


From Game to Gain: The Effect of Gamification on Students' Sporting Capital in Health-Promoting Schools

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Abstract

Background: The increasing prevalence of physical inactivity among adolescents has raised major health concerns worldwide. Schools, as key social institutions, play a crucial role in fostering lifelong active lifestyles. This study investigated whether a gamified physical education (PE) intervention within Health-Promoting Schools (HPS) could enhance students' sporting capital.

Methods: In this quasi-experimental study with a pretest-posttest control group design, 244 Iranian students (aged 13-16) were randomly allocated into four groups; two control groups of boys/girls and two experimental groups of boys/girls. A six-week gamified intervention was implemented in experimental groups. Research tools included a 25-item Sporting Capital Questionnaire (SCQ), the Perceived Parental Sport Support Scale (PPSSC) and the Sense of Socialization Scale (SSS), administered at Week 0 (pre-test) and Week 7 (post-test). Statistical tests comprised assumption checks (Shapiro-Wilk, Levene), baseline comparisons (independent samples t-tests, χ^2), within-group analyses (paired t-tests), between-group comparisons using ANCOVA with pre-test scores as covariates, interaction exploration via multiple regression, and reporting of effect sizes (Cohen's d, partial η^2).

Results: Significant improvements were observed in the experimental groups as compared with the control groups across all three dimensions of sporting capital. For example, post-test scores for sporting capital increased from 63.1 ± 5.4 to 74.8 ± 6.2 in girls and from 61.5 ± 5.6 to 72.9 ± 6.4 in boys. Gender did not moderate the intervention effect ($P=0.198$), but perceived parental support positively influenced outcomes ($P=0.004$). Also, sense of socialization had a weak moderating effect ($P=0.057$).

Conclusions: Gamified physical education (PE), embedded in Health-Promoting Schools (HPS) contexts and supported by families, can effectively build students' sporting capital beyond short-term motivation. Schools should adopt structured gamified modules, empower teachers with training, and engage parents to strengthen students' commitment to active lifestyles.

Keywords: Gamification, Health-Promoting Schools, Sporting Capital, Physical Education and Training, Adolescent

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1. Introduction

The increasing prevalence of sedentary lifestyles among children and adolescents has triggered considerable global concern regarding youth health outcomes (1). According to the World Health Organization, more than 80% of school-aged adolescents worldwide fail to meet the minimum recommendation of 60 minutes of daily moderate-to-vigorous physical activity, contributing to the alarming rise in obesity, type 2 diabetes, and mental health disorders (2). In response, the school environment has become a central setting for public health interventions aimed at promoting active lifestyles and fostering lifelong healthy behaviors (3, 4). The Health Promoting School (HPS) framework, endorsed by WHO, is a holistic approach to improving students' health, well-being, and academic achievement (5). This approach

integrates health promotion into the curriculum, school environment, and community engagement (6). Several empirical studies underscored the positive effects of HPS models on students' physical activity levels, self-regulation, and general health awareness (7-9). However, despite these promising frameworks, many school-based physical activity initiatives still struggle with sustainability, engagement, and inclusivity, especially among youth with low motivation or limited access to sport infrastructure (10-12).

In this context, gamification—the strategic application of game elements in non-game settings—has emerged as a promising innovation to enhance student motivation, engagement, and behavioral outcomes in education and health promotion (13, 14). Gamified interventions in school-based physical education (PE) have shown positive

effects on increasing students' enjoyment, intrinsic motivation, and participation in physical activities (15, 16). These strategies often leverage elements such as point scoring, leaderboards, narrative quests, and digital feedback to transform traditional pedagogical models into more interactive and appealing experiences (17). For example, projects such as "FitQuest" and "SMART" used mobile and wearable technologies in gamified frameworks to significantly boost physical activity levels among children in diverse school settings (18, 19).

