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The Impact of Multi-Component Comprehensive School Physical Activity Programs Intervention on Life Satisfaction Among Underserved Youth

Jongseon Kim[a] & Dongwoo Lee[b*]

[a]*Mary Lou Fulton College for Teaching and Learning Innovation, Arizona State University, Tempe, AZ, USA*
[b]*Department of Physical Education, Gwangju National University of Education, Gwangju, Republic of Korea*

Abstract

This study examined the effects of a tailored, multi-component Comprehensive School Physical Activity Program on student life satisfaction in an underserved elementary school. Ninety-six sixth-grade students were quasi-randomly assigned to Nutrition, Physical Activity During School, Family and Community Engagement, or control groups. Interventions were co-designed with local teachers. Life satisfaction was measured using the Korean Version of the Satisfaction With Life Scale and analyzed via independent-samples t-tests and one-way ANOVA with Scheffé post hoc tests. Students in the intervention groups showed higher life satisfaction scores than those in the control group, with the PADS group exhibiting the highest levels. Results underscore the importance of tailored, school-based physical activity interventions.

Key words: CSPAP, life satisfaction, underserved, mental health

Introduction

Increasing concerns about childhood physical inactivity and its long-term health implications have contributed to the adoption of whole-of-school health approaches that aim to integrate multiple strategies to support student well-being. These approaches emphasize providing physical activity (PA) opportunities throughout the school day by leveraging support from school staff, families, and community partners (Erwin et al., 2013). These whole-of-school approaches are especially important because sustained engagement in moderate-to-vigorous PA (MVPA) cannot be achieved through isolated or single-setting efforts. Instead, students require continuous, coordinated PA opportunities across multiple contexts of the school day. Building on a whole-of-school health perspective, the Comprehensive School Physical Activity Program (CSPAP) offers a focused framework for promoting PA opportunities within school settings (Carson et al., 2014b). The CSPAP, conceptualized by the Centers for Disease Control and Prevention (CDC) (2015), consists of five components: (a) quality physical education, (b) PA during school (PADS), (c) before- and after-school PA programs, (d) staff involvement, and (e) family and community engagement (FCE). Designed to help students achieve the recommended 60 minutes of MVPA daily (CDC, 2017; Elliot et al., 2013), CSPAP functions as a comprehensive framework for supporting schoolwide PA opportunities. The whole-of-school health approach provides the broader rationale for promoting student health and situates

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* Correspondence : dongw921@gnue.ac.kr

CSPAP within a comprehensive school health context.

While CSPAP has primarily focused on improving physical health outcomes through increased PA levels (Webster, 2023), mental health outcomes remain an area of growing interest. A growing body of evidence supports the effectiveness of school-based PA interventions in promoting positive mental health outcomes, including enhanced resilience, reduced anxiety, improved self-esteem, and overall well-being (Andermo et al., 2020; Papadopoulos et al., 2022; Yan et al., 2022). Among these outcomes, life satisfaction emerges as a particularly valuable indicator for evaluating CSPAP interventions due to its unique characteristics.

Unlike domain-specific measures such as self-esteem or anxiety, life satisfaction represents a holistic cognitive judgment about one's overall quality of life (Veenhoven, 1996), capturing the broader psychological state of adolescents as a cognitive component of subjective well-being and a potential proxy for happiness (Diener et al., 1985; Diener et al., 1999). This comprehensive nature makes it suited for assessing the far-reaching impact of whole-of-school approaches, which target multiple settings. Moreover, life satisfaction is a well-established marker of youth mental health that is consistently linked to beneficial outcomes such as stronger peer relationships, better coping skills, and lower rates of depression and anxiety (Proctor et al., 2009). Given the growing evidence that regular PA participation contributes to improved mental health outcomes, including reductions in depressive symptoms (Biddle et al., 2019), integrating life satisfaction as a key outcome in CSPAP research addresses a critical gap by reflecting the program's potential to support not only physical health but also psychological well-being in youth.

The importance of addressing life satisfaction through school-based PA becomes even more critical for students from underserved communities, who are more vulnerable to poor health outcomes and consistently report lower life satisfaction than their higher socioeconomic status (SES) peers due to compounding structural and psychosocial disadvantages (Fassbender & Leyendecker, 2018). In the context of PA, these students face substantial barriers including limited access to safe recreational spaces, shortages of trained physical education specialists, and insufficient funding for equipment and facilities (Finkelstein et al., 2017; Simonsen et al., 2024). These environmental constraints function as chronic stressors that not only restrict PA engagement but also erode self-regulation, diminish social connectedness, and increase exposure to emotional distress, ultimately contributing to cumulative disadvantages in mental health and well-being (Evans & Kim, 2013; Gee & Ford, 2011).

Recent evidence further demonstrates that psychological well-being and resilience are significantly associated with PA participation, suggesting that limited PA opportunities may exacerbate existing mental health disparities in underserved populations (Belaire et al., 2024). In this context, CSPAP offers a promising approach to mitigate these inequities by embedding PA throughout the school day across multiple settings thereby reducing reliance on external resources that are often inaccessible to underserved communities. By leveraging the school environment as a platform for PA promotion, CSPAP has the potential to address both the structural barriers and the mental health disparities that disproportionately affect students from low-SES backgrounds, making it a particularly valuable intervention for promoting life satisfaction in these vulnerable populations.

