaptation Study for Sustainable Good Health and Well-Being

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Highlights

What are the main findings?

- The Attitude Towards Sport Scale (ATSS) is a highly valid and reliable measurement tool for early adolescents, successfully preserving its original three-factor structure: Interest, Lifestyle, and Participation.
- The scale scores strongly predict actual daily physical activity durations, perceived physical literacy levels, and active athletic status (licensed vs. non-licensed) in middle school students.

What are the implications of the main findings?

- Physical education teachers, preventive medicine specialists, and pediatric sports psychologists can use this developmentally sensitive tool to accurately monitor youth sports engagement and identify students at risk of sports dropout.
- Early diagnosis and support of internalized sport attitudes provide an evidence-based pathway to foster lifelong physical activity habits, directly contributing to the targets of Sustainable Development Goal 3 (Good Health and Well-Being).

Abstract

Background: The decline in physical activity during the transition to early adolescence poses a significant threat to lifelong health and well-being, directly impacting the targets of Sustainable Development Goal 3 (SDG 3). To design effective preventive interventions, researchers need developmentally appropriate tools to measure the psychological drivers of physical activity. **Objectives:** This study aimed to adapt and validate the Attitude Towards Sport Scale (ATSS), originally developed for high school students, for a middle school population (ages 10–15). **Methods:** We used a mixed-methods approach, starting with cognitive think-aloud protocols to ensure semantic suitability, followed by a cross-sectional survey of 531 students. Data were analyzed using robust Confirmatory Factor Analysis (CFA). **Results:** The results confirmed that the original three-factor structure (Interest, Lifestyle, and Participation) perfectly fit the early adolescent sample. The scale demonstrated high composite reliability across all dimensions. Furthermore, the adapted ATSS showed strong criterion-related validity through high correlations with perceived physical literacy and actual physical activity durations. It also successfully differentiated between licensed athletes and non-licensed students. **Conclusions:** We conclude that the adapted ATSS is a highly reliable and developmentally sensitive screening tool for pediatricians, educators, and public health professionals to monitor youth sports engagement and promote sustainable health-lifestyle behaviors.

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1. Introduction

The United Nations' Sustainable Development Goals (SDGs), particularly SDG 3, emphasize the promotion of good health and well-being across all ages. A primary mechanism for achieving these targets—specifically in preventing non-communicable diseases and fostering mental health—is the establishment of regular physical activity habits. However, epidemiological evidence indicates a precipitous decline in sports participation and physical activity during the transition from late childhood to early adolescence [1,2]. Mitigating this decline is essential for instilling lifelong health behaviors. Since physical activity dropout in youth is not merely a physiological issue but deeply rooted in psychological determinants [3,4], accurately assessing the psychological antecedents of youth behavior is critical for designing sustainable health interventions [2,5]. Thus, understanding and measuring sports attitudes directly aligns with the preventative healthcare objectives of SDG 3.

Researchers frequently turn to the Theory of Planned Behavior (TPB) and Self-Determination Theory (SDT) to explain the drivers of sports participation. According to TPB, intention is the most direct cause of a behavior, and this intention is heavily shaped by a person's attitude—encompassing both their cognitive beliefs and emotional responses [6,7]. Meta-analyses confirm that attitude serves as the primary predictor of physical activity intentions among adolescents [8,9]. Complementing this, SDT addresses the nature of motivation. It proposes that healthy habits become sustainable once sports are integrated into a student's personal identity [10]. This shift from casual participation to making sports a lifestyle choice fits well within SDT's autonomy continuum [11,12]. Because early adolescence (typically the middle school years) is a key period for this psychological shift [13], reliably measuring these attitudes at a young age is essential for educators and public health professionals working to promote long-term well-being. In the context of preventive medicine, an adolescent's perspective on sports is more than just a school-related metric; it actively drives their broader health behaviors. Accurately assessing these views provides a foundational step in addressing physical inactivity, obesity, and the non-communicable diseases associated with them.

While many surveys measure general physical activity, the Attitude Towards Sport Scale (ATSS) developed by Senturk [14] captures a more detailed picture by dividing the concept into three areas: Interest in Sport, Sport Lifestyle, and Active Participation. This scale has proven highly reliable in Turkiye and is a common choice for graduate-level research. The limitation, however, is that the original ATSS was validated strictly for older adolescents in high school. Because middle schoolers are at a distinctly different stage of cognitive, emotional, and behavioral development, applying the high school version to them risks measurement errors and undermines the tool's validity. Consequently, adapting and validating this multi-dimensional scale specifically for early adolescents is a necessary methodological step.

