International Journal of
Mental Health Promotion

Tech Science Press

Doi:10.32604/ijmhp.2025.071944

ARTICLE

Structural Relationships between Perceived Psychological Well-Being, Social Support, Academic Engagement, and School-Life Satisfaction among Students Participating in School Esports Activities

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Received: 16 August 2025; Accepted: 29 October 2025; Published: 28 November 2025

ABSTRACT: Background: With the rapid growth of digital learning environments, esports has emerged as a popular form of school-based activity that promotes teamwork, motivation, and engagement. However, limited research has examined how participation in esports relates to students' psychological and academic development. To address this gap, the present study identified structural relationships between perceived psychological well-being, social support, academic engagement, and school-life satisfaction among students participating in school-based esports activities. **Methods:** We surveyed 588 students who competed in on-campus esports tournaments across 15 secondary schools in Gwangju Metropolitan City, South Korea. Psychological well-being, social support, academic engagement, and school-life satisfaction were measured using five-point Likert scales. Confirmatory factor analysis and structural equation modeling (SEM) were employed to test the hypotheses, and mediation effects were assessed via bootstrapping (1000 resamples, 95% confidence interval) and competing model analysis. **Results:** The results showed that psychological well-being has significant positive effects on social support (β = 0.899, p < 0.001) and academic engagement (β = 0.427, p < 0.01). Social support positively predicted school-life satisfaction (β = 0.804, p < 0.001). Psychological well-being did not directly influence this outcome; instead, it exerted an indirect effect via social support (indirect effect = 0.676, 95% confidence interval [0.549, 0.782]), indicating that social support functioned as a full mediator. **Conclusion:** Overall, the results demonstrate that school-based esports activities may serve as educational contexts that enhance students' overall satisfaction with school experiences through increased social support. Importantly, these findings highlight the unique psychosocial mechanisms of esports participation, including digital identity, online belonging, and virtual collaboration, which extend beyond traditional educational activities. Because the impact of academic engagement may depend on the quality of participation, future esports programs should incorporate support systems that foster autonomous and collaborative engagement and include digital-citizenship education.

KEYWORDS: Esports; psychological well-being; social support; academic engagement; school-life satisfaction; physical education

1 Introduction

With the rapid advancement of digital technologies, esports is emerging as one of the most popular leisure pursuits and co-curricular activities among students [1]. Debuting as an official medal event in the

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2022 Asian Games has further brought esports in a positive light worldwide [2,3]. According to recent findings, school-based esports activities foster collaborative problem-solving and self-regulation among students [4]. School-based esports activities are not only a form of entertainment; under appropriate conditions, but they may also serve as educational contexts that can contribute to students' holistic growth and development.

With the advent of the Fourth Industrial Revolution, school systems increasingly seek learners who possess future-oriented competencies such as self-directed learning, digital literacy, and collaborative problem-solving [5]. Esports, now widely regarded as an effective vehicle for cultivating these abilities, is gradually being integrated into educational settings. Game-based learning and esports have been found to enhance students' creativity and motivation, while simultaneously boosting their academic engagement [6]. Recent works further emphasize the educational value of esports, including its potential to cultivate 21st-century skills [7], shape learning trajectories in team-based contexts [8], and inform global higher-education curricula [9]. Moreover, because esports unfolds in virtual environments, it transcends temporal and spatial constraints and allows students from diverse cultural backgrounds to collaborate toward common goals, thereby fostering the broad range of competencies required in an increasingly globalized era.

Psychological well-being is an essential construct that helps students maintain a stable and positive state during stressful circumstances and achieve healthy developmental outcomes [10]. Higher levels of psychological well-being foster self-acceptance, positive interpersonal relationships, personal growth, and a sense of purpose in life, which, in turn, enhance students' overall quality of life and satisfaction with school [11,12]. Recent longitudinal studies have further demonstrated that well-being is closely associated with greater social resources and academic engagement [13,14]. Additional evidence confirms that social support functions as a critical protective factor in promoting good mental health and well-being in adolescents [15]. Consequently, schools are encouraged to prioritize enhancing students' psychological well-being, and esports activities may serve as a potentially useful tool under appropriate conditions, though further empirical validation is needed to confirm this possibility. While many studies highlight the benefits of esports in fostering communication, teamwork, and engagement, other studies have cautioned against potential risks, including excessive gaming, gender disparities, digital divides, and toxic behaviors within competitive environments [16,17]. These mixed findings suggest that the educational value of esports is not inherent but depends on careful program design and contextual safeguards.

