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Bullying prevention through an inclusive game-based physical education model in elementary school

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ABSTRACT

Bullying in elementary schools has a detrimental impact on students' social, emotional, mental well-being, and academic achievement. The purpose of this research was to develop, validate, and conduct preliminary testing of an inclusive game-based physical education (PE) model designed to prevent bullying among Grade 5 students in Aceh, Indonesia. A revised Research and Development (R&D) design adapted from Borg and Gall (2003) was employed across six phases: needs assessment, model design, expert validation, small-group trial, field trial, and final revision. Participants included PE teachers, students, and four expert validators. The model comprises six inclusive cooperative games embedding values of cooperation, empathy, solidarity, tolerance, teamwork, and sportsmanship. Expert validation demonstrated high feasibility ($M = 4.39/5$; $CVI = .92$), and practicality ratings from teachers and students were very high ($M = 4.42$; 88.40%). Field trial results revealed statistically significant improvements in prosocial behavior and anti-bullying attitudes, $t(39) = 14.82$, $p < .001$, with a large effect size (Cohen's $d = 2.34$) and moderate normalized gain ($N\text{-gain} = 0.52$). Observational data confirmed progressive gains across sessions, with the largest improvement in conflict reduction (+26 percentage points). This model offers a theoretically grounded, locally validated, and curriculum-aligned approach to bullying prevention within elementary PE contexts. Implications for PE teachers, school administrators, curriculum developers, and policymakers are discussed.



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Introduction

Bullying is recognized as one of the most pervasive forms of peer aggression in educational settings worldwide. According to the UNESCO Global Status Report on School Violence and Bullying (2019), approximately one in three students globally experiences bullying, making it a public health and educational priority deserving sustained, evidence-based intervention. Bullying is broadly defined as intentional, repeated aggressive behavior carried out by an individual or group against a victim who cannot easily defend themselves, characterized by a power imbalance between perpetrator and target (Olweus, 1993, as cited in Rico-González et al., 2025). It manifests across four primary dimensions: physical (hitting, pushing), verbal (name-calling, threats), relational or social (exclusion, rumor-spreading), and increasingly, cyberbullying through digital platforms (Toseeb et al., 2025). Each form carries serious developmental consequences: victims of bullying face significantly elevated risks of anxiety disorders, clinical depression, deteriorating academic performance, disengagement from school

life, social isolation, and in severe cases, suicidal ideation and self-harm (Gomes et al., 2022; Peng et al., 2025). Perpetrators are similarly at risk, showing higher likelihoods of antisocial behavior, conduct disorders, and later criminal involvement, while bystanders-often overlooked-frequently experience moral disengagement and heightened stress (Rico-González et al., 2025).

Elementary school children, typically ages 6 to 12, occupy a developmental window of exceptional importance for social learning. During this period, children form the foundational cognitive, emotional, and behavioral patterns that shape their capacity for empathy, peer cooperation, conflict resolution, and moral reasoning (Twemlow et al., 2001). Bullying prevention efforts initiated during elementary schooling have demonstrated greater potential for long-term behavioral change compared to interventions introduced later in secondary education, precisely because they can shape social norms before they calcify into persistent peer culture (Liu et al., 2024). Despite this, the incidence of bullying at the primary school level remains alarmingly high and is chronically underreported by victims who fear retaliation or disbelieve that adults will intervene effectively. In the Indonesian context, Ramadhanti and Hidayat (2022) documented a bullying prevalence rate of 32.90% among elementary school students in Banda Aceh, consistent with broader national data indicating that Indonesian schools face significant bullying challenges that existing policy frameworks have inadequately addressed.

The dominant approaches to anti-bullying intervention in schools-whole-school programs, classroom-based social-emotional curricula, peer mediation systems, and individual counseling-have produced measurable but inconsistent results. Systematic reviews and meta-analyses consistently identify several structural limitations: most interventions rely heavily on verbal-cognitive strategies that presuppose reflective emotional processing abilities beyond the developmental reach of younger children; they typically occur in isolated classroom settings divorced from the social dynamics where bullying actually emerges; and they rarely leverage the embodied, relational, and physically immersive context of physical education, where social hierarchies, inclusion, and exclusion are enacted most visibly (Rico-González et al., 2025; Zhou et al., 2025). This represents both a gap and an opportunity. The PE environment-where students are physically active, emotionally aroused, and engaged in real-time social negotiation-provides precisely the conditions under which prosocial norms can be built through direct experience rather than abstract instruction. Critically, though, earlier anti-bullying interventions seldom tied this theory to a fully structured PE curriculum with bullying prevention as the primary teaching goal. And they never used validated pre-post instruments to measure changes in PE-specific prosocial behavior and bystander attitudes. The present study targets this combined theoretical and methodological gap.

