INTERNATIONAL JOURNAL OF -EXERCISE SCIENCE-

Original Research

How Achievement Goal Orientations Shape Scheduled-Time Physical Activity: The Moderated Mediating Role of Self-Regulation Under Self-Efficacy Conditions

Luqmanul Hakim‡[1*], Bagus Nurul Iman‡[2], Mochamad Guntur†[3], Ramadhany Hananto Puriana*[1], Kholis Amalia Nofianti*[4]

[1]Department of Physical Education, Universitas PGRI Adi Buana Surabaya, Surabaya, Indonesia; [2]Department of Elementary School Education, Universitas Muhammadiyah Cirebon, Cirebon, Indonesia; [3]Department of Elementary School Education, Institut Prima Bangsa, Cirebon, Indonesia; [4]Department of Pharmaceutical Science, Universitas Airlangga, Surabaya, Indonesia

*Student Investigator, †Early-career investigator, ‡Established Investigator

Abstract

International Journal of Exercise Science 19(7): 7013, 2026. *https://doi.org/10.70252/IJES2026713*

Despite growing emphasis on motivational enhancement in youth physical activity research, evidence suggests that increased self-regulatory tendencies do not consistently translate into structured physical activity behavior among elementary school students. This study aimed to (1) investigate the indirect effects of mastery-approach and performance-avoidance goals on scheduled-time physical activity (STPA) through self-regulation, and (2) examine whether self-efficacy conditions the self-regulation–STPA relationship. A cross-sectional quantitative design was employed involving 240 elementary school students. Data were analyzed using moderated mediation modeling (PROCESS Model 14). Mastery-approach significantly predicted self-regulation (β = .382, 95% CI [.271, .493]), and performance-avoidance also showed a positive association with self-regulation (β = .266, 95% CI [.133, .398]), contrary to the hypothesized direction. Self-regulation did not significantly predict STPA in either model (β = .026, p = .748; β = .085, p = .263). The self-regulation × self-efficacy interaction was also non-significant (β = .067, p = .368; β = .072, p = .342), and the indices of moderated mediation included zero. Thus, the findings do not support the proposed mediation or moderated mediation pathways. The results instead indicate that achievement-goal orientations were associated with self-regulatory processes, while the translation of regulation into scheduled physical activity was not established in this cross-sectional sample. These findings highlight the need to examine motivational, behavioral, and contextual factors together when studying structured physical activity in children.

Keywords: Achievement goals, performance-avoidance, scheduled-time physical activity, self-efficacy, self-regulation

Introduction

Regular participation in physical activity is essential for physical health, psychological well-being, and long-term disease prevention. However, global surveillance reports from the World Health Organization indicate that physical inactivity remains one of the leading behavioral risk factors for noncommunicable diseases worldwide.[1,2] This persistent gap across both industrialized and

Corresponding Author: Luqmanul Hakim; Email: luqmanulhakim@unipasby.ac.id

developing nations suggests that environmental access and public health campaigns alone are insufficient to ensure sustained engagement in structured or scheduled-time physical activity.[3–6] Accordingly, the persistence of low activity despite public-health and environmental efforts suggests that motivational and self-regulatory processes also warrant attention when explaining engagement in structured or scheduled-time physical activity.

Recent research in sport psychology has emphasized the role of self-regulation and self-efficacy in translating behavioral intentions into consistent action.[7,8] Self-regulation enables individuals to plan, monitor, and adjust goal-directed behavior,[9] while self-efficacy strengthens confidence in executing actions despite barriers.[10] Systematic and theoretical work also indicates that motivation and personality contribute to physical activity behavior, suggesting that proximal regulatory processes should be considered alongside more distal motivational orientations.[11,12] The present study therefore focuses specifically on whether achievement-goal orientations are associated with self-regulation and whether that regulatory process is linked to STPA under different self-efficacy conditions.

Achievement Goal Theory provides a theoretically grounded framework to address this issue. Within the 2×2 framework, mastery-approach goals emphasize self-improvement and competence development, whereas performance-avoidance goals focus on avoiding negative normative evaluation.[13–15] Existing studies have examined achievement goals in academic and sport settings and have linked mastery-oriented goals with adaptive goal-pursuit processes, while approach–avoidance motivation has also been examined in relation to self-regulation and performance.[16–18] What remains insufficiently specified is whether these distal orientations are associated with self-regulation in structured school physical activity and whether any such association translates into STPA through a conditional regulatory pathway. The present study addresses this specific gap by proposing a conditional process model in which mastery-approach and performance-avoidance goals predict STPA indirectly through self-regulation, with self-efficacy tested as a second-stage moderator.

The present study addresses these gaps by proposing a conditional process model in which mastery-approach and performance-avoidance goals predict scheduled-time physical activity indirectly through self-regulation, with self-efficacy moderating the regulatory pathway. The model is grounded in Achievement Goal Theory and prior work linking achievement orientation with self-regulatory processes.[13–20] The following hypotheses were specified before analysis:

Table 1. Hypothesis summary.

Hypothesis	Proposed relationship
H1a	Mastery-approach goals are positively associated with self-regulation.
H1b	Performance-avoidance goals are negatively associated with self-regulation.
H2	Self-regulation is positively associated with STPA.
H3a	Self-regulation mediates the relationship between mastery-approach goals and STPA.
H3b	Self-regulation mediates the relationship between performance-avoidance goals and STPA.
H4	Self-efficacy moderates the relationship between self-regulation and STPA; the relationship is expected to be stronger at higher self-efficacy.
H5a	The indirect effect of mastery-approach goals on STPA through self-regulation is conditional on self-efficacy.
H5b	The indirect effect of performance-avoidance goals on STPA through self-regulation is conditional on self-efficacy.