Although numerous studies have explored the interrelations among psychological well-being, social support, academic engagement, and school-life satisfaction, most of them have been conducted in conventional classroom or sports settings. Consequently, little is known about how these dynamics operate in digitally mediated, team-based environments such as school esports. The present study addresses this gap by conceptualizing esports as a digital educational ecology in which students build virtual identities, collaborate strategically, and negotiate social belonging through technology-enabled interaction.

Accordingly, this study was not intended to assume that esports inherently produce positive outcomes, but rather to empirically examine the structural pathways linking psychological well-being, social support, academic engagement, and school-life satisfaction. By focusing on these relationships, this study aims to clarify both the potential benefits and limitations of esports as an educational practice, and to specify the psychosocial mechanisms—such as peer interaction, digital identity formation, and collaborative engagement—through which participation in sports may influence student well-being.

Social support is a vital resource that enables individuals to sustain a positive psychological state when confronted with stress [18]. Empirical evidence has shown that higher levels of social support are associated with greater resilience and heightened academic motivation among students, which improve

academic performance and adaptation to school life [19,20]. More recently, researchers have confirmed that social support enhances the adjustment and school satisfaction in adolescents across diverse cultural contexts [21,22]. Additionally, adequate social support encourages students' participation in their schooling, provides psychological stability, and facilitates positive educational experiences. Esports activities through their team-based structure can provide students with opportunities to build supportive relationships with their peers, which in turn enhance resilience and school adjustment.

Academic engagement refers to the degree of physical and psychological energy students invest in pursuing their educational goals [23,24]. Students exhibiting higher levels of engagement not only achieve superior academic outcomes but also report greater satisfaction with school life and stronger social achievements after graduation [25,26]. A systematic review further confirmed that engagement is positively linked to both academic success and subjective well-being [27]. More recent work also indicates that academic engagement mediates the relationship between social belonging and school satisfaction [28]. As esports programs can heighten students' intrinsic motivation and psychological immersion, they may serve as an important educational strategy for enhancing academic engagement.

School-life satisfaction is a key indicator of students' emotional and social adjustment to the school environment [29]. Students who report high levels of satisfaction tend to maintain positive attitudes toward interpersonal relationships and academic performance, which directly promotes academic persistence and reduces the risk of school dropout [30,31]. Recent studies also suggest that engagement may mediate the link between social relationships and school satisfaction [25,28]. School-based esports activities may enhance students' satisfaction with school by offering enjoyable, non-academic experiences. Beyond entertainment, these activities can foster a positive school climate that supports overall adjustment [32].

Despite growing interest in esports in education, prior studies have largely emphasized either isolated benefits or descriptive outcomes. Few studies have simultaneously examined the structural pathways linking psychological well-being, social support, academic engagement, and school-life satisfaction in the context of school-based esports. Moreover, the limited discussion of potential risks and boundary conditions leaves the overall picture incomplete. This gap underscores the need for an integrative approach that clarifies both the benefits and limitations of esports participation in schools.

Unlike conventional extracurricular activities, esports takes place in digitally mediated environments where students develop virtual identities and engage in cooperative as well as competitive interactions. [16]. These features align with emerging theoretical frameworks such as digital citizenship [33], gamification theory [34], and virtual collaboration theory [35], which emphasize how digital participation can foster responsibility, motivation, and peer connectedness. Hence, in this study, we aimed to replicate established psychological relationships and extend them into the novel context of esports as a digital educational arena.

Furthermore, to sharpen the theoretical contribution, this study incorporates Self-Determination Theory (SDT) [36]. SDT identifies three basic psychological needs—autonomy, competence, and relatedness—that are essential for fostering intrinsic motivation, psychological well-being, and high-quality engagement. Applying SDT to the esports context offers a nuanced lens: esports may provide autonomy through role selection and self-directed play, competence through skill mastery and performance feedback, and relatedness through peer bonding and teamwork. Prior research has shown that fulfilling these needs promotes sustained motivation and positive psychosocial outcomes in digital gaming environments [37,38]. By integrating SDT, this study extends traditional well-being–support–satisfaction pathways into the unique digital and collaborative ecology of esports, thereby clarifying its distinct theoretical and educational significance.