Given that increased participation in PA has been consistently linked to improved psychosocial outcomes (An et al., 2020; Marquez et al., 2020), school-based PA interventions offer a promising avenue for addressing well-being (Marsigliante et al., 2023). CSPAP interventions, through their multi-component structure, aim to support student engagement in PA across diverse contexts (Webster, 2023). Rather than relying on a single component to drive improvement, this holistic approach seeks to foster students' overall development by leveraging CSPAP's multifaceted design in an integrated manner (Carson et al., 2014a). This integration is not merely theoretical but substantiated by empirical findings. A systematic review of 32 multi-component CSPAP interventions conducted by Pulling Kuhn et al. (2021) demonstrated

that combinations incorporating physical education with additional CSPAP components were associated with positive health-related outcomes in youth. These findings underscore the synergistic value of multi-component CSPAP interventions.

However, for school-based PA interventions to be effective across diverse settings, it is crucial to consider the context-specific approach in which they are implemented (Jago et al., 2023; Porter et al., 2024). Context has been defined as a set of active and unique characteristics and circumstances that influence both the implementation and evaluation of an intervention. In the case of school-based PA programs, this includes factors such as school setting, student demographics, available facilities, and the attitudes, training, and capacity of school staff (Pfadenhauer et al., 2017). When designing and implementing CSPAP interventions, it is essential to recognize that contextual disparities, particularly those related to SES, can significantly influence program outcomes (Somers et al., 2019). These disparities introduce systemic variability in effectiveness, highlighting the importance of tailored adaptations that fit the specific needs and limitations of each school (Centeio et al., 2018). As Somers et al. (2019) emphasize, students from different SES backgrounds may experience CSPAP interventions differently due to variations in school resources and demographic profiles. This suggests that schools cannot be treated as homogeneous units when evaluating the impact of CSPAP interventions, and tailored approaches are needed to ensure equitable outcomes. Accordingly, the present study identified and prioritized specific CSPAP components that would be most relevant and feasible for underserved school settings, ensuring that intervention design reflected the actual needs and capacities of participating schools rather than imposing a standardized model.

Despite growing interest in school-based PA programs' effectiveness in mental health, opportunities remain to explore how these outcomes can be supported through contextually tailored approaches. To date, research examining life satisfaction as an outcome of CSPAP interventions remains limited, and no studies have compared the effects of tailored, multi-component CSPAP on life satisfaction among underserved youth. Addressing this gap, the present study implements a multi-component CSPAP intervention developed through a context-sensitive process and examines its impact on life satisfaction among underserved youth. Specifically, the research addresses the following questions:

RQ1: Does participation in a multi-component CSPAP intervention, including Nutrition, PADS, and FCE, improve students' life satisfaction compared to the control group?

RQ2: How does students' life satisfaction differ across tailored CSPAP programs: Nutrition, PADS, and FCE?

Methods

Research Design

This study employed a quasi-experimental design, selected due to the practical limitations of implementing randomized controlled trials in real-world school-based settings (Cook et al., 2002). The intervention was delivered within pre-existing classroom structures, where random assignment was not feasible due to administrative constraints and instructional scheduling (Mertens, 2019). Assignment occurred at the classroom level, with four intact sixth-grade classrooms assigned to conditions. All classrooms received their regularly scheduled physical education, with three classrooms additionally assigned to one of the tailored, multi-component CSPAP intervention components (Nutrition, PADS, or FCE) and one classroom assigned to the control group. This approach aligned with the school's instructional organization and allowed the intervention to be implemented without disrupting existing teaching schedules. However, the unit of analysis remained at the individual student level, with life satisfaction assessed for each participant.

Participants

Participants included 96 sixth-grade students from

an elementary school located in Mokpo-si, South Korea. Four intact sixth-grade classrooms, each comprising 24 students, were assigned to study conditions based on pre-existing classroom structures. Three classrooms were assigned to the CSPAP intervention groups, while one classroom served as the control group. This assignment procedure was determined by administrative and scheduling constraints inherent to the school's organizational structure. Standard protocols for obtaining student assent and parental consent were rigorously followed. Institutional Review Board approval was obtained from Gwangju National University of Education, along with administrative approval from the participating school. The selection of the current study site is notable given the area's high concentration of socioeconomically underserved populations. According to the Regional Report, 2019, Mokpo-si accounted for the highest proportion of low-income and single-parent households among all administrative districts in Jeollanam-do. Of the 7,843 households in the region receiving support under the Single-Parent Family Support Act and the National Basic Livelihood Security Act, 24.3%, or 1,906 households, were located in Mokpo-si. The proportion of low-income and single-parent households in Mokpo-si (24.3%) exceeds that of other similarly populated cities, such as Yeosu-si (14.9%) and Suncheon-si (12.0%), suggesting that Mokpo-si is a particularly salient context for examining school-based interventions aimed at promoting students' mental health.