Methods

Achievement Goal Orientations and Self-Regulation

Within the 2×2 achievement goal framework, mastery-approach goals are generally associated with adaptive motivational patterns, including persistence, strategic effort, and constructive coping. Individuals endorsing mastery-approach goals focus on personal growth and competence development, which aligns with greater engagement in planning and behavioral monitoring.[16] In contrast, performance-avoidance goals emphasize avoiding negative evaluation, often generating anxiety and disengagement that undermine sustained regulatory effort.[14,17,18] Because scheduled-time physical activity requires deliberate planning and persistence, achievement goals are expected to influence participation primarily through regulatory mechanisms.

Self-regulation refers to the capacity to initiate, sustain, and adjust goal-directed behavior. In structured physical activity contexts, it encompasses scheduling, adherence monitoring, and persistence despite competing demands.[19] Achievement goals are conceptualized as distal motivational antecedents shaping regulatory engagement, which in turn predicts behavioral consistency.[20]

The Moderating Role of Self-Efficacy.

Although self-regulation organizes behavior, its translation into action may depend on efficacy beliefs. Individuals with strong regulatory strategies but low self-efficacy may hesitate to implement planned behaviors. Conversely, high self-efficacy may amplify the effectiveness of regulatory processes by reinforcing persistence and resilience.[21]

Conditional Indirect Effects.

Integrating these arguments, achievement goals represent distal motivational orientations, self-regulation functions as the proximal mechanism, and self-efficacy operates as a boundary condition.

The conceptual moderated mediation framework, estimated using Andrew F. Hayes' PROCESS macro (Model 14), is illustrated in Figure 1.

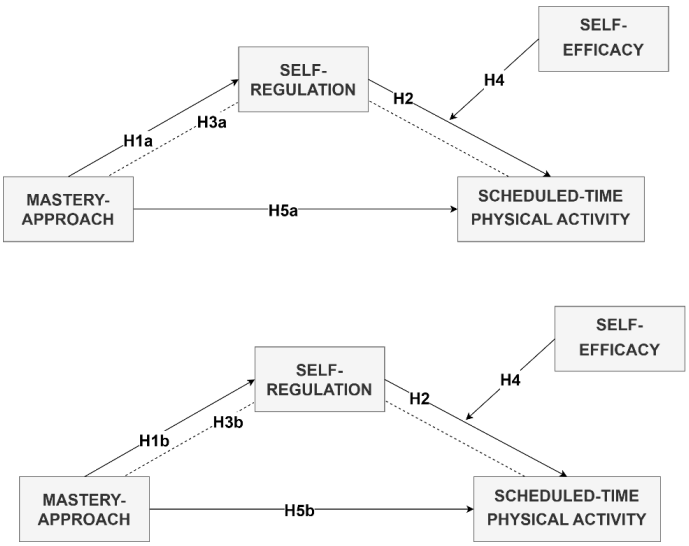


Figure 1. Conceptual moderated mediation model.

Research Design

This study employed a cross-sectional quantitative design to test a moderated mediation model using regression-based conditional process analysis. Data were collected through structured self-report questionnaires administered in a single assessment wave. Although the design does not permit causal inference, it is appropriate for testing theoretically derived indirect and conditional effects. The study protocol was reviewed and approved by the institutional research ethics committee. All procedures complied with established ethical standards for research involving human participants. This research was carried out fully in accordance with the ethical standards of the International Journal of Exercise Science.[22]

Participants

The participants were 240 fourth- to sixth-grade students (aged 10–12 years) recruited from public elementary schools in Surabaya. Inclusion criteria were: enrollment in grades 4–6, age 10–12 years, physical capability to participate in regular physical activity, parental consent, and student assent. Students were excluded if they did not meet the eligibility criteria, did not provide the required consent/assent, or were unable to participate in regular physical activity. The age range was selected to capture late childhood developmental stages, during which motivational orientations and self-regulatory capacities begin to consolidate in structured academic and extracurricular contexts. Participation was voluntary, and both parental consent and student assent were obtained in accordance with ethical standards for research involving minors.

Measures

Data were collected using closed-ended questionnaires measuring achievement goals (mastery-approach and performance-avoidance), self-regulation in physical activity, self-efficacy for exercise, and scheduled-time physical activity engagement. Questionnaires were administered in supervised classroom settings to ensure comprehension and standardized instructions. The instruments were adapted to the physical-activity context from the achievement-goal, self-regulation, and self-efficacy literature cited in this manuscript; the source file does not retain a separate instrument-development record or exact original-item citation for each adapted scale. The sample size (N = 240) was considered adequate for detecting small-to-moderate conditional indirect effects using bootstrapping procedures in regression-based moderated mediation analysis. All constructs were assessed using validated instruments adapted to the physical activity context. Items were rated on 5-point Likert scales (1 = strongly disagree to 5 = strongly agree). Composite scores were calculated by averaging item responses.