This study aims to bridge this methodological gap by adapting the ATSS for a middle school population (ages 10–15) and rigorously testing its psychometric properties using cognitive think-aloud protocols and advanced structural equation modeling on a large sample (N = 531). By providing a developmentally sensitive and statistically validated tool, this research contributes a reliable measurement instrument for behavioral scientists designing preventive public health interventions that support SDG 3.

Based on the theoretical background and the aim of the study, the following hypotheses were formulated:

- Hypothesis 1 (H_1): The adapted ATSS will demonstrate an acceptable model fit for the original three-factor structure (Interest, Lifestyle, and Participation) among middle school students.
- Hypothesis 2 (H_2): The scale will exhibit strong convergent and discriminant validity (AVE > .50, CR > .70) along with a high level of internal consistency (McDonald's ω > .80) for early adolescence.

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- Hypothesis 3 (H_3): The scale will provide strong evidence of criterion-related validity by demonstrating a positive and highly significant correlation with a structurally similar and accepted equivalent measurement instrument in the literature.
- Hypothesis 4 (H_4): The scale will statistically significantly differentiate attitudes between students who are and are not licensed athletes, within the scope of known-groups validity.

2. Materials and Methods

2.1. Study design and Participants

This study employs a methodological research design with a cross-sectional survey approach. It aims to evaluate the psychometric properties specifically the structural and criterion validity and internal consistency of the Attitudes Towards Sport Scale (ATSS), originally developed for late adolescents, within a younger cohort of middle school students. The research employed a multi-phase mixed-methods design, combining qualitative cognitive interviewing with quantitative psychometric validation to adapt the "Attitude Towards Sport Scale" (ATSS) for middle school students. Before contacting schools for this study, an application was made to the Turkish Ministry of National Education's "research permits" system, and the necessary research permission was obtained. Prior to data collection, ethical approval was obtained from the Health Sciences Institutional Ethics Committee of Mugla Sitki Kocman University (Protocol No: 240153; 19.11.2024/143). Since the participants were minors, written informed consent was secured from both their legal guardians (parents) and school administrations (Appendix A-D).

In the quantitative phase, the main study sample consisted of 577 middle school students. In this application of the study, no specific exclusion criteria were applied to schools or students; instead, a stratified purposive sampling method was used in 15 public schools selected from Marmaris in Mugla, Turkiye, where the researchers reside, to ensure representation across all grade levels (10 licensed male, 10 non-licensed male, 10 licensed female, and 10 non-licensed female per school; total 600 students). With the approval of the school administrations and physical education teachers, students from the fifth, sixth, seventh, and eighth grades were invited to participate. A general announcement was made in the schoolyards before the first lesson began. It was specifically emphasized that participation was based solely on interest in the research and that no academic advantage or exemption from classes was offered. Students were informed that a study on "physical activity habits" would be conducted, and consent forms were distributed to those who wished to participate, to be given to their parents. One week later, all forms (N=577) left at the schools' guidance and counseling offices were evaluated, and groups of five students were formed according to grade level.

These groups were invited to a guidance and counseling office on days and times deemed appropriate by the school administrations. During 5-minute preliminary inter-views, a conversation took place regarding the research, the researchers, and how to con-tribute to the study. Following this enlightening discussion, silence was observed, and the students completed the scale prepared with the revised items. It was reported that all participants completed the scales without encountering problems such as ambiguity or mis-reading, that no incomplete or incorrectly completed scales were found, and that the average time to complete the scale was 14.8 minutes for each student. The scale forms were carefully compiled into a dataset, anonymized, and stored on the responsible researcher's personal computer for confirmatory factor analysis. The demographics of the students (N=531) who participated in the quantitative part of the study and whose data were included in the confirmatory factor analysis after outliers and normality testing are presented in the table below (Table 1).

 doi:10.20944/preprints202603.0893.v1

Table 1. Demographics of Students Participating in the Quantitative Section of the Study.