Multi-Component CSPAP Program Development

To develop a multi-component CSPAP program incorporating local context, this study employed a consensus-based approach that integrates diverse perspectives to enhance decision-making quality and provide nuanced interpretations of contextual needs (Michaelsen et al., 1989). A consensus-based approach that emphasizes collaborative interpretation through structured agreement was selected to capture the context-dependent needs of the student population (Miller et al., 1987). Specifically, this method can be utilized in the development of tailored PA interventions for participants and incorporates their feedback to ensure contextual relevance (Devereux et al., 2024; Johannes et al., 2024; Whooten et al., 2020).

In the first phase, to operationalize the consensus-based approach, a dedicated coding team was established. The coding team consisted of four individuals: one educational researcher and three in-service teachers familiar with the local context and student population. Data from a preliminary survey, administered to 96 students, were primarily used for the consensus coding process. This survey was informed by unstructured student interviews and basic student profile data, and it included comprehensive questions on PA participation, nutritional habits, and FCE. Key findings revealed that 91.7% of students reported experiencing hunger during class, 14.6% regularly participated in PADS, and 29.2% engaged in PA-related conversations with their family at home (see Table 1).

In the second phase, each team member independently reviewed the preliminary survey responses. During this phase, coders generated preliminary thematic categories and accompanying analytic memos based on their interpretations of student needs, shaped by both professional judgment and contextual experience. This step allowed for diverse interpretations of student needs to emerge, forming the foundation for later synthesis. This was followed by a series of three structured consensus-building sessions, during which the team reconciled divergent codes and negotiated the boundaries and meanings of emerging subthemes. To ensure analytic consistency, subthemes were retained only when 80% agreement among coders was reached, in line with established qualitative research standards (Miles & Huberman, 1994). Throughout these sessions, emphasis was placed on identifying overlapping codes, resolving semantic discrepancies, and addressing any ambiguities in interpretation. Raw data excerpts were frequently revisited to ensure that the codes remained closely aligned with student perspectives and the intent embedded in the original responses. This iterative

Table 1. Preliminary survey results regarding student needs

Question	n	%
Nutrition		
Eating breakfast on the way to school	22	22.9
Participation in class while hungry	88	91.7
Whether you need balanced nutrition	80	83.3
PADS		
Regular PA participation during the class	14	14.6
Having access to PA equipment in the classroom	12	12.5
Having access to PA equipment at the recess	33	34.4
FCE		
Receiving support from family members for participation in PA	27	28.1
Having family members involved in family PA events	31	32.3
Engaging in discussions with family members about PA topics	28	29.2

Notes. n = number of students who responded "yes" to each question. The total number is 96. PA = physical activity; PADS = physical activity during school; FCE = family and community engagement.

process enabled the team to refine a shared understanding of the data while maintaining transparency in how interpretations evolved.

In the third phase, the team arrived at a shared consensus and interpretive structure, grounded in both individual coder perspectives and contextual knowledge. The collaborative nature of the process enhanced the analytic rigor of the study, contributing to the internal consistency of the coding structure and minimizing individual bias. Upon completion of the consensus-building phase, the final coding framework was synthesized into three key themes: Nutrition, PADS, and FCE. Notably, while Nutrition is not part of the original five-component CSPAP framework, it emerged as a critical component through the consensus process, reflecting priorities for comprehensive health promotion. This empirically-derived expansion aligns with the whole-of-school approach, which recognizes nutrition and PA as interconnected determinants of child health (World Health Organization [WHO], 2021). A summary of the consensus coding process used to incorporate local context into intervention design is provided in Table 2.

Lastly, based on the three key themes identified through consensus coding above, the research team employed a co-design approach to develop targeted intervention strategies. Co-design is a participatory method that incorporates stakeholder perspectives to ensure relevance, contextual alignment, and program sustainability (Iniesto et al., 2022). The team held two in-person meetings (90 minutes each) to interpret the coding results and establish the overall intervention framework. Additionally, two online consultations (40 minutes each) with the school's nutrition and counseling teachers supported the refinement of specific lesson content and scheduling. This co-design process localized the intervention to align with the school's contextual realities and student needs, thereby enhancing both relevance and feasibility (Jago et al., 2023).

Program Overview and Implementation

The intervention maintained a multi-component CSPAP approach by integrating physical education as the foundational component across all groups, supplemented by one context-specific tailored component per group based on the program development process. The four-week intervention preserved the integrity of the multi-component CSPAP by consistently delivering three standardized physical education classes per week across all tailored programs. Each intervention aligned with the Korean National Elementary Physical Education Curriculum, ensuring

Table 2. Consensus coding results for identifying local context

Supporting Evidence	Subthemes Identified	Key Themes
Eating breakfast on the way to school (22.9%) Participation in class while hungry (91.7%)	Skipping breakfast Experiencing hunger during class	Nutrition
Regular PA participation during class (14.6%) Access to PA equipment in the classroom (12.5%) Access to PA equipment at recess (34.4%)	Lack of regular PA during class Limited access to PA equipment Insufficient equipment for recess activities	PADS
Receiving family support for PA (28.1%) Family participation in PA events (32.3%) Discussions with family about PA (29.2%)	Lack of family support Limited family involvement Limited family discussions about PA	FCE

Notes. PA = physical activity; PADS = physical activity during school; FCE = family and community engagement.

fidelity to national standards (Ministry of Education, 2015). Building upon this common curriculum, each group received one tailored component (Nutrition, PADS, or FCE), while the control group received no supplemental activities. This design enabled clear isolation of effects attributable to each tailored intervention, maintaining CSPAP's multi-faceted nature. Implementation rigor and fidelity were verified through daily classroom visits and reviews of teacher logs by the primary researcher, focusing on adherence to session plans, dosage consistency, and participant engagement. Program assignments and characteristics are summarized in Table 3.