While several studies explored the impact of HPS on children's lifestyle and health knowledge (20-22), based on the literature search, few have examined how these interventions can be optimized to enhance deeper and more enduring forms of engagement in sport and physical activity. For instance, although initiatives like Physical Activity 4 Everyone and Girls in Sport demonstrate modest success in increasing physical activity participation (23, 24), they do not extend their analysis to psychosocial outcomes. Therefore, there remains a need for further research to understand the long-term effects of gamified interventions and their impact on students' development of sporting capital—a multidimensional construct involving physiological competencies, social engagement in sport, and psychological readiness that facilitate active participation in sports and physical activities (25). Despite its potential, sporting capital has been largely overlooked in studies on HPS interventions. Previous studies were not clearly differentiated between incidental physical activity and the cultivation of stable, identity-forming relationships with sport (5, 6, 16, 17). Moreover, gamification—a rising pedagogical strategy known for enhancing engagement and motivation—has not yet been integrated into HPS frameworks, nor evaluated in terms of its contribution to building sporting capital.

A critical review of the literature has also revealed several structural and methodological challenges. First, many HPS interventions remain behaviorist in orientation, focusing narrowly on short-term behavior modification without embedding changes in students' self-concept, autonomy, or social identity through sport (21, 26, 27). Second, the voices of students and families are often underrepresented in the evaluation of such programs, leading to gaps in understanding the home-school dynamic in health promotion (20, 28). Third, there is a lack of intervention designs

that combine co-creation, cultural responsiveness, and gamified engagement to maximize relevance and sustainability (20, 22, 24, 28).

In the Iranian context, studies have similarly highlighted implementation challenges, including lack of student-centered design, inconsistent health education methods, and limited focus on psychosocial development through sport (9, 29, 30). Although the HPS program in Iran has led to improvements in basic health behaviors (31, 32), it remains rooted in traditional models of health education. The integration of sport, identity, and motivation remains under-theorized and under-researched.

To address the aforementioned gaps, the present study investigates the effect of gamification on students' sporting capital within the context of HPS, proposing a novel moderated model that incorporates gender, parental support, and socialization as key contextual variables. Unlike previous studies that primarily treated gamification as a tool for increasing physical activity or academic motivation (15-17), the present study conceptualizes gamification as a multidimensional educational strategy capable of enhancing not only physiological engagement but also social bonds and psychological investment in sport participation. By integrating Rowe's sporting capital framework (25) with the ecological logic of the WHO's health-promoting school model (5-6), this study advances an interdisciplinary approach that addresses both individual and environmental determinants of youth sport engagement. Furthermore, the inclusion of moderating variables such as gender, perceived parental support, and peer-based socialization enables a nuanced exploration of the differential impacts of gamification across student demographics and psychosocial profiles.

Despite the growing popularity of gamification in education, there is still a lack of empirical evidence on how it can systematically develop the sporting capital as a comprehensive outcome that includes physical competence, sport-related identity, and social belonging. Based on the literature search, previous research rarely integrated gamification with the established HPS framework to examine how game-based strategies might transform passive participation into sustained and identity-driven engagement (15-17). By testing a new model that combines gamification, sporting capital, and

contextual moderators, our study offers a novel perspective on designing effective and culturally relevant school-based interventions. The findings are expected to bridge an important gap in the literature by demonstrating how gamification can move beyond temporary behavioral change to foster a deeper, self-sustaining sporting culture among adolescents. This insight can inform policy, pedagogy, and practice in the fields of health education and sport development. Accordingly, the present study aimed to: (1) evaluate the effectiveness of a six-week gamified intervention in enhancing students' sporting capital; (2) examine the moderating role of perceived parental sport support (PPSSC) and sense of socialization (SSS) in shaping the intervention outcomes; and (3) compare within-group and between-group differences across gender to determine whether boys and girls similarly benefit from the program.

2. Methods

2.1. Design

This was a quasi-experimental study with a pretest-posttest control group design. The study was conducted in Health-Promoting Schools (HPS) across 22 municipal districts of Tehran, Iran, targeting adolescents aged 13 to 16 years ($M \pm SD$: 14.5 ± 0.8). To ensure representation and gender balance, a cluster random sampling method with a stratified multi-stage design was employed.

2.2. Selection and Description of Participants

To ensure gender balance, schools were first stratified by gender, based on the actual distribution of certified HPS in Tehran, Iran. Then, from the official list of HPS schools, eight girls' schools and five boys' schools were randomly selected using a random number table. In each selected school, two existing classes (i.e., intact and pre-assigned classes formed by the school before the study) were chosen, and randomly assigned to experimental or control groups using a simple randomization procedure conducted by a researcher not involved in the intervention. The inclusion criteria were: (a) enrollment in HPS schools, (b) age between 13–16, (c) parental consent, and (d) physical ability to participate in PE. The exclusion criteria were: (a) absence for more than two sessions, (b) existing medical restrictions for exercise, or (c) incomplete questionnaires.