Achievement goal orientations were assessed using adapted subscales from the 2×2 Achievement Goal Questionnaire, focusing on mastery-approach and performance-avoidance dimensions. The manuscript retains these adapted subscales but does not retain the exact original questionnaire citation or item-development documentation; therefore, the present revision does not claim a more specific instrument lineage than is supported by the study record. The mastery-approach subscale comprised 11 items (e.g., "I strive to improve my personal performance in physical activity"), reflecting an individual's emphasis on self-improvement and competence development. The performance-avoidance subscale consisted of 10 items (e.g., "I try to avoid performing worse than others during exercise"), capturing the tendency to avoid demonstrating lower ability relative to others. Self-regulation was measured using nine items that assessed planning, monitoring, and persistence in physical activity (e.g., "I schedule my exercise sessions in advance"), indicating individuals' capacity to manage and sustain their exercise behavior

systematically [19,20]. Self-efficacy was assessed through nine items evaluating confidence in maintaining exercise despite potential barriers (e.g., "I am confident I can exercise even when I feel tired"), representing perceived capability to persist in physical activity under challenging conditions [10,21]. Scheduled-time physical activity was operationalized as self-reported frequency and consistency of engagement in planned exercise sessions per week, reflecting structured and intentional participation in physical activity.

Reliability coefficients exceeded acceptable thresholds ($\alpha \geq .70$). The manuscript does not retain the individual reliability coefficients, so exact α values are not reported here. Data were screened for outliers and multicollinearity prior to analysis. No serious violations were detected. Hypotheses were tested using PROCESS macro (Model 14) by SPSS.[23,24] Separate models were estimated for mastery-approach and performance-avoidance goals. Continuous predictors were mean-centered prior to interaction analysis. Indirect effects were estimated using 5,000 bootstrap resamples with bias-corrected 95% confidence intervals. Moderated mediation was supported if the index of moderated mediation confidence interval excluded zero. Standardized coefficients (β) were reported to facilitate interpretation of effect sizes.

Protocol

Following informed parental consent and student assent, participants completed the structured self-report questionnaires in supervised classroom settings. Standardized instructions were provided to support comprehension and ensure consistent administration across participants. The assessment was conducted in a single wave. The source manuscript does not record the exact interval between consent and assessment or the exact questionnaire administration time; therefore, these durations are not inferred in the revision. The questionnaires assessed achievement goal orientations, self-regulation in physical activity, self-efficacy for exercise, and scheduled-time physical activity engagement. All participants responded to the same 5-point Likert-scale format, and the data were collected during a single assessment wave.

Statistical Analysis

Data analysis was performed using IBM SPSS Statistics with Andrew F. Hayes' PROCESS macro (Model 14). The proposed conceptual framework was examined using regression-based conditional process analysis, which allows the simultaneous estimation of direct, indirect, and conditional indirect effects within a single analytical model. This analytical approach was selected because it provides robust estimates of mediation and moderated mediation effects while accommodating continuous predictor and moderator variables. Statistical inference was based on regression parameter estimates and bootstrap confidence intervals to determine the significance of the hypothesized relationships.

Procedure Analysis

The statistical analysis was conducted in a sequential manner. Initially, data quality and regression assumptions were evaluated before hypothesis testing. The retained output reports the multicollinearity diagnostics (tolerance and VIF) and indicates that no serious violations were detected; additional numeric assumption-test statistics were not retained in the source manuscript and are therefore not added here. Finally, the conditional indirect effects were interpreted by comparing the estimated effects across different levels of self-efficacy to determine whether the mediating role of self-regulation varied according to the proposed moderation mechanism.

Results

Prior to hypothesis testing, the measurement model was evaluated to verify the validity and reliability of all constructs. The assessment demonstrated that the measurement model satisfied the recommended psychometric criteria. All constructs achieved acceptable convergent validity, with indicator loadings exceeding the recommended threshold and Average Variance Extracted (AVE) values above .50. Discriminant validity was confirmed using the Fornell–Larcker criterion, cross-loadings, and the Heterotrait–Monotrait Ratio (HTMT), indicating adequate distinctiveness among constructs. Furthermore, Composite Reliability (CR) and Cronbach's Alpha (CA) values exceeded the recommended threshold of .70, confirming satisfactory internal consistency. Collectively, these findings indicate that the measurement model was robust and suitable for subsequent structural and moderated mediation analyses.

Following confirmation of the measurement model, preliminary diagnostic analyses were performed to examine the assumptions underlying the regression-based moderated mediation models. Multicollinearity was examined using tolerance and Variance Inflation Factor (VIF) values. As presented in Table 1, tolerance values ranged from .640 to .927 and VIF values ranged from 1.078 to 1.562, all well below the conservative threshold of 10. These findings indicate that multicollinearity did not pose a concern and that the regression coefficients could be interpreted with confidence. All moderated mediation analyses were estimated using PROCESS Model 14 with heteroscedasticity-consistent (HC3) standard errors and 5,000 bootstrap resamples.

Table 1. Multicollinearity diagnostic statistics.

Variable	Tolerance	VIF
Mastery-approach (MApp)	.840	1.190
Performance-avoidance (PAv)	.927	1.078
Self-Regulation (SR)	.640	1.562
Self-Efficacy (SE)	.783	1.277

Note. Dependent variable: Scheduled-Time Physical Activity (STPA).

Model 1: Mastery-Approach as Predictor

The first stage of the analysis assessed the effect of mastery-approach goals on the mediator (Path a). Results indicated a statistically significant and positive association between mastery-approach and self-regulation, $\beta = .382$, SE = .056, $t(238) = 6.80$, $p < .001$, 95% CI [.271, .493]. Mastery-approach accounted for 15.5% of the variance in self-regulation, $R^2 = .155$, $F(1,238) = 46.27$, $p < .001$. The standardized coefficient indicates a moderate association, while the 15.5% explained variance provides a useful estimate of the relationship's substantive magnitude within this mediator model; practical impact should nevertheless be interpreted cautiously because the study is cross-sectional.