Theoretically, this research extends traditional well-being–support–satisfaction frameworks by integrating SDT and digital-collaboration perspectives to explain how autonomy, competence, and relatedness are enacted in virtual team contexts. By applying SDT to esports participation, we highlight

the unique psychosocial mechanisms—digital identity formation, peer connectedness, and gamified cooperation—that differentiate esports from traditional extracurricular activities. This approach clarifies both the opportunities and boundary conditions of esports as an educational medium, thereby providing a novel theoretical contribution to studies of student well-being and engagement in technology-driven learning environments.

In this study, four major constructs were examined and defined as follows. Psychological well-being refers to a positive psychological state characterized by self-acceptance, personal growth, autonomy, purpose in life, environmental mastery, and positive relations with others [11]. Social support denotes the emotional, informational, instrumental, and appraisal assistance that students perceive from their peers and teachers, which enables them to cope with stress and foster resilience [18]. Academic engagement is conceptualized as a multidimensional construct comprising vigor, dedication, and absorption in learning activities [39]. Finally, school-life satisfaction represents students' overall evaluation of their school experiences, including academic, peer, teacher, and environmental domains [40]. In the hypothesized model, psychological well-being was conceptualized as a personal resource that not only enhances students' internal states but also fosters their external relationships. Higher levels of well-being may encourage students to seek and maintain supportive ties with peers and teachers, providing the emotional and informational resources needed for meaningful academic engagement. In turn, such engagement—when supported by strong relational networks—is more likely to translate into overall satisfaction with school life. This study aimed to elucidate the educational significance of school-based esports activities by identifying the structural relationships between psychological well-being, social support, academic engagement, and school-life satisfaction among students participating in school-based esports activities. In particular, we tested the following hypotheses.

Hypothesis 1 (H1): *Psychological well-being positively influences social support.*

Hypothesis 2 (H2): *Psychological well-being positively influences school-life satisfaction.*

Hypothesis 3 (H3): *Psychological well-being positively influences academic engagement.*

Hypothesis 4 (H4): *Social support positively influences school-life satisfaction.*

Hypothesis 5 (H5): *Academic engagement positively influences school-life satisfaction.*

Hypothesis 6a (H6a): *Social support mediates the relationship between psychological well-being and school-life satisfaction.*

Hypothesis 6b (H6b): *Academic engagement mediates the relationship between psychological well-being and school-life satisfaction.*

Fig. 1 presents the hypothesized structural model developed for this study. The model was constructed based on established theoretical frameworks and prior empirical findings linking psychological well-being, social support, academic engagement, and school-life satisfaction. It illustrates the hypothesized relationships that were empirically tested using structural equation modeling (SEM), rather than results already obtained.

The proposed model is not merely a reapplication of traditional well-being–support–satisfaction pathways. Rather, it interprets these relationships within the distinctive environment of esports, where gamified interaction and digital collaboration shape students' social and academic experiences. By exploring

these associations, we sought to provide empirical evidence of the need to integrate esports into school settings and to offer practical guidance on fostering students' holistic development.

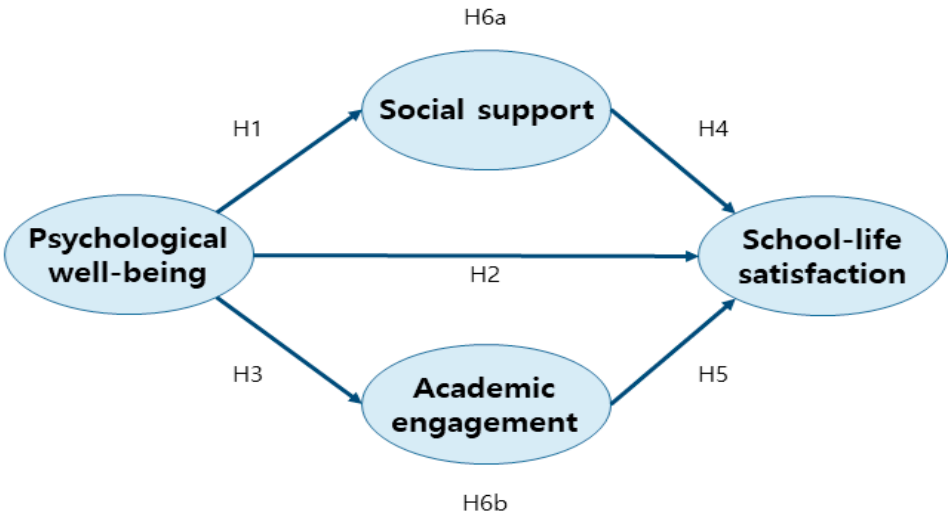

Figure 1: Hypothesized structural model.