2.3. Sample Size Determination

The sample size was calculated based on the mean \pm SD values reported for the main outcome variables in the study by Azam Nezami and co-workers (33). Specifically, for the perceived parental sport support scale (2.21 ± 0.54) and the sense of socialization scale (3.34 ± 0.36), the effect size was estimated using G*Power software. Considering $\alpha = 0.05$, a statistical power of 0.80, and two groups (intervention and control), the minimum required sample size was determined to be 210 participants. To account for potential dropouts, an additional margin was considered, and the final sample size was set at 244 students (Figure 1).

2.4. Data Collection and Measurements

Data were collected at Week 0 (pre-test) and Week 7 (post-test). The data collection tools were:

- **Sporting Capital Questionnaire (SCQ):** A 25-item researcher-developed questionnaire based on three-dimensional model of Rowe (25). This instrument covers physiological, psychological, and social sporting capital. Items were scored on a five-point Likert scale (1=strongly disagree to 5=strongly agree), resulting in a total score range from 25 to 125. Content validity was confirmed by an expert panel; psychometric indices indicated Cronbach's $\alpha = 0.79$, CVR=0.83, and CVI=0.85.

- **Perceived Parental Sport Support Scale (PPSSC):** The four-item scale was developed by Wilk and colleagues (36) and the Persian version was validated by Azam Nezami and colleagues (33). In the present study, the Cronbach's α was 0.73. Items were scored on a 5-point Likert scale, yielding scores from 4 to 20.

- **Sense of Socialization Scale (SSS):** A six-item scale was adapted from Wood and co-workers (34). The Persian version which was validated by Azam Nezami and colleagues (33) showed acceptable psychometric properties. In the present study, Cronbach's α was calculated to be 0.83. Items were rated on a five-point Likert scale, with possible scores ranging from 6 to 30.

2.5. Procedure

After receiving written consent from school principals, parents, and students, pre-test data