Subsequently, the full moderated model predicting STPA was examined. The overall model was not statistically significant, $R^2 = .027$, $F(4,235) = 1.50$, $p = .204$. Self-regulation did not significantly predict STPA ($\beta = .026$, SE = .082, $p = .748$), indicating that H2 was not supported. Furthermore, the interaction between self-regulation and self-efficacy (SR × SE) was non-significant ($\beta = .067$, SE = .075, $p = .368$). The inclusion of the interaction term did not significantly improve model fit ($\Delta R^2 = .005$, $p = .368$), thereby failing to support H4. Thus, the available results do not support a self-efficacy moderation of the self-regulation–STPA association.

Bootstrapping procedures with 5,000 resamples were employed to test the conditional indirect effects. The indirect effect of mastery-approach on STPA via self-regulation was non-significant at both low and high levels of self-efficacy, as all 95% confidence intervals included zero. Additionally, the Index of Moderated Mediation was non-significant (*Index = .026, BootSE = .029, 95% CI [−.026, .088]*), indicating that the indirect effect of mastery-approach on STPA was not contingent upon levels of self-efficacy. Consequently, H3a and H5a were not supported.

Overall, within this model, only H1a received empirical support. Although mastery-approach was positively associated with self-regulation, neither the self-regulation pathway to STPA nor the proposed conditional indirect effect was statistically supported.

Table 2. Model 1: x = mastery-approach.

Path	*β*	*SE*	*t*	*p*	LLCI	ULCI	Decision
MApp → SR (H1a)	.382	.056	6.80	<.001	.271	.493	Supported
SR → STPA (H2)	.026	.082	.32	.748	-.135	.188	Not Significant
SE → STPA	-.151	.091	-1.66	.098	-.331	.028	Not Supported
SR × SE (H4)	.067	.075	.90	.368	-.080	.214	Not Supported
Model R^2	.027						

*H3a (Indirect effect MApp → SR → STPA) → Not Supported

H5a (Moderated mediation) → Not Supported.

Model 2: Performance-Avoidance as Predictor

The second model examined performance-avoidance goals as the predictor variable. Path a analysis revealed a statistically significant positive association between performance-avoidance and self-regulation, $\beta = .266$, $SE = .067$, $t(238) = 3.95$, $p < .001$, 95% CI [.133, .398]. Performance-avoidance explained 6.7% of the variance in self-regulation, $R^2 = .067$, $F(1,238) = 15.63$, $p < .001$. The positive direction was opposite to the hypothesized negative association; therefore, H1b was not supported despite the statistically significant coefficient.

Table 3. Model 2: x = performance-avoidance.

Path	*β*	SE	t	p	LLCI	ULCI	Decision
PAv → SR (H1b)	.266	.067	3.95	<.001	.133	.398	Not Supported (direction inconsistent)
SR → STPA (H2)	.085	.076	1.12	.263	-.064	.234	Not Supported
SE → STPA	-.155	.091	-1.70	.091	-.334	.025	Not Significant
SR × SE (H4)	.072	.075	.95	.342	-.077	.220	Not Supported
Model R^2	.020						

*H3b (Indirect effect PAv → SR → STPA) → Not Supported

H5b (Moderated mediation) → Not Supported.

The full model predicting STPA was again non-significant, $R^2 = .020$, $F(4,235) = 1.10$, $p = .355$. Self-regulation did not significantly predict STPA ($\beta = .085$, $SE = .076$, $p = .263$). Likewise, the interaction between self-regulation and self-efficacy was non-significant ($\beta = .072$, $SE = .075$, $p = .342$), and the addition of the interaction term did not significantly increase explained variance ($\Delta R^2 = .005$, $p = .342$). Thus, H2 and H4 were not supported in this model.

Table 4. Conditional effects of self-regulation on STPA at levels of self-efficacy: Model 1 (mastery-approach).

Self-efficacy level	Moderator value	Conditional effect (β)
Low (−1 SD)	−.97	−.039
Mean	0.00	.026
High (+1 SD)	+.97	.091

Table 5. Conditional effects of self-regulation on STPA at levels of self-efficacy: Model 2 (performance-avoidance).

Self-efficacy level	Moderator value	Conditional effect (β)
Low (−1 SD)	−.97	.015
Mean	0.00	.085
High (+1 SD)	+.97	.155

Across both models, the interaction between self-regulation and self-efficacy was non-significant. For illustrative purposes, the conditional effect of self-regulation on STPA at low (−1 SD), mean, and high (+1 SD) levels of self-efficacy is presented in Figure 2 and Tables 4 and 5. The plotted slopes should therefore be interpreted descriptively rather than as evidence of a statistically significant moderation effect. Across both models, empirical support was limited to H1a, demonstrating that mastery-approach goals positively predict self-regulation. Although performance-avoidance goals also showed a statistically significant association with self-regulation, the unexpected positive direction precluded support for H1b. No evidence was found to support the direct effect of self-regulation on STPA (H2), its mediating role (H3a, H3b), or the moderating influence of self-efficacy on the direct or indirect pathways (H4, H5a, H5b). The non-significant indices of moderated mediation further indicate that the indirect effects of achievement goal orientations on scheduled physical activity were not conditionally dependent on self-efficacy within this sample. Taken together, the findings support an association between achievement-goal orientation and self-regulatory processes, but they do not establish that self-regulation or self-efficacy translated those orientations into scheduled physical activity.

