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Sports Moral Identity, Achievement Motivation, Physical Fitness, and Academic Procrastination Among Junior High School Students: A Cross-Sectional Study

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Abstract: This cross-sectional study of 570 junior high school students (266 boys, 304 girls) examined the relationships among sports moral identity, achievement motivation, physical fitness, and academic procrastination, alongside the mediating roles of sports moral identity and 50-m sprint performance. Questionnaire data and school-based fitness records were analyzed using correlations, hierarchical regression, and parallel mediation models. Sports moral identity and success-approaching motivation were negatively associated with procrastination, whereas failure-avoiding motivation was positively associated, with psychological variables explaining 55.7% of the variance versus only 0.9% added by fitness indicators. Among fitness measures, only the 50-m sprint score independently predicted procrastination ($\beta = 0.095$), though its indirect effect was small, while the indirect effect via sports moral identity was substantially larger (effect = −0.205 vs. −0.015). These findings indicate that sports moral identity and achievement motivation are dominant psychological correlates of academic procrastination, with overall fitness showing no direct link, and suggest that physical education should prioritize moral identity development alongside motivational and behavioral intervention strategies.

Keywords: academic procrastination, achievement motivation, moral identity, physical fitness, physical education, junior high school students

1. Introduction

Academic procrastination refers to the voluntary delay of an intended academic action despite an expectation that the delay may lead to adverse consequences. It is widely conceptualized as a failure of self-regulation rather than a simple problem of time management (Steel, 2007). In children and adolescents, procrastination can emerge in planning, task initiation, task execution, remedial action, and reflection, and it may become increasingly consequential as students face greater autonomy and more complex academic demands (González-Brignardello et al., 2023; Nie et al., 2025). Meta-analytic evidence has linked procrastination to poorer academic performance, although the magnitude of this relationship varies according to measurement (Kim & Seo, 2015).

Early adolescence is a critical stage for the development of motivational self-regulation. The transition to middle school reshapes classroom environments, academic evaluation criteria, social comparison patterns, and self-perceived competence (Nie et al., 2026). As social-cognitive studies suggest, adolescent motivational processes are highly susceptible to developmental changes and contextual factors (Anderman & Maehr, 1994). In this developmental phase, achievement motivation serves as a pivotal predictor of academic behaviors, as students vary distinctly in their pursuit of success and avoidance of failure. Approach-oriented achievement motivation focuses individuals on ability improvement, learning progress and task accomplishment, which facilitates proactive task engagement and persistent academic effort (Cheng et al., 2026). In contrast, failure-avoidant motivation heightens sensitivity to evaluative threats in academic settings, leading to defensive avoidance and behavioral withdrawal. A landmark meta-analysis by Steel (2007) confirmed that achievement motivation and self-regulatory traits are stable predictors of academic procrastination. From the self-regulated learning perspective, students with sustained motivational

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dedication and the ability to convert learning intentions into practical actions are less prone to academic delay (Wolters, 2003).

A second, less frequently examined factor is moral identity in the context of sport. Moral identity concerns the degree to which moral traits and standards are central to the self-concept (Aquino & Reed, 2002). Sport and physical education are normatively structured environments in which fairness, honesty, responsibility, respect for rules, and obligations to others are repeatedly salient (Liu et al., 2023). Research on moral behavior in sport indicates that motivational climates and self-regulatory processes are meaningfully related to prosocial and antisocial conduct (Kavussanu & Stanger, 2017). Although moral identity is not equivalent to academic self-control, a student who internalizes responsibility and rule-consistent conduct as self-defining may regulate behavior in accordance with obligations across school contexts.

Physical fitness may constitute a third pathway. Physical activity and fitness are related to multiple aspects of adolescent health and cognitive functioning, and international evidence supports the broad health value of regular physical activity for school-aged youth (World Health Organization, 2020; Liu et al., 2023). However, the relationship between specific fitness indicators and procrastination is conceptually less direct than the relationship involving motivation. A composite fitness score could conceal associations visible only for particular indicators.