Physical Education

Delivered three times per week over four weeks (12 classes total), the physical education component was structured to develop students' life satisfaction. In Week 1, students participated in health-enhancing activities such as yoga, stretching, and low-intensity endurance training, coupled with post-activity reflection to support mood awareness and emotional regulation. Week 2 emphasized mastery-oriented tasks, where students set individualized fitness goals (e.g., time trials, jumping distance) and tracked progress to build perceived competence and self-efficacy. During Week 3, the focus shifted to social development through small-sided team games and cooperative challenges that promoted empathy, peer support, and a sense of belonging. In the final week, students explored emotional expression through creative movement and improvisational dance, reflecting on internal emotional states and sharing interpretations with peers to deepen interpersonal awareness. Through this shared physical education curriculum, students across different tailored CSPAP programs were supported within a consistent environment designed to promote life satisfaction and a multi-component CSPAP framework.

Nutrition Program

The primary objective of the Nutrition Program was to improve students' irregular eating habits, alleviate

Table 3. Program assignments and characteristics

Programs	n	Age, *M*(*SD*)	Height (cm), *M*(*SD*)	Weight (kg), *M*(*SD*)
Nutrition	24	11.4 (0.5)	154.4 (7.6)	50.3 (9.22)
PADS	24	11.6 (0.4)	156.2 (7.9)	52.3 (14.68)
FCE	24	11.3 (0.5)	154.9 (7.8)	49.1 (11.82)
Control	24	11.5 (0.4)	155.8 (7.6)	50.2 (12.33)

Notes. Height is measured in centimeters. Weight is measured in kilograms. Age is measured in years.

hunger during class, and enhance their basic knowledge of nutrition. The intervention consisted of two core components: the provision of healthy snacks and a structured nutrition education curriculum. Healthy snacks such as bananas, yogurt, and whole grain cookies were provided in classrooms every morning (8:30–8:45 AM), five days a week, for four consecutive weeks (20 sessions total), with careful consideration of nutritional balance. Snack distribution followed a standardized protocol: classroom teachers distributed pre-portioned snacks while briefly explaining the nutritional benefits (e.g., "Bananas provide sufficient vitamin C and energy for your morning activities"). Students were encouraged to consume snacks mindfully and to reflect on how proper nutrition affected their energy levels and classroom engagement.

The nutrition education sessions were jointly developed and delivered in collaboration with a school nutritionist and conducted once a week (40 minutes per session) for a total of four sessions integrated into PE class time. Each session followed a consistent instructional structure: (1) 5-minute introduction using visual aids (e.g., food pyramid posters, nutrient flashcards), (2) 20-minute interactive lesson with guided discussions and question-answer activities, (3) 15-minute hands-on application activity (e.g., students categorized food cards, practiced reading mock nutrition labels, or role-played making healthy food choices at a cafeteria), with the pedagogical approach emphasizing student autonomy and practical application to daily life. Instructional content covered topics such as the functions of essential nutrients (Week 1), constructing a balanced diet (Week 2), reading food labels (Week 3), and practicing healthy dietary choices through role-playing activities (Week 4). Developed through co-design with a local nutrition teacher, the age-appropriate and interactive instructional materials were intentionally structured to foster students' intrinsic motivation and self-efficacy in making healthy dietary decisions. Implementation of fidelity was monitored using class participation logs and weekly face-to-face meetings.

PADS Program

The goal of the PADS Program was to expand opportunities for in-class PA during the school day. This intervention included two primary components. First, students engaged in a structured PA session lasting five minutes before the start of each morning class, five days a week for four weeks (20 sessions total). These sessions were based on a nationally developed routine, the New Millennium Health Exercise program, which was co-developed in 1999 by the Korea Sports Promotion Foundation and the Korean Broadcasting System. Second, PA equipment was provided and utilized to encourage more movement. Equipment such as two stability balls, two yoga mats, and five dumbbells was placed in classrooms for use between academic tasks, while additional items, such as two badminton sets, three soccer balls, and five baseball gloves, were made available during recess to promote autonomous participation in PA. Participation rates in the exercise routine and equipment usage were monitored through weekly meetings with teachers.

FCE Program

The FCE Program aimed to strengthen students' psychological and emotional support systems by enhancing the involvement of families and local communities in health-promoting activities, grounded in the premise that increased family engagement and social connectedness would enhance perceived social support and life satisfaction. Key components included home-school communication, family-inclusive physical education sessions, and community sports event participation.