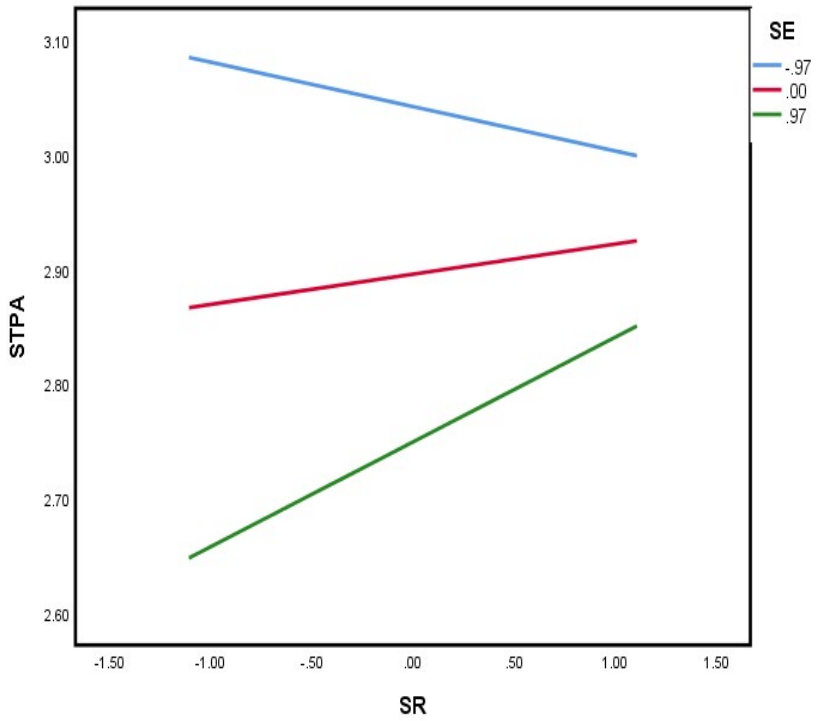


Figure 2. Interaction between self-regulation and self-efficacy predicting scheduled-time physical activity.

Across both models, empirical support was limited to H1a, demonstrating that mastery-approach goals positively predict self-regulation. Although performance-avoidance goals also showed a statistically significant association with self-regulation, the unexpected positive direction precluded support for H1b. No evidence was found to support the direct effect of self-regulation on STPA (H2), its mediating role (H3a, H3b), nor the moderating influence of self-efficacy on either the direct or indirect pathways (H4, H5a, H5b). The non-significant indices of moderated mediation further confirm that the indirect effects of achievement goal orientations on scheduled physical activity are not conditionally dependent on self-efficacy within this sample. Taken together, these findings suggest that while achievement goal orientations, particularly mastery-approach, play a meaningful role in shaping internal regulatory processes, self-regulation alone may be insufficient to drive engagement in structured physical activity. Additional contextual, environmental, or behavioral determinants may be necessary to translate motivational dispositions into consistent physical activity behavior. This pattern aligns with prior evidence indicating that regulatory and efficacy-related constructs, although theoretically central, do not consistently produce robust indirect or conditional effects on behavioral outcomes.[25] Previous findings have also shown that self-efficacy and self-control may demonstrate positive psychological associations without necessarily strengthening structural differences in behavioral engagement.[26] Likewise, regulatory styles such as planning and programming have been identified as important internal resources; however, their behavioral expression appears contingent upon contextual support.[27] Collectively, these converging findings reinforce the interpretation that intrapersonal regulatory mechanisms, while important, may not independently sustain structured physical activity.

Discussion

Mastery-Approach as the Core Regulatory Driver in Child Physical Activity

The most consistent finding was the positive association between mastery-approach orientation and self-regulation. This suggests that, within this sample, defining success around personal improvement and skill development was associated with greater planning, monitoring, and persistence in physical activity. Children at the elementary level are still consolidating competence beliefs and metacognitive skills.[28] Mastery framing may therefore be compatible with regulatory processes that emphasize personal progress rather than social comparison.[29,30] Importantly, this association did not extend to STPA through the proposed mediation pathway. Thus, the finding should be interpreted as evidence concerning the mediator rather than evidence that mastery-approach goals increased physical activity behavior.

Performance-Avoidance: Regulation Without Behavioral Translation

Interestingly, performance-avoidance orientation also positively predicted self-regulation, contrary to H1b. One possible interpretation is that concerns about negative evaluation can increase monitoring, effort, or task-focused regulation in achievement settings; prior work has linked approach–avoidance motivation with self-regulatory processes and has shown that performance goals can be oriented toward evaluative audiences.[18,19] However, the present study did not measure academic pressure, anxiety, peer evaluation, or cultural norms, so these mechanisms cannot be tested directly and should be treated only as plausible explanations for the observed association. The positive association also did not translate into significant STPA or mediation effects, indicating that increased regulation in response to performance-avoidance motives was not sufficient to establish greater scheduled activity in this sample.