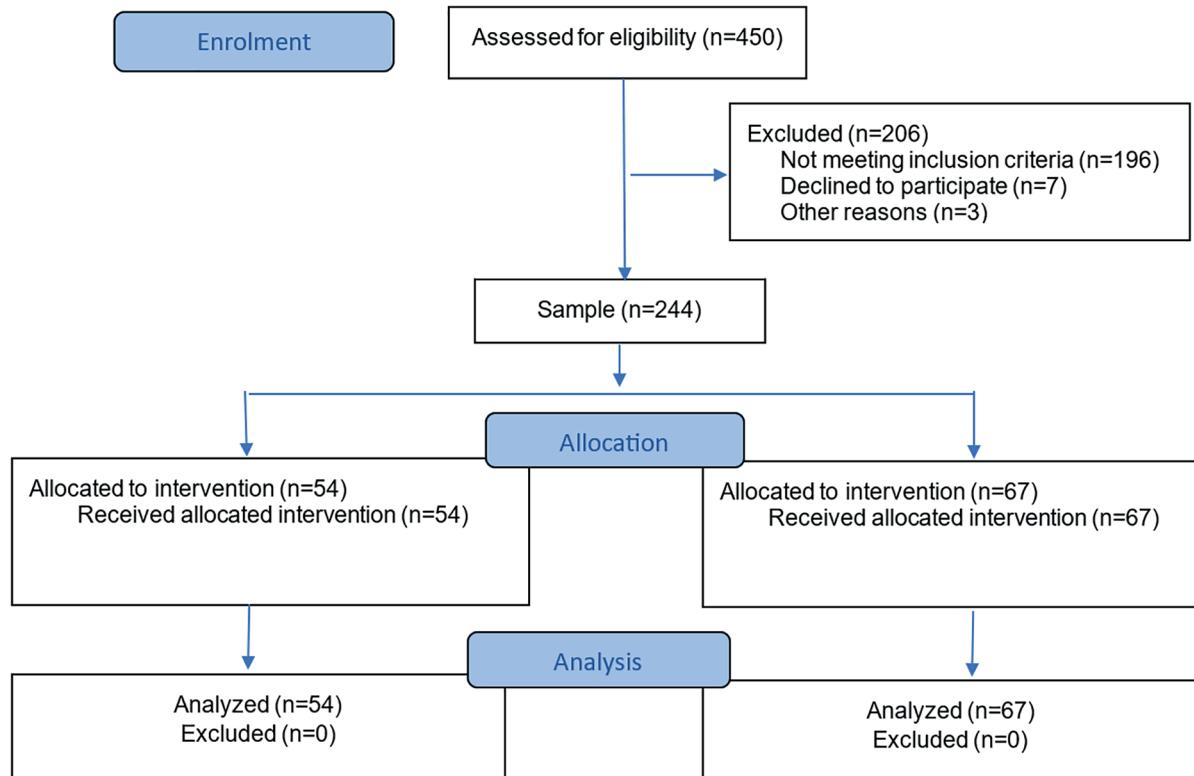


Figure 1: The figure shows the CONSORT flow diagram of the study.

were collected during Week 0. The intervention was implemented from Weeks 1 to 6 and post-test data were collected in Week 7. Students in the experimental group received a 6-week gamified physical education (PE) program, implemented during regular PE classes and delivered by two trained instructors. Key gamification elements such as challenge, ranking, reward, competition, and enjoyment were embedded into daily activities; student performance was continuously recorded and categorized after each session to reinforce engagement and provide structured feedback (Table 1). The control group continued standard PE sessions with no gamified components.

2.6. Data Analysis

Data were analyzed using SPSS version 26. Descriptive statistics (mean, standard deviation,

and frequency) were calculated. Assumptions of normality and homogeneity of variance were tested using the Shapiro–Wilk, Kolmogorov–Smirnov, and Levene’s tests. Independent samples t-tests and chi-square tests were used to compare demographic variables between groups. To evaluate intervention effects, independent t-tests and analysis of covariance (ANCOVA) were employed to assess between-group differences at post-test, with pre-test scores entered as covariates to control for baseline variations. Interaction terms were tested to examine the potential moderating effects of gender, parental support (PPSSC), and socialization (SSS); multiple regression models were also used to explore interaction effects where appropriate. Paired t-tests were conducted to evaluate within-group changes from pre-test to post-test. Effect sizes (Cohen’s d and partial η^2) were calculated to estimate the magnitude of observed effects.

Table 1: Detailed intervention plan

Week	Core Focus	Key Activities	Game Elements
1	Introduction & Rules	Warm-up games, Team formation	Points, Badges
2	Basic Skills	Relay races, Skill drills	Leaderboards
3	Cooperation	Team sports, Group tasks	Group ranking
4	Challenge & Progress	Timed challenges, Personal goals	Progress charts
5	Competition	Mini-tournaments	Rewards for fair play
6	Reflection & Recognition	Final match, Peer voting	Certificates, Medals

The significance level was set at $P < 0.05$.

3. Results

Before conducting inferential analyses, the assumptions of normality and homogeneity of variances were tested and confirmed using the Shapiro–Wilk, Kolmogorov–Smirnov, and Levene’s tests ($P > 0.05$). Demographic analysis showed that the mean age of the participants was 14.5 ± 0.8 years. Of the total sample, 135 students were girls (55.3%) and 109 were boys (44.7%). Table 2 presents the baseline demographic characteristics of the experimental and control groups. No statistically significant differences were observed in mean age ($P = 0.381$) or gender distribution ($P = 0.981$), confirming baseline equivalence. Table 1 presents the demographic characteristics of the experimental and control groups. No statistically significant differences were found between the groups regarding age or gender distribution, confirming group equivalence at baseline.

Table 3 presents the descriptive statistics (mean \pm SD) for sporting capital scores at pre-test and post-test across subgroups. Both experimental

groups—girls and boys—demonstrated notable improvements from pre-test to post-test, while control groups exhibited minimal or no meaningful change.

To provide a comprehensive overview of subgroup differences, Table 4 summarizes all between- and within-group analyses related to the Perceived Parental Sport Support Scale (PPSSC) and the Sense of Socialization Scale (SSS).