2 Materials and Methods

2.1 Participants and Data Collection

From May to December 2024, we surveyed 600 participants, of whom 375 (63.8%) and 213 (36.2%) were middle and high school students, respectively, who participated in intramural esports tournaments across 15 schools in Gwangju Metropolitan City. Participant age range was 13–18 years (Mean = 15.2, standard deviation [SD] = 1.4). The gender distribution was 480 males (81.6%) and 108 females (18.4%). After excluding 12 questionnaires with missing or careless responses, 588 responses were retained for analysis. Students were recruited through school announcements and direct invitations by esports advisors and physical education teachers. All eligible students were invited to participate, with participation being voluntary. We surveyed the students using an anonymous, self-administered questionnaire. The students completed this questionnaire in classrooms during a designated period under teacher supervision. Before conducting the survey, we obtained assent from the students and permission from their parents or guardians. No personally identifiable information was collected, and confidentiality was emphasized in the information sheet. The study protocol was reviewed and approved by the Korea National University of Education Ethics Review Committee (approval number: KNUE-202309-SB-0329-01).

2.2 Instruments

The questionnaire collected data on five demographic and esports-related characteristics: school level, gender, the esports game played, the frequency of watching esports, and the reason for watching esports. It also comprised scales assessing psychological well-being, social support, academic engagement, and school-life satisfaction. All items were rated on a five-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"). All scales demonstrated acceptable internal consistency and were considered suitable for the study sample.

2.2.1 Psychological Well-Being

Building on validated measures by Kim and Yoo [41] and Seong and Won [42], we adapted a scale for measuring psychological well-being in secondary-school contexts. It comprised 19 items across six dimensions: environmental mastery (three items; e.g., "I find daily tasks rewarding and enjoyable"), personal growth (three items; e.g., "I continually think about ways to improve or change my life"), self-acceptance (three items; e.g., "Looking back, I am satisfied with the course my life has taken"), positive relations with others (three items; e.g., "Maintaining close relationships is easy and enjoyable for me"), autonomy (three items; e.g., "I tend to make decisions without being influenced by others"), and purpose in life (four items; e.g., "I have a clear idea of what I want to accomplish in life"). The Cronbach's α for the dimensions ranged from 0.710 to 0.787.

2.2.2 Social Support

To measure social support, we adapted 14 items from Lee [43] to make them suitable for adolescents. The items measured emotional support (four items; e.g., "People around me make me feel loved and cared for"), informational support (three items; e.g., "People around me praise me when I do well"), instrumental support (three items; e.g., "When I face difficulties, people around me suggest wise solutions"), and appraisal support (four items; e.g., "If they are unable to help me directly, people around me connect me with someone who can"). The Cronbach's α coefficients ranged from 0.708 to 0.729.

2.2.3 Academic Engagement

Academic engagement was measured using 13 items adapted from Choo and Sohn [44]. Specifically, they assessed vigor (four items; e.g., "Even when my study tasks do not go well, I keep working on them"), dedication (four items; e.g., "Studying is difficult, but it challenges me in a meaningful way"), and absorption (five items; e.g., "When I study, I forget everything happening around me"). The reliability coefficients ranged from 0.721 to 0.806.

2.2.4 School-Life Satisfaction

Twenty-two items adapted from Choi [45] assessed five domains concerning school-life satisfaction: academic satisfaction (four items; e.g., "I enjoy learning the material taught in class"), school environment (five items; e.g., "I am satisfied with our classroom's environment, layout, and facilities"), school life (four items; e.g., "Most of my classmates adapt well and have fun at school"), teacher satisfaction (five items; e.g., "Teachers provide appropriate information to help me solve problems"), and peer satisfaction (four items; e.g., "My classmates respect my opinions and respond positively"). The Cronbach's α coefficients ranged from 0.778 to 0.810.

All measurement tools were adapted from validated scales previously developed in the field. Minor wording modifications were made to ensure clarity and appropriateness for Korean middle- and high-school students, particularly in the context of school-based esports activities. The adaptation process involved simplifying technical terms into age-appropriate language, aligning items with the cultural and educational context, and pilot-testing the items with a small group of students for comprehensibility.