Demographic	Groups	N	%	M_{GPA}	M_{DMPAT} (min.)	M_{WVPAT} (min.)
Gender	**Male**	258	48.6	87.29 ± 11.97	37.52 ± 19.68	224.19 ± 148.61
	Female	273	51.4	87.42 ± 11.10	30.90 ± 20.27	144.18 ± 112.79
Grades	**5.**	135	25.4	86.64 ± 13.35	32.59 ± 19.70	166.67 ± 114.74
	6.	142	26.7	89.37 ± 9.63	32.89 ± 20.32	167.75 ± 143.59
	7.	131	24.7	87.63 ± 10.75	35.42 ± 20.10	209.08 ± 146.069
	8.	123	23.2	85.51 ± 11.91	35.81 ± 20.91	190.98 ± 139.46
Licensed	**Yes**	268	50.5	89.30 ± 10.40	36.66 ± 19.57	235.52 ± 130.49
	No	263	49.5	85.38 ± 12.27	31.52 ± 20.61	129.58 ± 112.24

Note. DMPAT = daily mandatory physical activity time (minutes); WVPAT = weekly voluntary physical activity time (days x minutes); GPA = average grade.

2.2. Data Collection Instruments

2.2.1. Attitude Towards Sport Scale (ATSS)

The "Attitude Towards Sport Scale" (ATSS), developed by Şentürk [14], was utilized as the primary assessment tool. The adapted scale consists of 25 items across three sub-dimensions: Interest (13 items), Lifestyle (6 items), and Participation (6 items). Items are rated on a 5-point Likert scale (1=Strongly Disagree to 5=Strongly Agree). In its original validation study among late adolescents, the scale accounted for 60.6% of the total variance and exhibited a high internal consistency coefficient (Cronbach's Alpha = .97). The adaptation process ensured that the items reflect the psychomotor and social development characteristics of middle school students.

Middle school students (10-15 years old) have fresher abstract thinking skills compared to high school students. To confirm whether the statements in the 25 items were correctly understood by this age group, expert opinions (5 physical education teachers and 5 developmental psychologists) were sought, and the clarity of the items was tested using a "think-aloud" protocol with a small group of 24 participants. Consistent with the modern validity framework described by Messick [15] and Padilla and Benítez [16], validity evidence based on response processes was gathered. A 'Think-Aloud Protocol' was implemented following the guidelines of Ericsson and Simon [17] and Willis [18] to detect potential semantic ambiguities specific to the early adolescent developmental stage [19]. In particular, Woolley et al. [19] used the "Cognitive Pretesting" method to understand the cognitive processes children experience while reading and interpreting questionnaire items, and proved how critical this is for "Developmental Validity". In this context, the attitude statements or sentences that make up the scale items were evaluated and rewritten in a way that did not distort their meanings. The details of this application are comprehensively explained in the section below (2.3).

2.2.2. Physical Activity Questionnaire for Older Children (PAQ-C)

The Turkish adaptation of the PAQ-C [20], originally designed to assess general moderate-to-vigorous physical activity levels over a 7-day period, was conducted by Sert and Temel [21] for middle school populations. It was hypothesized that students exhibiting more positive attitudes on the ATSS would correspondingly report higher actual physical activity scores on the PAQ-C.

2.2.3. Perceived Physical Literacy Scale for Middle School Students

To assess the cognitive, motivational, and physical competence aspects of active lifestyle, this scale, recently developed and validated for Turkish middle school students by Akarsu et al. [22], was employed. We hypothesized a strong positive correlation between ATSS dimensions and physical literacy, as both constructs inherently share the underlying dimensions of motivation and sport-related knowledge.

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2.2.4. Personal Information Form

The study also utilized a personal information form to gather information on students' demographic characteristics. This form aimed to ascertain students' gender, grade level, academic achievement (grade point averages (GPA) out of 100 in Turkiye are available online to students and parents), daily mandatory physical activity time (minutes) [Question: Approximately how many minutes in total do you spend on physical activities (light-paced walking, cycling, climbing stairs, etc.) that you are required to do in your daily routine (going to school, going to the market, etc.)?], weekly voluntary physical activity time (days x minutes) [Question: How many days a week and approximately how many hours a day do you dedicate to voluntary intense physical activities (training, exercise, competition, etc. involving running, jumping, skipping rope, etc.)?], and formal sports participation status [Question: Have you ever held a sports license (school sports or sports club)?] by the researchers. In Türkiye, individuals cannot participate in any official sports competition without formal registration, i.e., without a sports license. Official procedures are usually handled by the student/athlete's coach or teacher, with the consent of their guardian and a medical report.