The Intention-Behavior Gap in Elementary Physical Activity

The non-significant pathway from self-regulation to STPA provides important insight into the intention–behavior gap in this sample. Even when children report regulatory tendencies, these tendencies may not translate into consistent scheduled activity participation. Possible contextual explanations include limited autonomy, dependence on parents or schools for scheduling and access, and the institutional organization of school physical activity. These interpretations are consistent with socio-ecological evidence emphasizing multilevel determinants of physical activity.[31,32] Because these contextual variables were not measured in the present study, however, they should be regarded as plausible contextual considerations rather than tested explanations.

The Moderating Role of Self-Efficacy in Behavioral Translation

The proposed moderating role of self-efficacy was not supported. In both models, the self-regulation × self-efficacy interaction was non-significant, and the indices of moderated mediation included zero. Therefore, the present data do not show that self-efficacy changed the strength of the self-regulation–STPA association. This null finding is important because Social Cognitive Theory identifies self-efficacy as a determinant of action initiation and persistence,[33] but the current cross-sectional results indicate that this theoretical construct did not operate as a statistically detectable moderator under the conditions measured here. Future studies with broader contextual measures and longitudinal or experimental designs are needed to test whether efficacy becomes consequential under different environmental or instructional conditions.

Because the self-regulation × self-efficacy interaction was non-significant in both models, the plotted lines in Figure 2 should be interpreted as descriptive representations of the estimated slopes rather than evidence of a statistically significant moderation effect.

Low Variance in STPA: The Dominant Role of Context

The relatively modest explained variance in scheduled physical activity (R^2 = .027 in the mastery-approach model and R^2 = .020 in the performance-avoidance model) indicates that the modeled motivational and regulatory variables accounted for only a small proportion of variation in STPA. This pattern is compatible with the possibility that school timetable integration, teacher encouragement, parental logistical support, peer participation, and facility access may contribute to child activity, as suggested by multilevel physical-activity research [31,32,34]. These factors were not directly measured here, so the study cannot determine which contextual variables explain the remaining variance.

Translational Pathways: From Motivation to Sustainable Routine

Cultivating a Mastery-Oriented Activity Climate. As a practice-oriented implication for future testing, schools could emphasize process-focused evaluation, personal progress, skill development, and self-referenced goals because mastery-approach was positively associated with self-regulation in this sample. These suggestions should be evaluated in intervention research rather than treated as demonstrated effects.

Embedding Behavioral Implementation Cues. Future school-based studies could test fixed weekly activity schedules, visual timetables, routine pre-activity cues, and teacher-led prompts as environmental supports for implementation. Such strategies are consistent with multilevel

approaches to child physical activity, but they were not evaluated in the present study.

Reducing Environmental Friction. Future implementation research could examine whether minimizing transition time, simplifying equipment preparation, and improving facility access helps children enact planned activity. These are proposed contextual strategies, not effects demonstrated by the current data.

Protecting Emotional Well-Being. Because performance-avoidance was positively associated with self-regulation but did not predict STPA through the proposed pathways, future studies should assess whether evaluative pressure, anxiety, enjoyment, and autonomy-related experiences alter the quality or sustainability of regulation. These constructs were not measured in the present study.

Practical Implications

For physical education teachers, the findings support emphasizing mastery-oriented instruction, personal progress, and self-referenced goals because mastery-approach was positively associated with self-regulation. For parents, predictable routines and logistical support may help children enact planned activity, although this study did not directly test parental effects. For schools, embedding regular activity opportunities, clear schedules, and accessible facilities may provide structural support for translating students' regulatory intentions into behavior. These recommendations should not be interpreted as evidence that self-efficacy moderates the regulation–STPA relationship, because the moderation tests were non-significant. Rather, they identify practical areas for future school-based research and implementation studies.

Theoretical Contributions to Sport and Physical Activity Literature

First, the findings show that achievement-goal orientations were associated with self-regulatory processes in this elementary student sample, but the proposed downstream behavioral pathways were not statistically supported. Second, the study highlights the need to examine regulation–behavior relationships in developmental and contextual settings rather than assuming that regulatory capacity will automatically produce activity. Third, the findings support integrating motivational and ecological perspectives when interpreting child physical activity, while recognizing that the present study did not directly measure environmental determinants.

The present findings can be interpreted through the lens of Achievement Goal Theory.[36] Within this framework, mastery-approach goals orient individuals toward competence development, whereas performance-avoidance goals orient them toward preventing negative evaluation. In the present data, mastery-approach was positively associated with self-regulation, whereas performance-avoidance was also positively associated with self-regulation but contrary to the hypothesized direction. Neither orientation showed a supported indirect effect on STPA through self-regulation, so the findings do not establish that either goal orientation produced sustained physical activity behavior.

The pattern of findings can also be discussed in relation to Self-Determination Theory,[37] particularly the distinction between more autonomous and more controlled forms of regulation. However, the present study did not measure autonomous versus controlled regulation directly. Therefore, the observed difference between mastery-approach and performance-avoidance associations with self-regulation should not be treated as direct evidence for different regulatory qualities.

The absence of a significant SR → STPA pathway indicates that the presence of self-reported regulation did not by itself establish behavioral enactment in this sample.

From the perspective of Social Cognitive Theory, behavior is shaped by reciprocal interactions between personal factors, behavior, and environment [33]. The modest variance explained in STPA is consistent with the possibility that environmental opportunity structures matter, but the present analysis did not include direct environmental measures. Thus, the study provides no basis for identifying which contextual constraints were most influential.

Integrating the theoretical and methodological findings, the present study suggests a developmental-regulatory framework for future research in which motivational orientation, self-regulation, self-efficacy, and structural opportunity are examined together. The current data support the association between motivational orientation and self-regulation, but they do not establish the proposed mediation or moderation mechanisms. Longitudinal and multilevel designs are therefore needed to test whether these pathways emerge when behavioral and contextual factors are measured directly.