The present study integrated these domains by examining sports moral identity, achievement motivation, objectively recorded school fitness scores, and academic procrastination. Building upon the self-regulation perspective, this study aims to clarify whether sports moral identity represents an additional psychological pathway for understanding academic procrastination beyond the established role of achievement motivation, while simultaneously evaluating its relative contribution alongside objective physical fitness indicators. By integrating motivational, moral, and physical factors within a single analytical framework, the study extends existing self-regulation research and provides a more comprehensive perspective on the mechanisms underlying academic procrastination among junior high school students. We expected higher sports moral identity and stronger success-approaching motivation to be associated with lower procrastination, whereas failure-avoiding motivation was expected to be associated with higher procrastination. Psychological variables were expected to explain substantially more variance than demographic controls. The incremental role of individual fitness indicators was examined more cautiously. Finally, a parallel mediation model tested whether the 50-m sprint score and sports moral identity statistically mediated the association between total achievement motivation and academic procrastination. Given the cross-sectional design, mediation was interpreted as an indirect statistical association rather than a causal mechanism.

2. Methods

2.1 Study design and participants

A cross-sectional quantitative design was adopted. Data were collected from student questionnaires and school physical fitness test records. The final analytic sample comprised 570 junior high school students, including 266 boys (46.7%) and 304 girls (53.3%). Most participants were enrolled in Grade 7 (n = 355, 62.3%) or Grade 8 (n = 213, 37.4%), whereas only two students (0.4%) were from Grade 9. Therefore, grade-related findings should be interpreted with caution because of the extremely small Grade 9 subgroup (Table 1). Because the focal psychological variables were measured at a single time point, all findings were interpreted as statistical associations rather than causal effects. This design was appropriate for identifying multivariable relationships and estimating the relative contributions of achievement motivation, sports moral identity, and physical fitness to academic procrastination. All study procedures were conducted in accordance with the Declaration of Helsinki and were approved by the Ethics Committee of the Faculty of Psychology, Beijing Normal University. Written informed consent was obtained from all participants and their legal guardians prior to data collection.

Table 1 Participant Characteristics

Variable	Category	N	%
Gender	Boys	266	46.7
	Girls	304	53.3
Grade	Grade 7	355	62.3
	Grade 8	213	37.4
	Grade 9	2	0.4

2.2 Measures

Sports moral identity was represented by the moral-identity subdimension of the sports morality measure used in the source dataset (Li et al., 2025; Liu et al., 2026). Positively and negatively worded items were included, with reverse-worded items recoded before computing the total. Higher scores indicated that fairness, responsibility, honesty, and rule awareness in sport were more central to the student's self-understanding.

Achievement motivation comprised success-approaching motivation, failure-avoiding motivation, and a total score calculated as success-approaching motivation minus failure-avoiding motivation. A higher difference score represented a more approach-dominant motivational profile.

Physical fitness was assessed using school test records. Indicators were endurance fitness (800-m/1000-m), muscular strength (sit-ups/pull-ups), sit-and-reach flexibility, standing long jump, 50-m sprint, and the composite physical test total score. Analyses used school scoring records as supplied in the dataset.

Academic procrastination was represented by a total procrastination score. The underlying assessment covered delay in planning, execution, remedial action, and summary/reflection. Higher scores indicated more severe academic procrastination.

2.3 Statistical analysis

Descriptive statistics and Pearson correlations were calculated. Hierarchical multiple regression predicted academic procrastination in three steps: Model 1 included gender and grade; Model 2 added sports moral identity, success-approaching motivation, and failure-avoiding motivation; and Model 3 added five component fitness indicators. A parallel mediation model examined total achievement motivation as the predictor, academic procrastination as the outcome, and 50-m sprint score and sports moral identity as simultaneous statistical mediators. Indirect effects were evaluated with bootstrap confidence intervals; an effect was significant when its 95% confidence interval excluded zero. Because the data were cross-sectional, mediation denotes decomposition of an observed association and does not establish temporal ordering.

3. Results

3.1 Common method bias

Harman's single-factor test indicated that the first unrotated factor explained 30.65% of the total variance, which is below the conventional threshold of 40%. These results suggest that common method bias is not a serious concern in the present study.

3.2 Descriptive analysis

Students reported relatively high sports moral identity (M = 26.47, SD = 3.74) within the observed range of 8–30. Mean success-approaching motivation (M = 44.31, SD = 7.35) exceeded failure-avoiding motivation (M = 36.42, SD = 9.07), producing a positive mean total achievement motivation score (M = 7.89, SD = 13.11). The mean composite physical test score was 79.16 (SD = 5.71). Academic procrastination showed substantial dispersion (M = 34.83, SD = 14.01; range = 17–75), indicating meaningful between-student variability(see Table 2).