2.3. Qualitative Phase: Cognitive Validity and Think-Aloud Protocol

2.3.1. Participants and Recruitment of Qualitative Phase

A group of 27 students was selected on a voluntary basis from a middle school with a total population of 738 students. No specific exclusion criteria were applied to the school or the students; instead, a stratified purposive sampling method was employed within a selected public school to ensure representation across all grade levels. With the approval of the school administration and physical education teachers, students from the fifth, sixth, seventh, and eighth grades were invited to participate. Prior to the start of the first lesson, a general announcement was made in the schoolyard. Students were informed that a discussion regarding "physical activity habits" would be conducted and those willing to participate were invited to register at the Psychological Counseling and Guidance (PCG) office, while others proceeded to their classrooms. It was strictly emphasized that participation was based solely on interest in the research, with no academic advantages or exemptions from lessons offered.

Following this recruitment process, 27 volunteers were identified with a mean age of 156.3 months. The group consisted of 14 males and 13 females, distributed as follows: 7 students from the 5th grade, 6 from the 6th grade, 7 from the 7th grade, and 7 from the 8th grade; 14 licensed and 13 non-licensed by their school (Table S1). Written informed consent was obtained from the parents over a one-week period, specifically covering both participation and audio recording of the sessions.

2.3.2. The Process of The Think-Aloud Protocol

To identify semantic problems in the items of the original scale developed for high school students, the guidelines suggested by Willis [18] were followed. In accordance with the Think-Aloud Protocol, are a valid method that provides direct access to an individual's cognitive processes [15,17,19,23], students were invited individually to the school's PCG office for face-to-face sessions. Each session began with a five-minute preliminary interview covering the study's objectives and the nature of the protocol. This was followed by a warm-up exercise where students practiced verbalizing their internal thought processes. Once the students demonstrated proficiency in the protocol, they were asked to read the original items (developed for high school students) aloud. During this phase, the researcher remained silent to avoid interference, providing only non-directive prompts such as "Please continue to share what you are thinking" when a student fell silent.

Upon completion of the verbalization phase, a retrospective probing stage was initiated. Abstract concepts that students found difficult to comprehend were meticulously noted to facilitate the subsequent transcription process. The audio recordings were then transcribed verbatim, and error

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codes (e.g., reading errors, misinterpretations, conceptual confusion) were generated. Each session lasted an average of 38 minutes.

2.3.3. Results of The Think-Aloud Protocol

The qualitative data were evaluated through face-to-face consultations with an expert panel comprising physical education teachers and developmental psychologists. The panel reviewed expressions that students found ambiguous or difficult to understand and revised them into concrete statements appropriate for the developmental level of middle schoolers (Table S2). Consequently, the original 25-item scale was reconstructed using language easily comprehensible to the target population.

To ensure cognitive validity and capture a fresh perspective while minimizing recall bias, an iterative process was implemented. Fourteen days after the initial sessions, a second round of individual think-aloud protocols was conducted in the PCG office with the same students. In this second application, no negative feedback was received, and the clarity of each revised item was confirmed through both researcher notes and audio transcriptions. The findings from this second iteration were shared with the expert panel via email, and the protocol was successfully concluded. The final refined items were then formatted into the scale, ready for administration to the larger sample group for further psychometric testing.

One of the strongest aspects that distinguishes this research from similar studies in the literature is that the quantitative analyses are supported by evidence of cognitive validity. "Think-Aloud" protocols ensured that the scale items were stripped of abstract statements at the high school level and adapted to the concrete operational stage of early adolescence. Participants' verbal interpretation of the items ensured that the items were not only statistically but also semantically valid. This meets the principle of "validity based on response processes," which is often neglected in scale adaptation studies but is critical for a Behavioral Sciences perspective [16,18,24–26].

2.4. Data Analysis

In the quantitative phase, the main study sample consisted of 577 middle school students selected via stratified purposive sampling from 15 public middle schools. Prior to CFA, the dataset was rigorously screened. Statistical analyses to prevent model bias were performed using IBM SPSS Statistics 26.0. Univariate outliers were removed based on standardized Z-scores (±3.29), and multivariate outliers were excluded using Mahalanobis distance ($\chi^2 > 52.62$, $p < .001$), resulting in a final sample of 531 students [27–29]. As a result of these rigorous screening procedures, 46 problematic observations that could potentially distort the factor structure were removed. The remaining refined dataset of 531 participants fully satisfied the foundational assumptions required for Confirmatory Factor Analysis.