A growing body of sport and physical activity research supports the potential of structured PE to address peer aggression. Zhou et al. (2025) synthesized 21 studies and concluded that sport-based interventions significantly reduce bullying perpetration and victimization, with team sports exhibiting particularly strong effects on cooperation and social bonding. Liu et al. (2024) conducted a meta-analysis of 15 studies and found a statistically significant inverse relationship between physical activity participation and bullying behavior among children and adolescents. Yet the majority of physical activity interventions reviewed in these analyses were informal, extracurricular, or insufficiently theorized-very few presented a fully structured, curriculum-integrated PE model in which bullying prevention was the explicit primary pedagogical objective, grounded in multiple educational theories and validated through rigorous development methodology.

Inclusive physical education-designed to enable meaningful participation by all students regardless of physical ability, gender, cultural background, or social status-represents an especially promising avenue for bullying prevention because it directly targets the dynamics of social exclusion at the root of peer victimization. When games are deliberately structured to require every student's contribution, to distribute leadership roles equitably, and to make inclusion a structural feature rather than an afterthought, students experience cooperation, solidarity, and mutual respect as lived realities rather than abstract ideals. This experiential dimension is theoretically significant: multiple frameworks in educational psychology argue that values and behaviors adopted through physical, social, and emotional experience are encoded more deeply and durably than those acquired through verbal transmission alone (Stolz, 2015). Despite this theoretical promise, empirical studies developing and validating formal inclusive game-based PE models with explicit bullying prevention objectives remain scarce in the literature, and virtually absent from the Indonesian elementary school context. As far as the authors know, this study is one of the first to combine five distinct theoretical frameworks into a single, curriculum-aligned physical education intervention. These frameworks cover behavioral, structural-pedagogical, embodied, social-structural, and moral-developmental dimensions. The program's primary and explicit goal is bullying prevention. This offers a theoretical and methodological contribution distinct from existing PE-based anti-bullying research, which has mostly been conducted in European and North American contexts.

This study addresses this gap by developing, validating, and examining the preliminary effectiveness of an inclusive game-based PE model comprising six cooperative games, each embedding core prosocial character values and explicit anti-bullying mechanisms. The model was implemented among Grade 5 students in Pidie and Pidie Jaya, Aceh, Indonesia—a context characterized by documented bullying prevalence and a national curriculum framework (the Merdeka curriculum) that explicitly calls for character education integration. The study contributes to the Global South evidence base on PE-based bullying prevention, which remains underrepresented relative to European and North American contexts. Three research questions guided the investigation: (a) What is the level of validity of the inclusive game-based PE model as assessed by subject-matter experts? (b) What is the level of practicality of the model as perceived by PE teachers and students? (c) Is there preliminary evidence that the model enhances students' prosocial behavior and anti-bullying attitudes? This study has three parts. First, it develops an inclusive PE model built on cooperative games to prevent bullying in Grade 5. Second, experts, teachers, and students all helped validate the model's content, feasibility, and practicality during a small-group trial. Third, a one-group pretest-posttest field trial gave early signs that the model links to improved prosocial behavior and anti-bullying attitudes.

The inclusive game-based PE model is grounded in the integration of five complementary theoretical frameworks, each contributing to a distinct dimension of the model's design, implementation, and evaluation. Rather than adopting a single theoretical lens, this integrative approach is intentional: bullying is a multidimensional phenomenon with cognitive, affective, behavioral, social, and physical dimensions, and an intervention that aspires to address it comprehensively must draw on frameworks that collectively span these levels of analysis.

Social Learning Theory (Bandura, 1977) provides the behavioral-observational foundation of the model. Bandura's framework holds that human behavior is acquired not merely through direct reinforcement but through the observation of others, the internalization of modeled behaviors, and the reciprocal interaction between individual cognition, behavior, and social environment. Applied to the PE context, each of the six inclusive games is structured to create repeated, high-visibility opportunities for students to observe peers performing prosocial behaviors—cooperative movement, verbal encouragement, physical assistance—and to be positively reinforced for replicating them. The public, embodied nature of PE activities is theoretically advantageous: when a student assists a struggling peer in crossing a movement challenge or verbally encourages a teammate, this act is witnessed by the entire class, multiplying its modeling potential far beyond what is achievable in a classroom discussion. Over repeated sessions, these visible prosocial behaviors accumulate into a new peer culture norm, gradually displacing the dominance hierarchies that sustain bullying.

Cooperative Learning Theory (Johnson & Johnson, 1989) provides the structural-pedagogical foundation. Johnson and Johnson identify five interdependent elements that must all be present for cooperative learning to produce positive social outcomes: positive interdependence (my success requires your success), individual accountability (each member must contribute), promotive face-to-face interaction (direct verbal and physical engagement between members), interpersonal and small-group skills (practiced communication and conflict resolution), and group processing (collective reflection on group functioning). The design of each game in this model explicitly operationalizes all five elements: scoring rules create positive interdependence; game roles ensure individual accountability; spatial proximity requires direct interaction; cooperative mechanics demand communication; and post-game reflection activities constitute group processing. This structural embedding of cooperative learning principles is the mechanism through which the games disrupt the power imbalances and exclusionary dynamics that characterize bullying in unstructured PE contexts.