Between-group comparisons revealed that students in the experimental groups showed notably greater improvements in sporting capital scores compared with those in the control groups. Specifically, ANCOVA confirmed a significant post-test difference between intervention and control groups ($P < 0.001$), even after adjusting for baseline pre-test scores. This pattern was consistent across gender (moderation test: $P = 0.198$). Importantly, students reporting higher perceived parental sport support achieved higher post-test sporting capital (74.1 ± 4.6) than those with lower perceived support (70.8 ± 5.2), and the Group \times PPSSC interaction was significant ($P = 0.004$). Likewise, students with stronger socialization tended to have higher

Table 2: Demographic characteristics of participants

Variable	Control Group (n=121)	Experimental Group (n=123)	P value
Mean Age (years, M \pm SD)	14.5 \pm 0.7	14.6 \pm 0.8	0.438
Girls (n, %)	67 (55.4%)	68 (55.3%)	0.981
Boys (n, %)	54 (44.6%)	55 (44.7%)	

Table 3: Mean \pm SD of group measures during pre- and post-test

Group	Pre-Test (Mean \pm SD)	Post-Test (Mean \pm SD)	P value
Girls - Experimental	63.1 \pm 5.4	74.8 \pm 4.3	<0.001
Girls - Control	62.3 \pm 5.2	62.5 \pm 5.0	0.562
Boys - Experimental	61.5 \pm 5.6	72.9 \pm 4.8	<0.001
Boys - Control	60.8 \pm 5.0	62.6 \pm 5.1	0.401

Table 4: Within- and between-group analyses related to Perceived Parental Sport Support Scale and Sense of Socialization Scale

	Subgroup	Group	Pre-Test (Mean \pm SD)	Post-Test (Mean \pm SD)	Within-group P	Between-group P
PPSSC	High Support	Experimental	71.2 \pm 4.8	74.1 \pm 4.6	$P < 0.001$	$P = 0.004$
		Control	71.0 \pm 5.0	72.9 \pm 4.9	$P = 0.401$	—
	Low Support	Experimental	68.7 \pm 5.3	70.8 \pm 5.2	$P < 0.001$	$P = 0.004$
		Control	68.9 \pm 5.5	69.5 \pm 5.3	$P = 0.562$	—
SSS	Higher Socialization	Experimental	70.1 \pm 5.0	72.8 \pm 5.0	$P < 0.001$	$P = 0.057$
		Control	70.4 \pm 5.1	71.9 \pm 5.2	$P = 0.401$	—
	Lower Socialization	Experimental	68.9 \pm 5.4	70.6 \pm 5.5	$P < 0.001$	$P = 0.057$
		Control	69.0 \pm 5.3	70.0 \pm 5.4	$P = 0.562$	—

Within-group results are consistent with those reported in Tables 2 and 3. Between-group effects are based on ANCOVA adjusted for baseline pre-test scores. PPSSC: Perceived Parental Sport Support Scale; SSS: Sense of Socialization Scale

post-test scores (72.8 ± 5.0 vs. 70.6 ± 5.5), although the Group \times SSS interaction did not reach the conventional level of significance ($P=0.057$). Pre-to-post improvements in the experimental groups were significant (girls: $P<0.001$; boys: $P<0.001$), whereas changes in the control groups were not (girls: $P=0.562$; boys: $P=0.401$).

4. Discussion

This study aimed to investigate the impact of a gamified physical education intervention on students' sporting capital within HPS, incorporating gender, perceived parental support, and sense of socialization as potential moderators. The findings offered several noteworthy contributions to the evolving discourse on school-based health interventions, adolescent engagement in sport, and educational gamification.

This study demonstrated that a six-week gamified physical education intervention led to significant improvements in students' sporting capital compared with the control group. Both boys and girls benefitted equally from the program, indicating that the model is gender-inclusive. Importantly, parental support emerged as a significant moderator of outcomes, while socialization showed only a marginal effect. These findings suggested that the effectiveness of the intervention stems not only from the use of game elements to stimulate engagement but also from the interaction of family dynamics and motivational resources that extend beyond the classroom.