Construct validity was tested via Confirmatory Factor Analysis (CFA) using JASP software (Version 0.95.4), which is powered by the lavaan R package. The Robust Maximum Likelihood (MLR) estimator was utilized to estimate the model parameters. Model fit was evaluated using multiple indices based on the recommendations of Hair et al. (2019) and Kline (2023): the ratio of Chi-square to degrees of freedom ($\chi 2/df < 5.0$), the Comparative Fit Index ($CFI \geq .90$), the Tucker-Lewis Index ($TLI \geq .90$), and the Root Mean Square Error of Approximation ($RMSEA < .08$). Reliability was rigorously assessed by computing Composite Reliability (CR) and Average Variance Extracted (AVE) values.

To establish construct validity, known-groups validity was examined by comparing the ATSS scores of licensed athletes and unlicensed students using independent samples t-tests. This analytical step was grounded in the well-established hypothesis that licensed adolescents or those engaged in organized sports exhibit significantly more positive attitudes towards sports and physical activity compared to their non-licensed peers [30–35]. Additionally, criterion-related validity was established by examining the Pearson correlation coefficients between the ATSS subscale scores and the students' self-reported 'physical activity durations', hypothesizing a positive association between attitudinal

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levels and actual physical engagement. All preliminary and comparative analyses were performed using IBM SPSS Statistics 26.0.

To establish the criterion-related validity (concurrent validity) of the adapted Attitudes Towards Sports Scale (ATSS), two robust and conceptually aligned measurement tools were administered alongside the core instrument. Based on behavioral theories suggesting that attitudinal precursors directly influence actual physical behavior and self-efficacy, we utilized the scales, "Physical Activity Questionnaire for Older Children" (PAQ-C) and "Perceived Physical Literacy Scale for Secondary School Students" (PPLS). Pearson product-moment correlation coefficients (r) were calculated to evaluate the strength and direction of these hypothesized associations. Significant positive correlations between the ATSS and both external criteria were considered strong empirical evidence of the scale's criterion-related validity.

3. Results

3.1. Measurement Model Fit and Structural Validity

Construct validity of the adapted 25-item scale was evaluated using Confirmatory Factor Analysis (CFA) with a robust maximum likelihood estimator. The hypothesized three-factor measurement model (Interest, Lifestyle, and Participation) demonstrated an excellent fit to the empirical data of the middle school sample.

While the Chi-square statistic was significant ($\chi^2 = 693.582$, df = 272, $p < 0.001$)—a common statistical artifact in large sample sizes—the relative Chi-square ratio (χ^2 / df = 2.55) indicated a strong fit, falling well below the conservative threshold of 3.0. Furthermore, all absolute and incremental fit indices strongly supported the structural adequacy of the model: CFI = 0.968, TLI = 0.964, SRMR = 0.035, and RMSEA = 0.054 (90% CI: 0.049, 0.059) [36,37]. These robust indices definitively confirm the structural validity of the adapted multi-dimensional scale for early adolescents. Consequently, these robust fit indices provided strong empirical support for Hypothesis 1 (H_1), definitively confirming the acceptable model fit of the original three-factor structure among middle school students.

3.2. Convergent Validity and Reliability

As detailed in the parameter estimates, all items loaded strongly and significantly onto their respective latent constructs (Table 2). Standardized factor loadings (λ) ranged from 0.66 to 0.89 (all $p < 0.001$), well above the recommended threshold of 0.60, indicating that the items effectively capture the underlying dimensions without significant redundancy (Figure S1).

Convergent validity was further established through Average Variance Extracted (AVE) and Composite Reliability (CR) metrics. The AVE values for Interest (0.717), Lifestyle (0.679), and Participation (0.709) substantially exceeded the recommended 0.50 threshold. Furthermore, while not directly computed by the software, the robust internal consistency metrics imply high composite reliability, demonstrating that the latent factors explain a significant portion of the variance in their indicators [38].

Discriminant validity was confirmed by examining the inter-factor correlations. The correlations among the three latent constructs ranged from 0.72 to 0.80. Since no correlation coefficient exceeded the severe multicollinearity threshold of 0.85 [28], it was concluded that the sub-dimensions measure distinct, albeit related, aspects of sports attitudes.