Weekly health information materials were distributed for four weeks via printed newsletters and digital messages (KakaoTalk, 91% delivery confirmation), covering balanced eating habits, hydration, outdoor safety, and family workouts. Each newsletter included practical tips and discussion prompts to facilitate parent-child health conversations. Two family participation PE sessions (Weeks 2 and 4, Saturday

mornings, 2 hours each) achieved participation rates of 53% (Session 1) and 45% (Session 2). Each session was structured as: (1) 10-minute warm-up emphasizing family PA benefits; (2) 50-minute collaborative planning workshop where families designed their own sports activities; (3) 60-minute cooperative games requiring parent-child teamwork (e.g., relay races, obstacle courses, cooperative ball games); and (4) 10-minute reflection circle for sharing experiences. The instructional approach emphasized enjoyment, cooperation over competition, and autonomy-supportive coaching to strengthen family bonds and create positive shared experiences hypothesized to enhance life satisfaction. One community sports event visit (Week 3) to a municipal youth festival achieved 57% family participation (n = 14). Students received a 20-minute orientation on event logistics and safety, with teachers facilitating social interactions during the event to foster community belonging and expanded social networks. Fidelity was ensured by collecting parent acknowledgment forms (100% return rate), family participation worksheets, and participant rosters. The intervention overview is summarized in Table 4.

Table 4. Tailored multi-component cspap intervention overview

Week	Nutrition	PADS	FCE	C
Week 1	Daily Snacks (5 Days) Nutrition ED Session 1: Nutrient Functions (30 min, interactive lesson with food pyramid, Q&A)	5 min Morning PA Session (5 Days) Activity Equipment	Newsletter 1: Balanced eating habits	PE Only
Week 2	Daily snacks (5 days) Nutrition Ed Session 2: Balanced diet construction (food categorization activity)	5 min Morning PA Session (5 Days) Activity Equipment	Newsletter 2: Hydration importance Family PE Session 1: (Sat 10AM-12PM) Cooperative games, planning workshop, reflection (Participation: 53%)	PE Only
Week 3	Daily snacks (5 days) Nutrition Ed Session 3: Reading food labels (mock label practice)	5 min Morning PA Session (5 Days) Activity Equipment	Newsletter 3: Outdoor safety Community Event: Municipal youth sports festival visit Participation: 57%	PE Only
Week 4	Daily snacks (5 days) Nutrition Ed Session 4: Healthy dietary choices (role-playing activity)	5 min Morning PA Session (5 Days) Activity Equipment	Newsletter 4: Family home workouts Family PE Session 2: (Sat 10AM-12PM) Family sports day implementation (Participation: 45%)	PE Only
Total Dosage	12 PE + 20 snacks + 4 education sessions	12 PE + 20 Morning PA session	12 PE + 4 newsletters + 2 family sessions + 1 event	12 PE

Notes. Every program includes three physical education classes per week. PA = physical activity. PADS = physical activity during school; FCE = family and community engagement; C = Control; PE = physical education.

Measures

Students' life satisfaction was measured using the Korean Version of the Satisfaction With Life Scale (K-SWLS; Cho & Cha, 1998), adapted from Diener et al.'s (1985) original scale. The K-SWLS has demonstrated strong psychometric properties in Korean adolescent populations, with Cronbach's α = .86 in a validation study of 437 adolescents aged 15–18 (Lim, 2012).

Given that the current sample comprised upper elementary students, younger than the typical validation population, two educational experts (i.e., one Ph.D. and one M.Ed.) independently reviewed the items for developmental appropriateness. Both experts confirmed that the original Korean wording was suitable for this age group. However, to reduce cognitive burden and facilitate more accurate responding, the response format was modified from a seven-point to a five-point Likert scale. This adaptation is consistent with best practices in survey research with children and early adolescents, as fewer response options enhance clarity and reliability without altering the underlying construct (Coombes et al., 2021; Mellor & Moore, 2014).

The K-SWLS consists of five items assessing global cognitive judgments of life satisfaction (e.g., “My life is close to my ideal,” “The conditions of my life are excellent,” “I am satisfied with my life”). Items were rated on a five-point scale (1 = *strongly disagree* to 5 = *strongly agree*), with higher scores indicating greater satisfaction. Internal consistency was strong at both time points (pretest α = .83; posttest α = .85). The scale was administered twice following a pretest-posttest design. At pretest, surveys were distributed during the week immediately preceding the intervention to establish baseline life satisfaction levels. At posttest, the same instrument was administered during the final week of the intervention period to assess changes in life satisfaction. Both administrations employed a standardized whole-class, paper-and-pencil format to ensure consistency across participants. During each session, the classroom teacher and primary researcher were both present to supervise administration, provide standardized instructions, and address any procedural questions. Each administration required approximately 10 minutes.

Data Analysis

To assess the effects of the CSPAP intervention on student-reported life satisfaction, K-SWLS data were securely managed and screened for accuracy, missing values, and outliers. Descriptive statistics summarized participants' baseline characteristics. Means and standard deviations for K-SWLS scores post-intervention are calculated. A *t*-test and one-way analysis of variance (ANOVA) were conducted to assess differences in life satisfaction among groups, followed by Scheffé post hoc analyses to identify specific inter-group differences. Statistical analyses were performed using SPSS version 27.0, with significance set at $p < .05$.