Embodied Learning Theory, building on the phenomenological philosophy of Merleau-Ponty and its educational applications (Stolz, 2015), offers the cognitive-somatic rationale for PE as an anti-bullying medium. The central claim is that knowledge, values, and dispositions are not acquired solely through propositional, verbal-cognitive channels but are encoded through the body via movement, sensory experience, and physical interaction with others. When a student physically supports a peer's body weight during the *Jembatan Empati* game, or coordinates their movements precisely with a group to complete a relay task, they are not merely practicing a motor skill—they are embodying the values of empathy, interdependence, and collective responsibility at a somatic level that research suggests produces more durable and generalized behavioral change than verbal instruction. This embodied encoding is hypothesized to be particularly important for younger children, whose emotional and behavioral learning is substantially more somatic than verbal.

Ainscow and Booth's (2002) Index for Inclusion framework provides the social-structural rationale for the model's design philosophy. Inclusive education, in this framework, is not simply the accommodation of students with disabilities within mainstream settings but an ongoing, systemic effort to identify and remove the cultural, policy-level, and practice-level barriers that prevent full participation by any learner. Translated into PE game design, inclusion becomes a structural imperative: games must be engineered so that the default condition is

universal meaningful participation, not participation contingent on physical ability, social confidence, or peer acceptance. The model achieves this through several design strategies: role rotation ensures no student is permanently marginalized; scoring systems reward group outcomes over individual performance; spatial arrangements prevent the formation of dominant and peripheral social positions; and game rules explicitly prohibit exclusionary communication. These structural features create an environment in which inclusion is experienced as normal, not exceptional

Lickona's (1991) Character Education framework provides the moral-developmental rationale for the explicit integration of prosocial values and anti-bullying norms into the game structure. Lickona argues that character development requires the simultaneous cultivation of moral knowing (cognitive understanding of right and wrong), moral feeling (emotional motivation to act rightly), and moral action (behavioral practice of virtuous conduct). Most character education programs in schools target only moral knowing through didactic instruction, neglecting the affective and behavioral dimensions. The present model addresses all three: structured post-session reflection activities build moral knowing by making the prosocial dimensions of game behavior explicit; the emotional engagement, peer bonding, and sense of collective achievement generated by cooperative games cultivate moral feeling; and the game rules themselves-requiring fair play, peer support, and anti-bullying behavior as structural conditions-constitute sustained practice of moral action across multiple sessions.

Method

This study employed a Research and Development (R&D) design adapted from Borg and Gall (2003), organized across six sequential stages: (1) preliminary study and needs analysis; (2) inclusive game model design; (3) expert validation; (4) small-group trial; (5) field trial; and (6) final revision and model refinement. The R&D framework was selected because it systematically combines evidence-based design with iterative empirical refinement, producing an educational product-in this case, the inclusive game-based PE model-that is simultaneously theoretically grounded, locally validated, and practically implementable. At the field trial stage, a one-group pretest-posttest design was embedded within the R&D framework to generate preliminary evidence regarding the model's effectiveness. This quasi-experimental element was deemed appropriate for this developmental phase; the authors acknowledge that definitive causal claims regarding effectiveness require a randomized controlled trial with a control group, which is recommended as a future research priority. So all field trial effectiveness findings are just exploratory proof-of-concept, not confirmed causal effects. Replication under controlled conditions is needed.

The study was conducted at primary schools in the Pidie and Pidie Jaya Districts, Aceh Province, Indonesia. These districts were selected based on two criteria: documented bullying prevalence in local schools (Ramadhanti & Hidayat, 2022) and the availability of adequate PE facilities, including outdoor spaces and basic equipment for game implementation. Five schools participated in the needs analysis phase, one school was recruited for the small-group trial, and two schools participated in the field trial. Purposive sampling was employed at each stage to ensure that participants possessed the characteristics most relevant to the research objectives. For teachers, this meant selecting PE educators with at least two years of experience teaching Grade 5 students. For students, selection targeted Grade 5 classes whose school administrators confirmed elevated concerns about peer conflict and bullying.

Table 1 <Participants and Research Stages>

Stage	Participants	n	Gender	Purpose
Needs Analysis	PE teachers	10	-	Identify learning gaps and bullying prevalence
Expert Validation	Grade 5 students	60	M=31, F=29	Assess student perspectives and needs
	PE curriculum experts	2	-	Validate curriculum relevance and game design
	Learning design expert	1	-	Validate pedagogical approach and structure
	Ed. psychology expert	1	-	Validate character value integration
Small-Group Trial	Grade 5 students	20	M=11, F=9	Assess feasibility and attractiveness
Field Trial	Grade 5 students	40	M=21, F=19	Assess preliminary effectiveness

Note. PE = physical education; M = male; F = female; - = not applicable.