Table 2 Descriptive Statistics of Study Variables (N = 570)

Variable	N	Minimum	Maximum	Mean	Standard Deviation
Moral identity of sports morality	570	8	30	26.4667	3.74397
Success-approaching achievement motivation	570	19	60	44.307	7.35245
Failure-avoiding achievement motivation	570	15	60	36.4211	9.07254
Total achievement motivation (Success − Failure)	570	-28	45	7.886	13.11244
Endurance fitness (800m/1000m)	570	10	100	76.6719	11.86625
Muscular strength fitness (sit-ups/pull-ups)	570	0	100	68.5368	9.69968
Sit-and-reach flexibility	570	20	100	73.7982	11.4442
Standing long jump	570	0	100	75.6789	13.98306
50-m sprint	570	0	100	83.4877	12.85039
Composite physical test total score	570	50.3	95.1	79.1621	5.7091
Academic procrastination	570	17	75	34.8263	14.01467

3.3 Correlations among study variables

The correlation matrix revealed a coherent motivational pattern(see Table 3). Sports moral identity was positively correlated with success-approaching motivation ($r = 0.536$, $p < .01$) and total achievement motivation ($r = 0.506$, $p < .01$), and negatively correlated with failure-avoiding motivation ($r = -0.297$, $p < .01$). Most importantly, sports moral identity showed a strong negative association with academic procrastination ($r = -0.611$, $p < .01$).

Success-approaching motivation was negatively correlated with academic procrastination ($r = -0.635$, $p < .01$), whereas failure-avoiding motivation was positively correlated with procrastination ($r = 0.434$, p

< .01). Total achievement motivation had the largest absolute bivariate correlation with procrastination (r = -0.656, p < .01). Students characterized by stronger success orientation and a more favorable approach-versus-avoidance motivational balance tended to report substantially less academic delay.

Fitness indicators showed a differentiated pattern. The composite physical test total score was essentially unrelated to academic procrastination (r = -0.009). Endurance, muscular strength, flexibility, and standing long jump also showed no significant bivariate associations with procrastination. In contrast, the 50-m sprint score was positively associated with academic procrastination (r = 0.181, p < .01)

Table 3 Correlation Matrix of Study Variables (N = 570)

Variable	1	2	3	4	5	6	7	8	9	10	11
1	1										
2	0.536**	1									
3	-0.297**	-0.267**	1								
4	0.506**	0 .745**	-0.841**	1							
5	-0.008	-0.03	0.046	-0.049	1						
6	0.041	0.037	-0.058	0.061	0.081	1					
7	-0.113**	-0.032	0.02	-0.032	-.083*	0.037	1				
8	0.019	0.058	0.103*	-0.039	.122**	.093*	-0.015	1			
9	-0.056	-0.127**	0.160**	-0.182**	.109**	.094*	-0.044	0.112**	1		
10	0.075	0.001	0.061	-0.042	.535**	0.379**	0.091*	0.404**	0.603**	1	
11	-0.611**	-0.635**	0.434**	-0.656**	0.018	-0.042	0.057	-0.048	0.181**	-0.009	1

*Note. 1 = Sports moral identity; 2 = Success-approaching achievement motivation; 3 = Failure-avoiding achievement motivation; 4 = Total achievement motivation; 5 = Endurance fitness; 6 = Muscular strength; 7 = Sit-and-reach; 8 = Standing long jump; 9 = 50-m sprint; 10 = Composite physical test score; 11 = Academic procrastination. * p < .05. ** p < .01 (two-tailed).*

3.4 Hierarchical regression predicting academic procrastination

The demographic control model was statistically significant but explained little variance in academic procrastination ($R^2 = 0.017$, adjusted $R^2 = 0.013$). Grade was a significant predictor in Model 1 (B = 3.660, β = 0.129), whereas gender was not(see Table 4).

Adding sports moral identity and the two achievement-motivation components dramatically improved prediction. Model 2 explained 55.7% of the variance, representing an incremental 54.0% beyond controls ($\Delta R^2 = 0.540$, p < 0.001). Sports moral identity independently predicted lower procrastination (B = −1.204, β = -0.322, p < 0.001). Success-approaching motivation was the strongest unique negative predictor (B = −0.770, β = -0.404, p < 0.001), while failure-avoiding motivation independently predicted higher procrastination (B = 0.367, β = 0.238, p < 0.001). After these psychological variables were entered, the grade effect was reduced to near zero.