Results

Before examining intervention effects, the baseline homogeneity of students' life satisfaction between the intervention and control groups was assessed using an independent samples *t*-test. The analysis yielded a *p*-value of .13, which exceeds the conventional threshold of .05, indicating that the observed difference in means is not statistically significant. Although no conclusive evidence of identical baseline levels, this result supports the assumption of baseline equivalence, as there is insufficient statistical justification to conclude that the groups differed meaningfully before the intervention. Table 5 presents the results of this preliminary analysis.

Differences in Program Participation

An independent samples *t*-test was conducted to examine whether participation in a tailored, multi-component CSPAP integrating context significantly improved students’ life satisfaction. Results indicated that students in the CSPAP intervention group (M = 3.58, SD = 0.83) reported significantly higher life satisfaction than those in the control group (M = 2.69, SD = 0.71), $t(94) = 4.71$, $p < .001$ (See Table 6).

Table 5. Baseline equivalence of life satisfaction between intervention and control groups

	Groups	*N*	*M*	*SD*	*df*	*t*	*p*
Life Satisfaction	Intervention	72	3.53	.53	94	1.57	.13
	Control	24	3.24	.85			

Notes. Life satisfaction scores range from 1 (strongly disagree) to 5 (strongly agree), with higher scores indicating greater satisfaction.

Table 6. Life satisfaction analysis results by program participation

	Group	*N*	*M*	*SD*	*df*	*t*	*p*
Life satisfaction	Intervention	72	3.58	.83	2, 94	4.71	< .001
	Control	24	2.69	.71			

Notes. Life satisfaction scores range from 1 (strongly disagree) to 5 (strongly agree), with higher scores indicating greater satisfaction.

Table 7. One-way ANOVA results for life satisfaction by CSPAP programs

Source	*SS*	*df*	*MS*	*F*	*p*
Between Groups	19.32	3	6.44	15.91	< .001
Within Groups	37.26	92	0.41		
Total	56.58	95			

Table 8. One-way ANOVA results with scheffé post-hoc for life satisfaction by CSPAP programs

Group	*N*	*M*	*SD*	*df*	*F*	*p*	Scheffé post-hoc
Nutrition[a]	24	3.22	.71	3, 92	15.91	< . 001	b > a,c,d
PADS[b]	24	4.13	.55				c > d
FCE[c]	24	3.39	.90				
Control[d]	24	2.69	.41				

Notes. Life satisfaction scores range from 1 (strongly disagree) to 5 (strongly agree), with higher scores indicating greater satisfaction. PADS = physical activity during school; FCE = family and community engagement.

Life Satisfaction Differences Across Tailored CSPAP Programs

A one-way ANOVA was conducted to examine whether students' life satisfaction differed by participation in the CSPAP programs. Results indicated a statistically significant difference among the four groups, $F(3, 92) = 15.91$, $p < .001$ (see Table 7). Post hoc comparisons using the Scheffé test revealed that students in the PADS program ($M = 4.13$, $SD = 0.55$) reported significantly higher life satisfaction scores than those in the Nutrition program (M = 3.22, SD = 0.71), the FCE program ($M = 3.39$, $SD = 0.90$), and control group ($M = 2.69$, $SD = 0.14$). Additionally, students in the FCE program had significantly higher life satisfaction than those in the control group (see Table 8). These findings indicate that participation in different tailored CSPAP programs had varying effects on students' life satisfaction, with the PADS reporting the highest level of life satisfaction among all groups.

Discussion

The current study examined the effects of a tailored, multi-component CSPAP intervention integrating local context on students' life satisfaction in underserved school settings. In relation to RQ1, which asked whether participation in a multi-component CSPAP intervention is associated with higher students' life satisfaction, results demonstrated that students in the intervention groups reported significantly higher life satisfaction compared to the control group. This finding suggests that contextually tailored CSPAP intervention can be relevant for psychological well-being among underserved youth. Regarding RQ2, which examined how life satisfaction differed across tailored CSPAP programs (Nutrition, PADS, and FCE), post-hoc analyses revealed that the PADS program was linked with significantly higher life satisfaction than the Nutrition program, FCE program, and control group. This suggests that components emphasizing direct PA engagement during the school day may be particularly relevant for promoting life satisfaction. These results highlight the value of integrating CSPAP not only with contextual sensitivity but also through specific components that prioritize direct engagement with movement during the school day.