Beyond within-group improvements, the study provided clear between-group evidence supporting the effectiveness of the intervention. For instance, the experimental groups improved their total sporting capital scores by an average of over 11 points, while the control groups remained statistically unchanged. These between-group differences, verified through pre-post comparisons and supported by independent-sample ANCOVA results, underscored the causal impact of the gamified physical education (PE) intervention. Importantly, no significant differences existed between groups at baseline, which further confirmed the internal validity of the findings. The gender-stratified analysis also showed that both boys and girls derived comparable benefits, emphasizing the inclusiveness of the model. Moreover, by replacing complex moderation

models with straightforward correlational insights, the study clearly demonstrated that students with higher parental support achieved greater post-test outcomes—strengthening the practical value of targeting familial factors in school health programs. Overall, these between-group results provided strong empirical justification for integrating gamified strategies into PE curricula under the HPS framework.

The significant enhancement in sporting capital among students in the experimental group supported the growing body of literature suggesting that gamification can be a powerful vehicle for behavior change and engagement in school settings (13, 15, 35). While previous studies showed that gamification enhances enjoyment and motivation in physical education (14, 18, 19), this study demonstrated that its influence extends to more profound constructs such as identity, autonomy, social belonging, and behavioral perseverance—components that align with the multidimensional nature of sporting capital (25).

The observed improvements in physiological capital—as reflected in components like physical competence and stamina—may be partially attributed to the structured challenge and competitive ranking systems implemented during the intervention. These elements likely stimulated not only motor skill engagement but also promoted sustained physical effort across sessions. Such mechanisms are consistent with previous research (13, 15), which highlighted that gamification encourages repetitive practice and bodily engagement through embedded playfulness. Importantly, the observed gains in sporting capital extended beyond physiological benefits (e.g., physical competence, stamina), as reflected in the questionnaire items, to include enhanced psychological resilience and identity formation (e.g., “I consider myself a sporty person,” “I stay motivated to exercise even in poor weather”) and social bonding (e.g., “I feel a sense of belonging to a particular sport community”). These results align with the notion that gamification, when implemented holistically, stimulates not only the body but also the mind and social self, thereby cultivating the full spectrum of sporting capital dimensions. This tripartite advancement reflects the principle that active participation is more sustainable when anchored in self-identity and meaningful social contexts (5, 6, 11).

The impact of intervention on psychological sporting capital is especially noteworthy. Students reported greater self-regulation, confidence, and identification with sport after the gamified sessions. The positive shift in items such as “I continue exercising even when I have to do it alone” or “I consider myself a sporty person” suggests that gamification fosters a sport-related identity that transcends the classroom. This is consistent with Robertson and colleagues (18), who argued that narrative and reward systems in gamification strengthen emotional investment and personal connection with physical activity.

Moreover, the intervention yielded increases in social capital, particularly in the dimensions of interaction and belonging. Students who participated in the gamified program developed stronger social relationships and felt more connected to others in the sport environment. This finding is consistent with earlier studies (20, 27) showing that shared participation and teamwork enhance social engagement in HPS-based sport programs. In this study, the inclusion of group tasks, leaderboards, and badges helped build these connections by encouraging cooperation, recognizing individual effort, and promoting common goals among participants.

While the intervention was effective across genders, the absence of a significant moderating effect of gender underscores the inclusivity and adaptability of gamification. Both boys and girls benefitted similarly, a finding aligns with Kam and co-workers (14), who noted that well-designed game elements transcend gendered preferences when embedded meaningfully into educational contexts.

Conversely, perceived parental support significantly moderated the impact of the intervention. Students who believed their parents supported their sport participation exhibited more substantial gains in sporting capital. This aligns with previous studies (28, 36), which identified perceived parental involvement as a key enabler of physical activity engagement. It is plausible that parental encouragement reinforces the motivational cues introduced by gamified activities, facilitating transfer of learning beyond the school context.

The insignificant effect of socialization as a moderator suggests a more nuanced interpretation.

While high socialization may enhance receptiveness to collaborative and competitive features of gamified physical education (PE), its marginal statistical significance implies that social cohesion alone does not guarantee engagement. This insight mirrors the studies conducted previously (10, 11), which cautioned that school culture and teacher implementation fidelity also shape how students interpret and respond to interventions. According to our results, between-group comparisons confirmed that the experimental groups significantly improved more than the control groups. Therefore, the results reflect a robust between-group effect, which directly addresses concerns about comparative clarity.