Finally, the internal consistency of the scale was robust. Both Cronbach's alpha (α) and McDonald's omega (ω) coefficients yielded values ≥ 0.92 across all three sub-dimensions (Interest: $\omega = 0.971$, $\alpha = 0.970$; Lifestyle: $\omega = 0.927$, $\alpha = 0.923$; Participation: $\omega = 0.936$, $\alpha = 0.935$), providing strong evidence for the reliability of the adapted instrument for early adolescents. Collectively, these metrics of adequate average variance extracted (AVE > 0.50), composite reliability (CR > 0.92), and excellent internal consistency fully supported Hypothesis 2 (H_2).

 doi:10.20944/preprints202603.0893.v1

Table 2. Psychometric Properties of the Adapted Scale (Factor Loadings, CR, and AVE).

Item No	Factor 1 (Interest) (λ)	Factor 2 (Lifestyle) (λ)	Factor 3 (Participation) (λ)	R^2
4	0.876			0.767
7	0.871			0.759
8	0.803			0.645
9	0.790			0.624
12	0.847			0.717
13	0.894			0.799
14	0.822			0.675
15	0.820			0.672
18	0.843			0.711
19	0.882			0.778
23	0.783			0.613
24	0.874			0.763
25	0.878			0.771
1		0.766		0.587
3		0.890		0.792
5		0.863		0.744
6		0.839		0.705
17		0.656		0.431
22		0.883		0.780
2			0.839	0.703
10			0.852	0.726
11			0.818	0.669
16			0.859	0.738
20			0.871	0.758
21			0.812	0.659
AVE	0.717	0.679	0.709	
CR	0.970	0.925	0.936	
McDonald's (ω)	0.971	0.927	0.936	0.973 (Total)
Cronbach (α)	0.970	0.923	0.935	0.974 (Total)

Note. $\chi2(272) = 693.582$, $p<0.001$; $\chi2/df = 2.55$; CFI = 0.968; TLI = 0.964; RMSEA = 0.054 (90% CI [.049, .059]); All loadings are standardized and significant at $p < .001$. CR = Composite Reliability; AVE = Average Variance Extracted. Estimator = Robust Maximum Likelihood (MLR).

To provide further evidence for construct validity, the known-groups method was employed (Table 3). As expected, independent samples t-test results revealed that licensed student-athletes scored statistically significantly higher across all sub-dimensions of the ATSS compared to their non-licensed peers ($p < 0.001$). This significant differentiation underscores the scale's robust known-groups validity, proving it is capable of accurately reflecting individuals' real-life behavioral statuses (e.g., participating in organized sports, holding an athletic license, attending regular training) [39–41]. The scale's strong discriminative capacity suggests it is a highly practical screening instrument for physical education teachers and sports psychologists in talent identification and attitude monitoring. These robust findings strongly support Hypothesis 4 (H_4), verifying that the adapted scale statistically significantly differentiates attitudes between licensed athletes and non-licensed students.

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Table 3. Construct Validity: Known-Groups Comparison.

Factors	Groups	N	M	SD	t	*df*	*p*	*Cohen's d*
Interest	**Licensed**	268	55.32	10.99	8.515	529	0.001**	0.739
	Non-licensed	263	45.54	15.18				
Lifestyle	**Licensed**	268	24.82	4.25	7.991	529	0.001**	0.694
	Non-licensed	263	21.24	5.94				
Participation	**Licensed**	268	20.54	3.77	10.114	529	0.001**	0.878
	Non-licensed	263	16.61	5.10				

*p<.05; **p<.001.

Criterion-related validity was further established through Pearson correlations between the ATSS sub-dimension scores and two behavioral criteria: daily mandatory physical activity time (DMPAT) and weekly voluntary physical activity time (WVPAT) (Table 4). Interestingly, while attitude factors showed weak albeit significant associations with mandatory physical activities (DMPAT r values ranging from 0.095 to 0.121), they were moderately to strongly correlated with voluntary physical activity durations (WVPAT r values ranging from 0.422 to 0.523, $p < 0.001$). This theoretically sound distinction indicates that internalized sport attitudes are predominantly reflected in voluntary athletic engagement rather than compulsory school activities. Consistent with Eime et al. [30], these sustained voluntary behaviors act as a psychological and social shield, reinforcing the protective role of sports participation during early adolescence [42,43].

Table 4. Criterion-related validity via Pearson correlations with physical activity durations.

PA durations	ATSS	Factor 1 (Interest)	Factor 2 (Lifestyle)	Factor 3 (Participation)
DMPAT	0.113	0.095	0.121	0.104
(min.)	0.009*	0.029*	0.005*	0.017*
WVPAT	0.492	0.435	0.422	0.523
(day x min.)	0.001**	0.001**	0.001**	0.001**

Note. *p<.05; **p<.001; r = Pearson's correlation; ATSS: Attitudes Towards Sport Scale; DMPAT: daily mandatory physical activity time; WVPAT: weekly voluntary physical activity time.