The higher reported levels of life satisfaction observed among students in the context-integrated CSPAP intervention, compared to the control group, align with direct evidence supporting the positive associations of multi-component CSPAP interventions in underserved school settings. These results are consistent with prior research indicating that school-based PA interventions positively influence life satisfaction among youth populations (An et al., 2020; Feng et al., 2022). However, the current study extends this line of research by emphasizing the role of contextual integration as a central feature of program design and implementation. Specifically, the incorporation of contextual factors through preliminary needs assessments and a consensus-based approach with local teachers likely played a pivotal role in relating to the observed improvements in life satisfaction. This process ensured that intervention components were meaningfully aligned with the unique characteristics, needs, and limitations of each school setting. For example, the SWITCH project in Iowa highlights the efficacy of adapting school-based wellness programs to local needs and demonstrates enhanced student engagement and sustained health outcomes (Chen et al., 2018). Similarly, Carson et al. (2014a, 2020) emphasized that tailoring interventions to the unique contexts and constraints of individual schools is essential to overcoming participation barriers and improving program effectiveness. As noted by Webster et al. (2022), grounding CSPAP strategies in environmental contexts can increase both their relevance and effectiveness, particularly in schools serving underserved communities. Taken together, the present findings not only confirm the general value of school-based PA programs but also underscore the importance of embedding interventions within the specific realities of the local context (Porter et al., 2024).

Children's life satisfaction is significantly shaped by the quality of their daily contexts, including their motivation, supportive relationships with family, and inclusive peer environments (Choi et al., 2021; Urbano-Mairena et al., 2024; Zaborskis et al., 2022). However, in underserved schools, these contextual supports are often fragmented or entirely absent, making standard interventions insufficient to meet students' broader psychological needs (Vigo-Valentin et al., 2014). In this study, the multi-component CSPAP intervention intentionally targeted these environmental factors by integrating locally adapted programs across PADS, Nutrition, and FCE, each operating through distinct psychological mechanisms. The PADS program provided structured opportunities for PA during the school day, which has been shown to reduce stress and enhance mood and emotional well-being, processes linked to improved life satisfaction (Biddle et al., 2019). The FCE program promoted family and community participation, fostering a sense of belonging and social connectedness that extends beyond the classroom. Such inclusive participation satisfies fundamental psychological needs for relatedness, a core component of self-determination theory consistently associated

with enhanced subjective well-being (Ryan & Deci, 2000). Additionally, teacher collaboration throughout the intervention fostered more supportive adult-student interactions, strengthening students' sense of competence, which has been identified as a significant predictor of life satisfaction among adolescents (Tian et al., 2016). We proposed that these complementary mechanisms, operating across multiple school contexts, may have converged to create a supportive environment that students experienced directly and emotionally, thereby positively influencing their subjective evaluations of life satisfaction. However, as these mechanisms were not directly assessed, future research should include mediator measures to empirically validate these proposed pathways.

Students in the PADS program reported significantly higher levels of life satisfaction compared to those in the Nutrition program, FCE program, and the control group. This finding highlights the relevance of providing consistent embedded opportunities for PA in fostering students' emotional well-being. This finding aligns with prior research demonstrating the positive psychological effects of MVPA. For example, Perales et al. (2014) found in their longitudinal study that regular participation in MVPA significantly reduced psychological distress and lowered the risk of severe emotional discomfort. Similarly, Rose and Soundy (2020), in their integrative review of studies focusing specifically on underprivileged children and adolescents, identified consistent associations between MVPA and improvements across multiple mental health domains, including internal, social, and physical outcomes, thereby underscoring the potential of MVPA as an effective strategy for promoting mental health in underserved contexts.

Unlike the Nutrition and FCE programs, the PADS program directly provided opportunities for MVPA, which is a central aim of CSPAP frameworks (CDC, 2015). As Webster et al. (2022) highlight, CSPAP components like social support primarily serve supportive roles. Thus, direct PA opportunities, such as structured classroom PA breaks and movement integration, might offer more substantial and immediate psychosocial benefits (Moon & Webster, 2019; Moon et al., 2022). Taken together, these findings highlight the unique value of embedding consistent, structured PA opportunities into the school day. By intentionally restructuring daily routines to incorporate regular PA, schools, particularly those in under-resourced settings, can play a transformative role in creating environments that significantly relate to higher students' life satisfaction and overall mental health.

Although the PADS program was associated with the highest life satisfaction scores, the comparatively lower reports from the Nutrition and FCE programs may be understood in relation to differences in fidelity, dose, and exposure. The Nutrition program involved less frequent, focusing primarily on informational content rather than direct experiential engagement, which may limit its immediate relevance to students' daily life evaluations. Similarly, the FCE program required active participation from families. Brown et al. (2015) indicate that family engagement initiatives often exhibit substantial variability in responsiveness, particularly in underserved communities where competing demands and resource constraints may affect participation. As a result, students in the FCE group may have had less consistent exposure to the intended activities, reducing opportunities for meaningful relational or behavioral changes that could influence life satisfaction.

This study adds support to the growing recognition that effective school-based PA interventions are likely strengthened when they are adapted to the specific contexts in which they are implemented. Porter et al. (2024) emphasize that traditional one-size-fits-all approaches often fail to produce meaningful outcomes, proposing instead a context-specific, portfolio-based strategy through which schools can select and tailor intervention components aligned with their local realities. While their scoping review offers a valuable framework of potential activity components, it also highlights a significant gap in the reporting and understanding of contextual factors.