Adding fitness indicators in Model 3 yielded a small but significant increase in explained variance ($\Delta R^2 = 0.009$, p < .01); the final model explained 56.6% of variance (adjusted $R^2 = 0.558$). Psychological coefficients remained robust. Among fitness indicators, only the 50-m sprint score was a significant unique predictor (B = 0.104, β = 0.095, p < .01). Standing long jump, flexibility, endurance, and muscular strength were not significant. Thus, the dominant explanatory contribution came from psychological variables rather than physical fitness.

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Table 4 Hierarchical Multiple Regression Predicting Academic Procrastination (N = 570)

Predictor	Model 1 (Controls)	Model 2 (Psychological Variables Added)	Model 3 (Fitness Indicators Added)
Constant	30.132***	89.957***	82.595***
Gender	-0.234 (-0.008)	0.10098	0.125491
Grade	3.660** (0.129)	0.043 (0.002)	1.127 (0.040)
Moral Identity (Sports Morality)	—	-1.204*** (-0.322)	-1.204*** (-0.322)
Success-Approaching Motivation	—	-0.770*** (-0.404)	-0.747*** (-0.392)
Failure-Avoiding Motivation	—	0.367*** (0.238)	0.347*** (0.224)
50-m Sprint Score	—	—	0.104** (0.095)
Standing Long Jump	—	—	-0.047 (-0.047)
Sit-and-Reach Flexibility	—	—	-0.020 (-0.016)
Endurance (800m/1000m)	—	—	0.011 (0.010)
Muscular Strength	—	—	0.020 (0.014)
R	0.129	0.746	0.752
R^2	0.017	0.557	0.566
Adjusted R^2	0.013	0.553	0.558
ΔR^2	—	0.540***	0.009**
F for Model	4.787*	141.653***	72.949***

*Note. Unstandardized coefficients are shown first; standardized coefficients are in parentheses where supplied in the source results. * p < .05. ** p < .01. *** p < 0.001.*

3.5 Parallel mediation analysis

The parallel mediation model explained 54.1% of the variance in academic procrastination (R = 0.736, R^2 = 0.541, F = 222.28). Total achievement motivation remained a significant negative predictor after both mediators were included (B = −0.481, SE = 0.036, t = −13.41, p < 0.001, 95% CI [−0.552, −0.411]). Sports moral identity was negatively associated with procrastination (B = −1.418, SE = 0.124, t = −11.464, p < 0.001), whereas the 50-m sprint score showed a positive coefficient (B = 0.085, SE = 0.032, t = 2.695, p = 0.007).

Both indirect effects were significant. The indirect association through the 50-m sprint score was small (effect = −0.015, Boot SE = 0.007, 95% CI [−0.032, −0.004]). The indirect association through sports moral identity was much larger (effect = −0.205, Boot SE = 0.023, 95% CI [−0.252, −0.160]). The total indirect effect was −0.220 (Boot SE = 0.025, 95% CI [−0.271, −0.174]). Persistence of the direct association together with significant indirect associations is consistent with partial statistical mediation. The moral-identity indirect effect accounted for the great majority of the total indirect association(see Table 5).

Table 5 Parallel Mediation Model Predicting Academic Procrastination

Predictor / Path	B/Effect	SE/Boot SE	t	p	95% CI	Significance
Regression model (R=.736, R^2=.541, F=222.28)						
Constant	69.042	4.064	16.988	< 0.001	[61.060, 77.025]	—
X (Total achievement motivation)	-0.481	0.036	-13.41	< 0.001	[-.552, -.411]	—
M_1 (50-m sprint)	0.085	0.032	2.695	0.007	[.023, .147]	—
M_2 (Moral identity)	-1.418	0.124	-11.464	< 0.001	[-1.661, -1.175]	—
Direct & indirect effects						
Direct X→Y	-0.481	0.036	—	—	[-.552, -.411]	Significant
Indirect X→M_1→Y	-0.015	0.007	—	—	[-.032, -.004]	Significant
Indirect X→M_2→Y	-0.205	0.023	—	—	[-.252, -.160]	Significant
Total indirect effect	-0.22	0.025	—	—	[-.271, -.174]	Significant

4. Discussion

This study surveyed 570 junior high students to explore the correlations among sports moral identity, achievement motivation, physical fitness and academic procrastination, yielding three core outcomes. Achievement motivation and sports moral identity strongly predicted procrastination; total achievement motivation was the top correlate, consistent with the view that procrastination is self-regulatory failure (Steel, 2007). Success-approaching motivation drives active academic engagement, while failure-avoidant motivation triggers task escape for temporary emotional relief (Sirois, 2023; Qu et al., 2025). Psychological variables explained far more incremental variance than demographics and fitness. Parallel mediation detected two indirect paths via 50-m sprint and sports moral identity, with the moral identity effect vastly larger. Regression confirmed approach and avoidance motivation are independent opposite predictors, so interventions should cultivate approach goals and reduce failure avoidance.