To establish criterion-related validity (specifically, concurrent validity) for the adapted ATSS, Pearson product-moment correlation coefficients were calculated (Table 5). This analysis examined the bivariate relationships between the ATSS dimensions (Interest, Lifestyle, and Participation) and two established external health and behavioral criteria: the Perceived Physical Literacy Scale (PPLS; comprising Motivation, Information, Trust, and Physical dimensions) and a physical activity measure (PAQ-C: Physical Activity Questionnaire for Children). Most notably, the overall ATSS score demonstrated a remarkably high correlation with overall physical literacy (r = .923) and physical activity levels (r = .845). When examining the sub-dimensions, a strong theoretical alignment is observed. The Interest dimension, which primarily captures the cognitive and affective components of sports attitude, exhibited its highest correlations with the cognitive/psychological facets of physical literacy, specifically Motivation (r = .841), Information (r = .823), and Trust (r = .830).

Conversely, the behavioral dimensions of the ATSS (Lifestyle and Participation) aligned perfectly with behavioral outcomes. The Lifestyle dimension showed its strongest internal physical literacy correlation with the physical dimension (r = .739). Furthermore, active physical engagement, measured by the PAQ-C, correlated highly with both the Lifestyle (r = .755) and Participation (r = .757) dimensions. This nuanced correlational matrix confirms that the adapted ATSS does not merely assess a superficial inclination towards sport; rather, it effectively captures a deep-seated behavioral intent that manifests directly in early adolescents' physical literacy and actual daily physical activity habits. As detailed in Table 5, the analyses yielded positive, statistically significant, and strong

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correlations across all theoretical dimensions ($p < 0.001$), thereby providing robust empirical support for Hypothesis 3 (H_3).

Table 5. Criterion-related validity via Pearson correlations with PPLS and PAQ.

Scales/Sub-scales	ATSS	Factor 1 (Interest)	Factor 2 (Lifestyle)	Factor 3 (Participation)
PPLS	.923**	.919**	.767**	.752**
PPLS (motivation)	.802**	.841**	.560**	.647**
PPLS (information)	.810**	.823**	.639**	.657**
PPLS (trust)	.796**	.830**	.589**	.619**
PPLS (physical)	.622**	.514**	.739**	.546**
PAQ-C	.845**	.791**	.755**	.757**

Note. *p<.05; **p<.001; ATSS: Attitudes Towards Sport Scale; PPLS: the Perceived Physical Literacy Scale; PAQ-C: Physical Activity Questionnaire for Children.

4. Discussion

Early adolescence is the most critical developmental threshold at which individuals either transform physical activity habits into a lifelong lifestyle or completely abandon sports [44]. In line with the Sustainable Development Goals (SDG 3), protecting public health depends on accurately diagnosing the psychological foundations of this abandonment [45–51]. The findings of this study demonstrate that the Attitude Towards Sport Scale (ATSS) is a highly valid, reliable, and developmentally appropriate tool for measuring internalized attitudes towards sport in individuals during early adolescence.

Our findings regarding construct validity showed that the original three-factor construct (Interest, Sport Lifestyle, and Participation), designed for the high school population, was preserved with excellent fit indices in the middle school sample. High factor loadings and Composite Reliability (CR) values confirm the psychometric power of the instrument. Although the cognitive capacities of early adolescents are based on more concrete operations compared to late adolescents, the multidimensional nature of attitudes toward sport remains unchanged. This confirms that the "strong link between intention and behavior" predicted by the Theory of Planned Behavior [6] operates with the same structural integrity in early childhood as well.

One of the study's findings that contributes to the literature is the high correlation between attitude dimensions and perceived physical literacy and actual physical activity levels. The concept of physical literacy, whose foundations were laid by Whitehead [52] in the literature, encompasses not only physical competence but also motivation and confidence towards sport. Our findings show a very strong match between the Interest dimension of the ATSS and the cognitive (knowledge) and affective (motivation, confidence) dimensions of physical literacy, perfectly aligning with theoretical expectations. Furthermore, the direct prediction of physical activity duration by the Lifestyle and Participation dimensions proves the behavioral validity of the instrument. As emphasized in current healthcare publications [53–61], internalizing physical literacy and a positive attitude towards sport at an early age is the strongest preventive medicine intervention against global health crises such as obesity and sedentary lifestyles. Because the adapted ATSS scores exhibited remarkably strong correlations with actual physical activity durations (PAQ-C), the scale effectively predicts a primary healthcare outcome. Therefore, it transcends being a simple pedagogical tool and emerges as a vital screening instrument for preventive healthcare, enabling professionals to monitor and promote health-lifestyle behaviors during the critical transition of early adolescence.