Strengths and Limitations

Although there are numerous examples of

school-based PA intervention approaches, many studies continue to rely on highly standardized intervention protocols without actively promoting local adaptation of intervention components (Krishnaswami et al., 2012; Langford et al., 2015). In contrast, this study contributes to the CSPAP literature by examining mental health outcomes, particularly life satisfaction, within underserved contexts. To our knowledge, this is the first tailored, multi-component CSPAP intervention to examine mental health outcomes in an underserved student population. A key strength of this study was the deliberate alignment of intervention components with identified local context, achieved by actively involving teachers in consensus coding and co-design processes. This collaborative approach provides evidence for the feasibility and potential efficacy of tailored CSPAP initiatives, even within resource-limited settings. Furthermore, the significant improvement observed in life satisfaction highlights CSPAP's potential as a practical tool for enhancing students' mental health and broader well-being.

First, classroom-level assignment created substantial clustering effects that were unaddressed in the analysis. Students were nested within classrooms taught by single teachers, yet analysis treated observations as independent, violating t-test and ANOVA assumptions and potentially biasing standard errors. Teacher-specific factors such as instructional style and rapport remain confounded with intervention effects. Additionally, control group dissatisfaction may have suppressed their life satisfaction scores. Future research must employ cluster-randomized designs or multilevel modeling to account for nested data structures.

Second, the four-week intervention duration severely limits conclusions about sustained effects. This brief timeframe raises questions about whether improvements represent meaningful change or transient responses. Without follow-up assessments, durability remains unknown. The compressed timeline may also have favored components with immediate impact over those requiring cumulative learning. Extended interventions with multiple follow-up points are needed to establish sustainability.

Third, the posttest-only design and unmeasured contextual factors limited analytical rigor and generalizability. Analyzing only post-intervention scores without baseline covariates reduced statistical power, particularly given the small sample (n = 96) and potential regression to the mean. Moreover, critical individual-level moderators, including SES indicators, family structure, parental education, and access to recreational facilities, were not collected, preventing examination of for whom the intervention was most effective. The absence of parent and community stakeholder engagement further limited ecological integration. Future studies should employ ANCOVA or mixed-effects models with baseline controls, systematically measure contextual covariates to identify key moderators, and adopt participatory approaches involving families and local resources to enhance sustainability in underserved settings.

Finally, while we treated life satisfaction as a unidimensional construct based on previous validation research with adolescents (Lim, 2012), some studies have found that factor structure may vary across populations. Future research could examine whether elementary school students' life satisfaction comprises distinct subdimensions and whether CSPAP components differentially affect these potential facets.

Implications and Future Directions

The present study demonstrated the value of consensus-based, co-design approaches that actively engage local educators to ensure interventions reflect contextual realities. Rather than applying a standardized protocol, this collaborative framework enabled tailored CSPAP implementation aligned with school-specific needs, resources, and cultural considerations. A key methodological contribution lies in systematically operationalizing context through replicable procedures, moving beyond abstract conceptualization to concrete measurement. The findings confirm that collaboratively developed interventions can effectively promote life satisfaction among underserved youth, offering a promising avenue for addressing concurrent challenges of physical inactivity and mental health in schools.

Future research should continue exploring tailored

approaches through portfolio-based frameworks that emphasize flexibility and local adaptation while maintaining fidelity to core intervention principles (Porter et al., 2024). Such methodologies will refine strategies for integrating context-specific considerations into CSPAP and foster more inclusive PA programming. Given the positive associations with life satisfaction of PADS observed in this study, schools may prioritize brief, peer-led activity breaks that integrate seamlessly into existing routines. For example, 5-minute movement sessions led by trained student leaders at the start of morning classes can provide consistent PA opportunities while promoting social interaction, requiring minimal teacher burden and no additional resources. Fidelity monitoring through simple weekly logs or brief check-ins during regular meetings ensures sustainable implementation without increasing staff workload, making this approach particularly viable for resource-constrained settings.

Conclusions

This study demonstrates that tailored, multi-component CSPAP interventions can effectively enhance life satisfaction among students in underserved educational contexts. By incorporating local contextual factors through consensus-based co-design with educators, the intervention addressed critical barriers, including limited PA opportunities, nutritional deficits, and inadequate family support. Results showed significant improvements in life satisfaction, particularly for students participating in the PADS program, highlighting CSPAP's potential to support both physical and mental health outcomes through context-responsive implementation.

These findings underscore the value of reconceptualizing school-based PA interventions away from standardized protocols toward whole-of-school approaches that integrate multiple components tailored to local realities. However, the study's quasi-experimental design with classroom-level assignment and individual-level analysis introduces important limitations. Future research should prioritize two methodological advances: first, implementing cluster-randomized designs with multilevel analysis to appropriately account for classroom nesting effects and teacher influences; and second, conducting extended interventions with follow-up assessments to establish the durability and dose-response relationships of tailored CSPAP components. These methodological refinements will strengthen causal inference and inform scalable, evidence-based strategies for promoting life satisfaction through school-based PA in underserved populations.

Author Contributions

Conceptualization: J. Kim
Writing-original draft preparation: J. Kim
Writing-review and editing: J. Kim
Supervision: D. Lee

Conflict of Interest

The authors declare no conflict of interest.

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