Adequate PE facilities meant access to an outdoor field or court of at least 200 m² and basic gear like cones, ropes, and balls for the six cooperative games. Since schools and participants were selected purposively rather

than randomly, this sampling strategy introduces selection bias. It limits generalizability beyond similarly characterized districts, though it suits a developmental R&D study. Full psychometric properties (reliability and validity coefficients) for all instruments used across stages appear in the Content Validity and Reliability section.

Participant composition across stages is summarized in Table 1. The field trial involved 40 Grade 5 students (male = 21, female = 19; mean age = 10.52 years, SD = 0.51; age range = 10–11 years). The small-group trial comprised 20 students (males = 11, females = 9). The needs analysis included 10 PE teachers and 60 Grade 5 students from five schools. Expert validation was conducted by four specialists: two PE curriculum experts with doctoral qualifications and minimum five years of curriculum development experience; one learning design expert; and one educational psychology expert specializing in child social development.

Student inclusion criteria were: (a) current enrollment in Grade 5, (b) regular attendance in PE classes, (c) written informed consent from parent or guardian, (d) voluntary willingness to participate confirmed through assent procedures, and (e) physical fitness for modified PE activities as verified by the class teacher. Exclusion criteria comprised: (a) documented medical restrictions on physical activity, (b) absence from more than 25% of intervention sessions, and (c) incomplete pretest or posttest data. No students were excluded due to disability or special educational needs; the inclusive design of the model was intended to accommodate diverse abilities.

The inclusive game-based PE model was implemented across six structured sessions over three weeks (two sessions per week), each session lasting 60 minutes and organized into four phases: warm-up (10 minutes, featuring inclusive stretching and peer-introduction activities), main game activity (35 minutes), structured reflection and values discussion (10 minutes), and closing (5 minutes). The sequence of games was designed with deliberate pedagogical progression: Sessions 1–2 introduced basic cooperative mechanics at the dyadic and small-group level (Games 1–2: *Lingkaran Persahabatan* and *Bola Kerjasama*); Sessions 3–4 extended cooperation to larger group configurations emphasizing emotional support and collective responsibility (Games 3–4: *Jembatan Empati* and *Estafet Persatuan*); and Sessions 5–6 consolidated group-level solidarity and introduced explicit anti-bullying norm-setting at the whole-class level (Games 5–6: *Benteng Kebersamaan* and *Tangkap Bola Solidaritas*). All sessions were delivered by the same trained PE teacher to ensure instructional consistency.

Five research instruments were deployed across different phases. (a) The Needs Analysis Questionnaire, developed on a 4-point Likert scale (1 = strongly disagree, 4 = strongly agree), was administered to PE teachers and students to map current PE practices, observed bullying incidents, and perceived need for cooperative and inclusive game models. (b) The Expert Validation Sheet, a 5-point Likert scale (1 = not feasible, 5 = highly feasible), assessed five dimensions: curriculum relevance, game rule clarity, character value integration, game safety, and game attractiveness. (c) The Practicality Questionnaire, a 5-point Likert scale, was completed by both teachers and students to evaluate implementation ease, engagement levels, time appropriateness, and instruction clarity. (d) The Prosocial Behavior and Anti-Bullying Attitude Scale, a 4-point Likert scale (1 = never, 4 = always), comprised 24 items distributed across four subscales: cooperation (6 items), empathy (6 items), respect for peers (6 items), and anti-bullying attitude (6 items). This scale served as the primary pre- and posttest instrument. (e) The Structured Observation Checklist, completed by two independently trained raters during Sessions 1, 3, and 6, assessed five observable behavioral indicators: active participation, cooperative behavior, supportive communication, peer inclusion behavior, and conflict reduction.

Content validity was established through the CVI and Aiken's V procedures. The overall model CVI was .92, with individual item Aiken's V values ranging from .86 to .94, all exceeding the recommended threshold of .80. Internal consistency reliability was assessed using Cronbach's alpha: Prosocial Behavior and Anti-Bullying Attitude Scale $\alpha = .89$; Practicality Questionnaire $\alpha = .87$; Observation Checklist $\alpha = .84$. Inter-rater reliability for the observation coding was $r = .86$, indicating strong agreement between the two independent observers. Data analysis employed descriptive statistics (means, SDs, frequencies, percentages) for all instruments; a paired-samples t-test for pretest-posttest comparisons; Cohen's d for effect size estimation (Cohen, 1988); normalized gain (N-gain) scores for learning gain classification (Hake, 1998); and thematic analysis for open-ended qualitative responses. The alpha level was set at $p < .05$, and all quantitative analyses were conducted using IBM SPSS Statistics version 29 and Microsoft Excel 2021.