Our known-groups validity results revealed that students who are licensed athletes exhibit a massive difference (large effect size) compared to their unlicensed peers in all attitude sub-dimensions. While this is expected, what is particularly noteworthy is that licensed athletes show the greatest difference in the Participation and Lifestyle dimensions. When considered within the context of Deci and Ryan's [10] Self-Determination Theory, it is seen that licensed athletes internalize sport not merely as an external obligation (a school subject) but as a part of their identity (autonomous

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motivation). Indeed, recent studies [46–48] argue that the fundamental condition for the sustainability of the physical education and sports ecosystem is to ensure that children adopt sport as a way of life (Lifestyle) rather than imposing it on them [51,62–69]. Our adapted ATSS offers precisely this opportunity to diagnose this level of "internalization" at an early age.

In conclusion, the ATSS adapted for early adolescents is not only an "attitude screening tool" for physical education teachers or sports psychologists, but also a strategic early warning system for public health professionals and education policymakers. Using this multidimensional scale to identify children's tendencies to drop out of sports rather than focusing on talent selection, and to develop preventative pedagogical interventions, will directly serve the SDG 3 vision of "healthy generations".

Limitations and Future Directions

While this study robustly validates the ATSS for early adolescents, several limitations should be acknowledged. First, the sample was drawn exclusively from 15 schools in Marmaris, Mugla, Türkiye. Although this provided a sufficiently large sample, the relatively homogeneous sociocultural structure of this distinct region may limit the generalizability of the findings. Several limitations in the current study offer clear directions for future work. First, testing the ATSS across different cultural and geographic groups will be essential to see how well these findings generalize. Additionally, because we relied on a cross-sectional design, we cannot confirm direct cause-and-effect links between a student's attitude, their physical literacy, and how active they actually are. To truly understand why early adolescents stop playing sports as they move into high school, researchers will need longitudinal studies that follow these behavioral shifts over a longer period.

Another point to consider is our use of self-reported surveys. As is typical in adolescent research, participants might overestimate their activity levels or simply misremember them due to social desirability or recall bias. Pairing the scale with objective tracking tools, such as accelerometers, would give a much more accurate picture of their real-world physical activity.

Finally, a note of caution is necessary regarding the English version of the ATSS included in Appendix E. We provided this translation mainly to help international readers understand the conceptual framework. Even though a team of bilingual experts carefully handled the translation and back-translation process, we have not yet tested this English version on a native English-speaking middle school sample. Therefore, before anyone uses the English ATSS for actual data collection, it still needs to undergo a full cross-cultural validation study. We strongly encourage international researchers to take up this task to broaden the scale's global utility.

5. Conclusions

Encouraging young adolescents to maintain active lifestyles remains a major public health challenge. To address the lack of age-appropriate measurement tools, this study adapted and validated the Attitude Towards Sport Scale (ATSS) specifically for middle school students. Our psychometric analyses—covering construct, criterion, and known-groups validity—confirm that the 25-item scale is reliable and developmentally suited for this demographic. It successfully retains its original three-factor structure: Interest, Lifestyle, and Participation. Beyond just recording student opinions, the adapted scale proved capable of predicting actual physical activity levels and perceived physical literacy. This means the ATSS serves as a practical behavioral predictor rather than just a simple attitude survey.

For professionals on the ground—such as physical education teachers, pediatric psychologists, and public health policymakers—this multidimensional tool functions as an effective screening measure. It allows them to track youth engagement in sports and to quickly spot students who are at risk of dropping out before they adopt sedentary habits. With these insights, educators can design better, more specific interventions. Ultimately, by measuring and supporting positive sport attitudes during these formative middle school years, health professionals and educators can make a tangible contribution to the lifelong well-being targets set by the United Nations' Sustainable Development

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Goal 3 (SDG 3). Ultimately, utilizing such developmentally sensitive tools is a fundamental step in transitioning youth from compulsory physical activities toward autonomous, sustainable, and lifelong athletic lifestyles.

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