Positioned within sport and exercise psychology literature, this study extends discussion of achievement goals to elementary student physical activity while showing that statistically significant associations at the motivational-to-regulatory stage did not necessarily continue to the behavioral outcome. The cross-sectional design restricts causal inference, and reliance on self-report measures may limit behavioral precision. In addition, the study did not retain exact instrument-development documentation, assessment duration, or direct measures of contextual opportunity. Future research should use longitudinal designs, objective activity monitoring (e.g., accelerometers), and multilevel models incorporating parental, school, and contextual supports [31,32]. Experimental manipulation of mastery-oriented climates and efficacy-supportive structures could further clarify whether these factors change self-regulatory and behavioral outcomes.

In conclusion, mastery-approach and performance-avoidance orientations were positively associated with self-regulation, although the performance-avoidance association was opposite to the hypothesized direction. Self-regulation did not significantly predict STPA, and neither mediation nor self-efficacy moderation was supported. The findings therefore suggest that motivational orientation may be relevant to regulatory processes without necessarily producing measurable scheduled physical activity behavior in a cross-sectional elementary-school sample. Future research should test these relationships longitudinally and incorporate objective activity measures and contextual factors to determine when regulatory processes are translated into sustained physical activity.

References

1. Katzmarzyk PT, Friedenreich C, Shiroma EJ, Lee IM. Physical inactivity and non-communicable disease burden in low-income, middle-income and high-income countries. *Br J Sports Med*. 2022;56(2):101-106. https://doi.org/10.1136/bjsports-2020-103640

2. Zhu M, Xu S, Li Y, et al. Global burden of non-communicable diseases attributable to behavioral factors. *Sci Bull*. 2025;70(19):3129-3133. https://doi.org/10.1016/j.scib.2025.08.037

3. Hasson Rebecca, Sallis James F, Coleman Nailah, Kaushal Navin, Nocera Vincenzo G, Keith NiCole. COVID-19: Implications for Physical Activity, Health Disparities, and Health Equity. *Am J Lifestyle Med*. 2021;16(4):420-433. https://doi.org/10.1177/15598276211029222

4. Kohl III HW, Murray TD, Salvo D. *Foundations of Physical Activity and Public Health*. Human Kinetics; 2025.

5. Salvo D, Jáuregui A, Adlakha D, Sarmiento OL, Reis RS. When Moving Is the Only Option: The Role of Necessity Versus Choice for Understanding and Promoting Physical Activity in Low- and Middle-Income Countries. *Annu Rev Public Health*. 2023;44:151-169. https://doi.org/10.1146/annurev-publhealth-071321-042211

6. Zhong J, Liu W, Niu B, Lin X, Deng Y. Role of Built Environments on Physical Activity and Health Promotion: A Review and Policy Insights. *Front Public Heal*. 2022;Volume 10-2022. https://doi.org/10.3389/fpubh.2022.950348

7. Rhodes RE. Translating Physical Activity Intentions into Behavior: Reflective, Regulatory, and Reflexive Processes. *Exerc Sport Sci Rev*. 2024;52(1).

8. Yuanji Z, Wenhao G, Yang X, Pengwei C, Yongshun W. The effect of digital media on college students' sports participation: The mediating role of sports cognition and the moderating role of self-efficacy. *PLoS One*. 2025;20(9):e0330445.

9. Kong S, Qiu L, Su Y, Zhang Y, Sun K. Mindfulness, cognitive load, and performance: examining the interplay of stress and self-regulation in physical education. *BMC Psychol*. 2025;13(1):518. https://doi.org/10.1186/s40359-025-02794-x

10. Warner LM, Schwarzer R. Self-Efficacy and Health BT. In: Liamputtong P, ed. *Handbook of Concepts in Health, Health Behavior and Environmental Health*. Springer Nature Singapore; 2025:1-26. https://doi.org/10.1007/978-981-97-0821-5_15-1

11. Gerber M, Cheval B, Cody R, et al. Psychophysiological foundations of human physical activity behavior and motivation: theories, systems, mechanisms, evolution, and genetics. *Physiol Rev*. 2025;105(3):1213-1290. https://doi.org/10.1152/physrev.00021.2024

12. Macali IC, Smith L, Dale M, Lind E, DeShong HL, Holmes ME. Influences of motivation and personality on physical activity behavior: A systematic review . *J Sports Sci*. 2025;43(6):623-635. https://doi.org/10.1080/02640414.2025.2468998

13. Cui Y, Meng Y, Zhang X, Tang L. The mediating effect of performance-approach goals and mastery-approach goals on the relationship between teacher and peer support, emotions and flow: A multigroup analysis. *Eur J Psychol Educ*. 2025;41(1):1. https://doi.org/10.1007/s10212-025-01047-0

14. Morbée S, Delrue J, Vansteenkiste M, Haerens L, Mouratidis A. Game-to-game dynamics: the role of autonomous and controlled reasons behind mastery-approach goals and appraisals in soccer performance. *Motiv Emot*. Published online 2026. https://doi.org/10.1007/s11031-026-10202-z

15. Chen Y, Li J, Chui H, King RB. Peer cooperation and competition are both positively linked with mastery-approach goals: An achievement goal perspective. *Br J Educ Psychol*. 2025;95(4):941-961. https://doi.org/10.1111/bjep.12784