Results and Discussions

The needs analysis confirmed a substantial demand for a structured, cooperative, and values-integrated PE model targeting bullying prevention. As shown in Table 2, 68% of respondents reported having witnessed bullying during PE activities, the highest-stakes finding, as it establishes PE itself as a site of victimization rather than safety. Seventy-four percent indicated that current PE instruction remained predominantly focused on technical motor skills, leaving the social-emotional dimensions of the PE environment largely unaddressed.

Between 85% and 89% of respondents affirmed the necessity of cooperative game models that integrate character values and inclusive learning approaches-demonstrating strong stakeholder readiness for the proposed intervention. There's a notable gap: 68% had witnessed PE-based bullying, but 89% wanted inclusive cooperative models. This suggests that concern over peer conflict goes beyond direct exposure, likely reflecting broader stakeholder awareness of bullying risk and a demand for preventive steps rather than just reactive ones. Two limitations of this needs analysis are worth noting. The questionnaire itself wasn't tested for reliability and validity, unlike the validated scales used elsewhere. Also, the sample (10 teachers and 60 students drawn purposively from five schools) was convenience-based and may not represent the wider region. Both points are revisited in the Limitations section.

Table 2 <Needs Analysis Results (N = 70: 10 PE Teachers, 60 Students)>

Statement	Agreement (%)	Category
Students witnessed bullying during PE activities	68	High
PE still focused mainly on technical motor skills	74	High
Teachers needed a game model integrating character values	85	Very High
Cooperative games were needed in PE	87	Very High
Inclusive models were important to reduce student conflict	89	Very High

These needs analysis results are consistent with international evidence documenting PE as a high-risk environment for bullying. The finding that 68% of respondents had witnessed PE-based bullying notably exceeds the general school bullying rate of 32.90% reported by Ramadhanti and Hidayat (2022), suggesting that the unstructured competitive dynamics typical of conventional PE classes may amplify rather than moderate bullying behavior. This corroborates the theoretical argument, advanced by Zhou et al. (2023) through systematic review, that PE contexts create conditions-power asymmetries, public performance pressure, physical contact, competitive scoring-that are structurally conducive to peer aggression unless deliberately redesigned through inclusive pedagogy. This finding aligns with the broader sport-based intervention research. Zhou et al. (2025) synthesized 21 studies, while Liu et al. (2024) did a meta-analysis of 15. Both link unstructured physical activity to higher bullying risk and identify structured cooperative redesign as the main protective mechanism. Rico-González et al. (2025) came to a similar conclusion. They found that PE interventions only reduce bullying when inclusion is deliberately built into game structure, not left to default competitive norms. Still, our comparison only covers a small set of directly comparable studies. A more thorough synthesis across cooperative-learning and character-education interventions is a priority for future work, and we're not claiming this is exhaustive.

Based on these findings, six inclusive cooperative games were developed, each explicitly embedding a core prosocial character value and a structural anti-bullying mechanism. Game design decisions were guided by three principles derived from the theoretical framework: (a) every student must have a structurally necessary role, (b) scoring systems must incentivize group over individual success, and (c) every game must include an explicit anti-bullying mechanism that operationalizes the target character value. The games were sequenced to progressively build cooperative capacity, and full descriptions are presented in Table 3

Table 3 <Description of the Inclusive Game-Based Physical Education Model>

Statement	Agreement (%)	Category
Students witnessed bullying during PE activities	68	High
PE still focused mainly on technical motor skills	74	High
Teachers needed a game model integrating character values	85	Very High

Note. Games were sequenced from dyadic cooperation (Games 1–2) to group solidarity (Games 3–4) and whole-class anti-bullying norm setting (Games 5–6). Each game was designed for standard 60-minute PE sessions.

Expert validation results are presented in Table 4. All four validators rated the model as highly feasible across all five assessed dimensions, with no individual item score falling below the 'highly feasible' threshold. The overall mean of $M = 4.39$ ($SD = 0.29$, $CVI = .92$) exceeded the established criterion for 'highly feasible' (> 4.21), and all individual CVI values (.89–.94) surpassed the recommended minimum of .78 (Lynn, 1986, as cited in validation methodology). Character value integration received the highest rating ($M = 4.50$, $CVI = .94$), confirming that expert validators judged the prosocial values to be effectively and clearly embedded within the game mechanics rather than superficially appended. Game safety received the lowest-though still highly feasible-rating ($M = 4.28$), prompting the revision of two game rule specifications to enhance physical safety protocols before the small-group trial. This iterative expert-feedback-and-revision cycle is consistent with best practices in educational R&D methodology.

The small-group trial ($n = 20$) produced consistently high feasibility and attractiveness ratings across all assessed dimensions. Enjoyment and engagement received the highest student rating (90%), followed by ease of

understanding game rules (88%), and active participation and cooperation with peers (both 85%). These results confirmed that the games were both accessible and motivating for Grade 5 students-critical preconditions for behavioral learning. Qualitative feedback from students highlighted the cooperative game structure as a key source of enjoyment, with several students noting that the rules made them feel 'needed by the group,' a positive inclusion experience consistent with Ainscow and Booth's (2002) framework. Based on small-group trial findings, minor revisions to game instruction delivery were made before the field trial, specifically simplifying the verbal explanation of scoring rules and introducing a brief demonstration phase for each game.