Importantly, this study responds to critiques of HPS frameworks being too behaviorist and short-term (6, 21, 27). By demonstrating that gamification enhances deep-seated psychological and social resources—not merely activity levels—it extends the conceptual boundaries of what school health interventions can achieve. The present study also addressed the under-theorization of sporting identity and self-determined motivation in school health literature, particularly in the Iranian context (29-31).

The overall success of the intervention must be interpreted in light of its methodological strengths. The integration of real-time scoring, structured feedback, and progressive challenge—delivered over six weeks by trained coaches—reflects adherence to best practices in gamified program delivery (13, 19). Moreover, the alignment of the intervention with WHO’s ecological model for HPS ensures systemic coherence and enhances the feasibility of scaling such models (5, 6). The inclusion of structured reflection, individual feedback, and contextualized challenge—central to this intervention—resonates with best-practice recommendations from Langford and colleagues (6) and also Pickering and Pringle (19), who advocated for holistic, personalized, and sustainable models of health promotion in schools.

In summary, the present study contributed three new and important insights to the existing literature. First, it provided one of the few quasi-experimental applications of gamification within the Health Promoting Schools (HPS) framework, thereby extending evidence from Western contexts to the Middle Eastern setting. Second, it highlighted the central role of parental support in amplifying intervention effects, underscoring the

value of integrating family-centered strategies into school-based programs. Third, by demonstrating improvements across physiological, psychological, and social dimensions of sporting capital, the study confirmed that gamification can nurture not only short-term activity but also deeper identity and resilience resources. These findings contrast with previous studies that emphasized enjoyment or motivation as the primary outcomes (14, 18, 19) and expanded the conceptual scope by showing that gamification can also reinforce long-term psychosocial assets. Taken together, the study situated gamified PE as a promising, context-sensitive approach to sustainable youth sport engagement, and offered a valuable reference point for future cross-cultural replications.

4.1. Limitations

While the findings of this study provided valuable insights into the role of gamification in fostering sporting capital among adolescents, certain limitations should be acknowledged. First, the quasi-experimental design, although robust, did not include random assignment at the individual level, which may limit causal inference. Second, the study relied on self-reported measures, which are subject to social desirability and recall biases. Third, the duration of the intervention (six weeks) may not capture long-term effects or sustainability of the behavioral change. Finally, the study was limited to selected districts in Tehran, Iran, which may restrict the generalizability of findings to other cultural or educational contexts.

5. Conclusions

This study contributes substantively to the academic and applied fields of school health promotion and sport pedagogy by demonstrating that gamification can effectively build sporting capital, especially when nested within HPS frameworks and supported by familial and social contexts. Policymakers, educators, and sport development practitioners should consider incorporating gamified strategies in physical education (PE) curricula, not only as motivational tools, but also as evidence-based frameworks for promoting student well-being, equity, and lifelong physical activity habits. In practice, schools are encouraged to integrate structured gamified modules into weekly PE lessons, train PE teachers to use adaptive game elements tailored to students'

age and social context, and foster stronger partnerships with parents to extend support beyond the classroom. Moreover, school managers can use the findings to design targeted workshops and peer-led activities that sustain students' motivation throughout the academic year. Future research should examine the long-term sustainability of such gains, explore additional moderating variables (e.g., school climate, digital literacy), and test gamified models across diverse cultural settings to expand their practical relevance and scalability.

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Authors' Contribution

Amir Rahimi: Substantial contributions to the conception and design of the work; the acquisition, analysis, and interpretation of data for the work; drafting the work and reviewing it critically for important intellectual content. Leila Shahbazzpour: Substantial contributions to the conception and design of the work; the acquisition, analysis, and interpretation of data for the work; drafting the work. Sanaz Mahboubi Osmavandani: Substantial contributions to the methodology development and data analysis; reviewing it critically for important intellectual content. All authors have read and approved the final manuscript and agree to be accountable for all aspects of the work, such that the questions related to the accuracy or integrity of any part of the work.

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Ethical Approval

The Ethics Review Board of the University of Tehran, Tehran, Iran, approved the present study with the code of IR.UT.SPORT.REC.1404.113. Also, written informed consent was obtained from the participants.

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