The negative link between sports moral identity and procrastination is this study's key contribution. Moral identity theory states moral traits can form core self-concepts and guide consistent behaviors (Aquino & Reed, 2002). Sports moral identity covering responsibility, fairness and rule compliance transfers self-regulatory standards to academics and reduces schoolwork avoidance, consistent with prior sports moral research (Kavussanu & Stanger, 2017). The 50-m sprint is the only fitness indicator with unique predictive value. Notably, its direct regression coefficient positively predicts academic procrastination, while its indirect effect via achievement motivation is negative, reflecting complex multivariate suppression effects that cannot be fully clarified by current data. Its indirect path is far weaker than that of sports moral identity.

Overall fitness composite and most sub-dimensions had no significant correlation with procrastination, dismissing the simplistic view that higher fitness equals less academic delay. The contradictory sprint result may stem from measurement particularity: 50-m sprint emphasizes short-term explosive competition rather than sustained self-discipline, and its score is easily disturbed by temporary test mood, effort input and short competitive arousal, failing to reflect long-term self-regulation capacity (Ma et al., 2025; Qiu et al., 2025). No reliable physiological linkage between sprint performance and academic procrastination was identified in this cross-sectional dataset. Future research should control confounding factors including habitual exercise volume, sedentary time and sleep status, adopt unified raw sprint scores instead of standardized fitness grades, and incorporate executive function indicators to distinguish transient competitive performance from stable self-regulation traits, so as to further untangle the mixed correlation between sprint and academic procrastination.

The research provides targeted practical implications for physical education and anti-procrastination intervention. After controlling psychological variables, the predictive effect of grade on procrastination disappeared, meaning grade-based procrastination gaps originate from motivational and identity differences rather than age itself (Anderman & Maehr, 1994). For physical education, teachers can build students' sports moral identity via reflective debriefing, student responsibility systems and mastery-oriented feedback, creating autonomy-supportive sports atmospheres that foster prosocial self-regulation (Kavussanu & Stanger, 2017). For procrastination intervention, educators should highlight progress and short-term specific goals to reduce failure avoidance, split complex assignments into small milestones to improve task expectancy following temporal motivation theory. Intervention plans ought to combine motivational support with concrete behavioral frameworks instead of relying on empty persuasion alone (van Eerde & Klingsieck, 2018).

This study has several limitations. First, the cross-sectional design precludes causal inference, and the mediation results should be interpreted as statistical associations rather than causal pathways. Second, all psychological variables were self-reported, which may introduce common method bias. Although Harman's single-factor test suggested no serious bias, it is only a preliminary diagnostic approach; future studies should adopt more rigorous methods, such as marker-variable techniques or latent method-factor models (Podsakoff et al., 2003). Third, the sample primarily included Grade 7 and Grade 8 students, with only two Grade 9 participants, limiting the generalizability of the findings to older adolescents. Future research should employ longitudinal designs with more representative samples and incorporate objective measures to further validate the findings.

5. Conclusion

This study highlights sports moral identity and achievement motivation as core psychological determinants of academic procrastination in junior high students, with approach and avoidance motivations working in opposite directions. Overall physical fitness bears little relevance to procrastination, while the marginal role of the 50-m sprint likely reflects transient competitive arousal rather than stable self-regulation. Sports moral identity emerges as a key mediating pathway, implying that values of responsibility and fairness internalized in physical education may transfer to academic self-discipline. Grade-related procrastination differences stem from motivational disparities rather than age. Accordingly, physical education should deliberately nurture moral identity through reflective and mastery-oriented practices, and procrastination interventions must pair motivational support with concrete behavioral strategies like task structuring and proximal goal setting.

Conflict of Interest

The author declares that they have no conflicts of interest in this work.

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