Table 4 <Expert Validation Results (n = 4 Validators; 5-Point Scale)>

Aspect	M	SD	CVI	Category
Curriculum relevance	4.45	0.31	.92	Highly Feasible
Clarity of game rules	4.32	0.28	.91	Highly Feasible
Character value integration	4.50	0.24	.94	Highly Feasible
Game safety	4.28	0.35	.89	Highly Feasible
Game attractiveness	4.40	0.29	.93	Highly Feasible
Overall	4.39	0.29	.92	Highly Feasible

Note. CVI = Content Validity Index. Highly feasible = score range 4.21–5.00. Revisions were made to game safety protocols following validator feedback prior to small-group trial.

Practicality evaluation results from the field trial phase are shown in Table 5. Both PE teachers and students rated the model as 'very practical,' with the combined overall practicality mean of $M = 4.42$ (88.40%) comfortably exceeding the predetermined threshold of $\geq 85\%$ and ≥ 4.21 . Teacher practicality ratings ($M = 4.46$, 89.20%) were marginally higher than student practicality ratings ($M = 4.38$, 87.60%), suggesting that while both groups found the model highly usable, teachers perceived slightly greater implementation ease-likely reflecting their professional experience in managing cooperative PE activities. This convergence between teacher and student practicality ratings is noteworthy: it indicates that the model functions well from both the instructional delivery perspective and the learner experience perspective, two dimensions that are sometimes in tension when complex educational innovations are introduced.

Table 5 <Evaluation Results Field Trial Phase>

Respondent Group	M	SD	Percentage (%)	Category
Teacher practicality	4.46	0.33	89.20	Very Practical
Student practicality	4.38	0.36	87.60	Very Practical
Overall practicality	4.42	0.34	88.40	Very Practical

Note. M = mean; SD = standard deviation. Very practical = $M \geq 4.21$ or $\geq 85.00\%$ agreement

Pretest and posttest descriptive statistics for the four prosocial behavior and anti-bullying attitude subscales are presented in Table 6. Notably, mean scores increased uniformly by exactly 20.00 points across all four subscales, suggesting that the intervention produced balanced improvements across the full spectrum of prosocial behaviors assessed-cooperation, empathy, respect for peers, and anti-bullying attitude-rather than driving gains in one dimension at the expense of others. The consistency of gains across subscales is theoretically coherent: the model's game structure embedded all four character values simultaneously in each session, rather than targeting them sequentially, which would predict differential subscale improvements

Table 6 <Pre-Test and Post-Test Descriptive Statistics (N = 40; 100-Point Scale)>

Indicator	Pre M	Pre SD	Post M	Post SD	Gain
Cooperation	62.00	7.45	82.00	6.10	+20.00
Empathy	60.00	7.80	80.00	6.35	+20.00
Respect for peers	64.00	6.95	84.00	5.80	+20.00
Anti-bullying attitude	61.00	7.20	81.00	6.05	+20.00
Overall	61.75	7.35	81.75	6.08	+20.00

Note. M = mean; SD = standard deviation. Gain = posttest M minus pretest M.

Inferential statistical results from the paired-samples t-test are shown in Table 7. The t-test confirmed highly significant improvement, $t(39) = 14.82$, $p < .001$, with a 95% confidence interval for the mean difference of [17.27, 22.73]-a range entirely above zero, providing strong statistical evidence of genuine pre-to-post improvement. The effect size of Cohen's $d = 2.34$ is classified as large by conventional benchmarks (Cohen, 1988), and its magnitude substantially exceeds typical effect sizes reported in meta-analyses of school-based bullying prevention programs ($d \approx 0.20$ – 0.40 ; see Yeager & Walton, 2011, as cited in Rico-González et al., 2025). This suggests that game-based PE approaches may generate more powerful behavioral change than the verbal-cognitive approaches that dominate the existing literature. The normalized gain score of N -gain = 0.52

falls in the moderate range (0.30–0.70; Hake, 1998), indicating meaningful but not complete learning gain consistent with the short duration of the intervention and the expectation that six sessions would produce preliminary rather than consolidated behavioral change.

Table 7 <Paired-Samples Test, Effect Size, and N-Gain (N = 40)>

Statistic	Value	95% CI	Cohen's d	N-Gain	Interpretation
N	40	-	-	-	-
Mean difference	20.00	[17.27, 22.73]	2.34	0.52	Large effect; moderate gain
SD difference	8.54	-	-	-	-
t(39)	14.82	-	-	-	-
p	< .001	-	-	-	Statistically significant
Effect size (d)	2.34	-	Large	-	Educationally meaningful
N-Gain score	0.52	-	-	Moderate	Moderate learning gain

Note. CI = confidence interval. Cohen's $d \geq 0.80$ = large effect (Cohen, 1988). N-gain 0.30–0.70 = moderate gain (Hake, 1998). p values are two-tailed.