16. Katz-Vago I, Benita M. Mastery-approach and performance-approach goals predict distinct outcomes during personal academic goal pursuit. *Br J Educ Psychol*. 2024;94(2):309-327. https://doi.org/10.1111/bjep.12645

17. Mousavi N, Golara S, Bockstedt J. The Impact of Situational Achievement Goals on Online Learning Behavior: Results from Field Experiments. *Inf Syst Res*. 2024;36. https://doi.org/10.1287/isre.2022.0353

18. Hamoud M, Sæther SA, Bjørnebekk G. Self-regulation and performance among elite youth soccer players: the role of approach-avoidance motivation. *Front Psychol*. 2024;Volume 15-2024. https://doi.org/10.3389/fpsyg.2024.1416931

19. Geelen SJG, Kekäläinen T, Hassandra M, et al. Staying engaged: a scoping review of psychological and motivational drivers of adherence to technology-supported physical activity in older adults. *Eur Rev Aging Phys Act*. 2025;22(1):21. https://doi.org/10.1186/s11556-025-00387-6

20. Kozlowski SWJ, Bell BS. Disentangling achievement orientation and goal setting: effects on self-regulatory processes. *J Appl Psychol*. 2006;91(4):900-916. https://doi.org/10.1037/0021-9010.91.4.900

21. Pillay D, Nel P, Zyl E. Positive affect and resilience: Exploring the role of self-efficacy and self-regulation. A serial mediation model. *SA J Ind Psychol*. 2022;48:a1913. https://doi.org/10.4102/sajip.v48i0.1913

22. Navalta JW, Stone WJ, Lyons TS. Ethical issues relating to scientific discovery in exercise science. *Int J Exerc Sci*. 2019;12(1):1-8. https://doi.org/10.70252/eycd6235

23. Hayes AF. Introduction to mediation, moderation, and conditional process analysis: A regression-based approach. *Introd to Mediat moderation, Cond Process Anal A regression-based approach.The Guilford Press*. Preprint posted online 2013:xvii, 507-xvii, 507.

24. Hayes AF. PROCESS : A Versatile Computational Tool for Observed Variable Mediation , Moderation , and Conditional Process Modeling 1. In: 2012.

25. Esentürk OK, Seçer E, Yarimkaya E, İlhan EL. Perceived social support and school engagement in sports science students : The moderated mediation of school alienation and social media addiction. *J Phys Educ Sport*. 2025;25(4):689-700. https://doi.org/10.7752/jpes.2025.04074

26. Lorenco-lima LDE, Ph D, Rosario D, Gaines S, Ph D. Comparative analyses of psychological and training characteristics in judo competitors and non-competitors : Mental strength , self-efficacy , grit , resilience , self-control , aggression , mental health , and life satisfaction. *J Phys Educ Sport*. 2025;25(7):1318-1325. https://doi.org/10.7752/jpes.2025.07147

27. Popovych I, Hoi N, Hrys A, et al. Junior athletes ' behavioral self-regulation styles within the dimensions of psychological safety in the learning and training environment. *J Phys Educ Sport*. 2025;25(8):1629-1639. https://doi.org/10.7752/jpes.2025.08182

28. Loon M van, Roebers CM. Development of metacognitive monitoring and control skills in elementary school: a latent profile approach. *Metacognition Learn*. 2024;19(3):1065-1089. https://doi.org/10.1007/s11409-024-09400-2

29. Meurlin RT, Senko C. Whom are you trying to impress? Pursuing performance goals for parents, teachers, or classmates. *J Educ Psychol.American Psychological Association*. 2025;117(4):663-678. https://doi.org/10.1037/edu0000935

30. Ching BHH, Li XF, Tan Y. Academic contingent self-worth and self-handicapping: an experimental test of failure mindset as a moderator. *Soc Psychol Educ*. 2024;28(1):16. https://doi.org/10.1007/s11218-024-09990-4
`

31. Yali H, Woong-jae C. Multilevel mechanisms of in-and-out-of-class integrated physical education on adolescents' physical health: a qualitative study based on socio-ecological and social cognitive theories. *Front Educ*. 2025;Volume 10-2025. https://doi.org/10.3389/feduc.2025.1661624

32. Zhao C, Yuan J, Huang WW. Multilevel determinants of physical activity in children and adolescents: a meta-analysis guided by social ecological model. *BMC Sports Sci Med Rehabil*. 2025;17(1):202. https://doi.org/10.1186/s13102-025-01225-z

33. Bandura A. *Social Foundations of Thought and Action: A Social Cognitive Theory*. Prentice-Hall, Inc; 1986.

34. Jiang Y, Feng B. How children's sports participation influences school engagement levels. *Rev Psicol del Deport (Journal Sport Psychol*. 2024;33(2):37-45.

35. Smith Jr LE. The Impact of High School Sports Participation on Academic Achievement in Urban Low-Performing School Districts: A Parental Perspective. *Concordia University Chicago*. Preprint posted online 2025.

36. Harwood C, Spray CM, Keegan R. Achievement goal theories in sport. *Adv Sport Psychol 3rd ed.Human Kinetics*. Preprint posted online 2008:157-185,444-448.

37. Vlachopoulos SP, Karageorghis CI, Terry PC. Motivation Profiles in Sport: A Self-Determination Theory Perspective. *Res Q Exerc Sport*. 2000;71(4):387-397. https://doi.org/10.1080/02701367.2000.10608921