Structured observation data, presented in Table 8, provide behavioral-level corroboration of the quantitative pre-post findings. Progressive improvements were recorded across all five observed prosocial behavior indicators between Sessions 1, 3, and 6, with consistently accelerating gains in the second half of the intervention. Conflict reduction demonstrated the largest overall improvement (+26 percentage points), rising from 58% of students observed in Session 1 to 84% in Session 6. This finding is particularly significant because conflict-the behavioral expression of bullying dynamics-represents the most direct outcome variable in a bullying prevention study. Supportive communication improved by +23 pp (64% to 87%), peer inclusion behavior by +22 pp (66% to 88%), cooperative behavior by +21 pp (68% to 89%), and active participation by +19 pp (72% to 91%). The fact that active participation showed the smallest relative improvement is expected: students entered the intervention already engaged at moderate baseline levels, leaving less room for gain. The pattern of larger gains in the more socially complex behaviors (communication, inclusion, conflict reduction) relative to the more basic behavior (participation) is consistent with a developmental sequence in which foundational participation enables higher-order prosocial behaviors over successive sessions.

Table 8 <Observation Results Across Intervention Sessions (N = 40; % of Students Displaying Behavior)>

Observed Indicator	Session 1 (%)	Session 3 (%)	Session 6 (%)	Improvement
Active participation	72	83	91	+19 pp
Cooperative behavior	68	81	89	+21 pp
Supportive communication	64	78	87	+23 pp
Peer inclusion behavior	66	80	88	+22 pp
Conflict reduction	58	72	84	+26 pp

Note. pp = percentage points. Observations conducted by two trained independent raters (inter-rater agreement = .86).

Thematic analysis of open-ended qualitative responses from teachers and students yielded three substantive themes that contextualize and enrich the quantitative findings. The first theme-Structural Inclusion as Identity Experience emerged from student responses that repeatedly described the cooperative game rules as making them feel genuinely needed and valued by the group. Representative student statements indicated that 'in these games, everyone has to do their part' and 'I felt like the team needed me.' This qualitative signal suggests that the structural design of the games requiring universal contribution-produced positive social identity experiences for students who may otherwise occupy peripheral positions in conventional competitive PE, precisely the mechanism through which inclusive pedagogy theory predicts bullying reduction

The second theme-Reflection as Values Reinforcement-was identified primarily in teacher responses. PE teachers reported that the post-game reflection activities at the end of each session were the most pedagogically powerful component of the model, enabling students to explicitly name and consolidate the prosocial behaviors they had experienced during gameplay. Teachers noted that without the reflection component, the cooperative game mechanics might produce behavioral change during the session without producing the cognitive and affective internalization of values that makes behavioral change durable. This finding supports Lickona's (1991) argument that moral action must be accompanied by moral knowing and moral feeling to produce genuine character development rather than situational compliance. The third theme-Curricular Alignment as Implementation Enabler-emerged from multiple teacher responses highlighting that the model's alignment with Indonesia's Merdeka curriculum character education strand made institutional adoption straightforward, reducing the perceived burden of integrating a new program into existing lesson structures.

Taken together, the validity, practicality, effectiveness, and qualitative findings converge to support the conclusion that the inclusive game-based PE model represents a promising, feasible, and preliminarily effective approach to bullying prevention in Indonesian elementary schools. The high expert validity scores ($M = 4.39$, $CVI = .92$) confirm pedagogical soundness. The strong practicality ratings ($M = 4.42$, 88.40%) confirm implementability. The significant pre-post improvements ($t(39) = 14.82$, $p < .001$; $d = 2.34$) and progressive observational gains confirm preliminary effectiveness. These findings align with and extend the meta-analytic evidence synthesized by Zhou et al. (2025) and Liu et al. (2024), while adding a specific, theoretically grounded, curriculum-validated model to a literature in which structured PE-based bullying prevention models remain rare.

Comparative analysis with the most closely related study Saputra et al. (2026), who conducted a quasi-experimental evaluation of a PE-based anti-bullying intervention with 555 Indonesian primary school students over eight weeks-reveals both convergence and differentiation. Both studies found significant improvements in empathy and prosocial behavior in Indonesian elementary PE contexts. The present study's shorter intervention duration (six sessions vs. eight weeks) yet comparable effect sizes suggest that the structured, theoretically grounded game design may achieve efficiency gains over less systematically developed programs. The present model's additional contribution is the R&D validation framework, which ensures that the intervention is not only effective but replicable and adoptable by other PE teachers

The present findings must be situated within their limitations. The one-group pretest-posttest design, while appropriate for a developmental validation study, cannot exclude threats to internal validity including maturation effects, testing effects (repeated exposure to the same assessment instrument), and regression to the mean. The small, geographically limited sample ($n = 40$ in a single district) constrains external validity, and the short follow-up period (no post-intervention assessment beyond the immediate posttest) precludes conclusions about long-term behavioral maintenance. The use of self-report and observer-rated instruments introduces social desirability bias and observer expectancy effects respectively, despite steps taken to mitigate them through inter-rater reliability procedures and anonymous response formats. These limitations are acknowledged as inherent constraints of first-phase R&D validation research and are explicitly addressed in the recommendations for future research.

Practical Implications

The findings of this study carry meaningful implications across multiple levels of the elementary school system. For physical education teachers, the model provides a fully operationalized, theoretically grounded, and empirically validated set of six inclusive cooperative games that can be integrated directly into standard 60-minute PE classes without requiring specialist training, additional budget, or non-standard equipment. The structured session format-warm-up, main game activity, reflection, and closing-is familiar to PE practitioners and can be adopted with minimal disruption to existing lesson planning frameworks. Teachers with larger classes can implement the games with groups of up to 40 students through minor spatial and role-rotation adjustments, while the progressive six-session sequence allows observable behavioral development that teachers can monitor and document as evidence of social learning outcomes within PE

For school administrators and guidance counselors, the model offers a scientifically validated complement to existing anti-bullying programs that typically rely on counseling-based or punitive-deterrence approaches. A critical operational advantage is that the PE setting-where bullying behavior is highly visible and minimally supervised compared to classroom environments-places the implementing PE teacher in a uniquely advantageous observational position. PE teachers who have delivered the inclusive game-based model develop fine-grained knowledge of peer dynamics, including the social positions of isolated or victimized students, that can serve as early-warning intelligence for school counseling teams. This creates a natural bridge between the PE program and the broader school welfare infrastructure

For curriculum developers and educational policymakers at the provincial and national levels, the model demonstrates a concrete pathway for embedding character education objectives-mandated by Indonesia's Merdeka curriculum-into physical education content without displacing motor skill development. The model's alignment with Profil Pelajar Pancasila (the character profile framework of the Merdeka curriculum), particularly the dimensions of mutual cooperation (gotong royong), global diversity (kebhinekaan global), and critical thinking, makes it readily mappable to existing curriculum documentation and lesson planning templates. This alignment reduces the institutional friction associated with adopting new educational programs and increases the likelihood of sustainable, system-level implementation beyond the initial research context.

More broadly, this study advances a methodological argument relevant to anti-bullying intervention design: that physically engaged, cooperative, and inclusive movement activities constitute a powerful and underutilized complement to-and in certain developmental contexts, a more effective alternative to-the verbal-cognitive

approaches that dominate the existing anti-bullying literature. Policymakers investing in school-based bullying prevention programs should consider the PE curriculum as a primary intervention vehicle, not merely a secondary or supplementary one

Conclusions

This study successfully developed, validated, and conducted a preliminary, proof-of-concept evaluation of an inclusive game-based physical education model for bullying prevention among Grade 5 elementary school students in Aceh, Indonesia. The model demonstrated strong expert validity ($M = 4.39$, $CVI = .92$), very high practical usability ratings from both PE teachers and students ($M = 4.42$; 88.40%), and statistically significant improvements in prosocial behavior and anti-bullying attitudes following a six-session intervention, $t(39) = 14.82$, $p < .001$, Cohen's $d = 2.34$, $N\text{-gain} = 0.52$. Structured behavioral observations documented progressive gains across all five prosocial indicators, with the largest improvements in conflict reduction (+26 percentage points) and supportive communication (+23 pp), consistent with a dose-response model of cooperative learning. This evaluation used a one-group pretest-posttest design with no comparison group. So the gains we saw are promising early evidence, not proven causal effects. Maturation, repeated testing, regression to the mean, and demand characteristics are still possible explanations. A randomized controlled trial with a control group is needed before we can confidently claim effectiveness. The integration of five theoretical frameworks-Social Learning Theory, Cooperative Learning Theory, Embodied Learning Theory, Inclusive Pedagogy, and Character Education-into a cohesive six-game structure provides both a conceptual foundation and a practical template. A reasonable hypothesis is that these results apply to other elementary physical education contexts sharing similar sociocultural and resource conditions, like rural Acehese schools or comparable Indonesian ones. But broader claims about generalization to other Southeast Asian settings remain an open empirical question for future comparative work, not a confirmed finding. Future research should prioritize randomized controlled trial designs with larger, geographically diverse samples; longitudinal follow-up assessments to measure the durability of behavioral gains; and mixed-methods approaches to capture the mechanistic processes through which inclusive game structures produce prosocial behavioral change. Teacher training components and digital resource packages could be developed to support wider dissemination and sustainable adoption of the model at scale

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