2.3 Data Analysis

Descriptive statistics were calculated for demographic and esports-related variables. Using confirmatory factor analysis, we evaluated the construct validity of the scales employed in this study. Internal consistency was assessed using Cronbach's α coefficients. Next, descriptive statistics were determined for the four main variables, and correlation analysis was performed to identify relationships among

them. Finally, SEM was employed to test the overall fit of the proposed research model and verify causal relationships. To test mediating effects, we performed a comparison of competing model fit indices and Bootstrapping. All statistical analyses were conducted using IBM SPSS and AMOS (version 24.0; IBM Corp., Armonk, NY, USA), and statistical significance was set at $p < 0.05$.

3 Results

3.1 Descriptive Statistics for Demographic and Esports-Related Variables

Table 1 presents the descriptive statistics for demographic and esports-related variables.

Table 1: Descriptive statistics for demographic and esports-related variables.

Variable	Categories	Frequency	Percentage (%)
School level	Middle school	375	63.8
	High school	213	36.2
Gender	Male	480	81.6
	Female	108	18.4
Esports game	League of Legends	240	40.8
	Valorant	282	48.0
	FC Online	33	5.6
	KartRider (Drift)	33	5.6
Frequency of watching esports	Non-viewer	147	25.0
	Once a week	138	23.5
	Two to three days a week	147	25.0
	Four to six days a week	66	11.2
	Daily	90	15.3
Reason for watching esports	Enjoyment	213	36.2
	Analysis & preparation	144	24.5
	Team support	177	30.1
	Leisure pastime	54	9.2
Total		588	100.0

Note: Percentages are based on valid responses. Age range = 13–18 years (Mean = 15.2, standard deviation [SD] = 1.4).

3.2 Confirmatory Factor Analysis

Confirmatory factor analysis was conducted to examine the validity of the scales employed in the study. First, model fit was evaluated using the Standardized Root Mean Square Residual (SRMR < 0.08), Root Mean Square Error of Approximation (RMSEA < 0.08), Tucker-Lewis Index (TLI > 0.90), and Comparative Fit Index (CFI > 0.90) [46,47]. In addition, convergent validity was assessed by inspecting standardized factor loadings (>0.50), average variance extracted (AVE > 0.50), and construct reliability (>0.70) [48]. The results indicated that the scales used in this study met all criteria for model fit and convergent validity (Table 2). Specifically, all standardized factor loadings exceeded 0.60 and were statistically significant ($p < 0.001$), and all AVE and Composite Reliability (CR) values met the recommended thresholds, confirming construct reliability. For clarity, Table 2 presents only standardized loadings (β), AVE, and CR values, as these indices sufficiently demonstrate the constructs' reliability and validity.

Table 2: Results of confirmatory factor analysis of the measurement scales used in the study.

Variable		β	CR	AVE
Psychological well-being	Environmental mastery	0.630–0.729	0.819	0.601
	Personal growth	0.682–0.835	0.870	0.691
	Self-acceptance	0.675–0.801	0.835	0.629
	Positive relations with others	0.670–0.760	0.854	0.661
	Autonomy	0.649–0.836	0.750	0.503
	Purpose in life	0.684–0.808	0.843	0.573
Social support	Emotional support	0.787–0.886	0.929	0.767
	Informational support	0.611–0.894	0.901	0.756
	Instrumental support	0.774–0.837	0.896	0.743
	Appraisal support	0.798–0.834	0.888	0.666
Academic engagement	Vigor	0.722–0.886	0.885	0.660
	Dedication	0.665–0.920	0.883	0.658
	Absorption	0.783–0.908	0.909	0.668
School-life satisfaction	Academic satisfaction	0.775–0.907	0.887	0.663
	School environment	0.711–0.927	0.908	0.667
	School life	0.594–0.871	0.907	0.714
	Teacher satisfaction	0.830–0.895	0.950	0.791
	Peer satisfaction	0.868–0.884	0.937	0.789

Note: χ^2 = 2637.219 (df = 2057, p < 0.001), standardized root mean square residual (SRMR) = 0.051, comparative fit index (CFI) = 0.927, Tucker-Lewis Index (TLI) = 0.919, root mean square error of approximation (RMSEA) = 0.038.

3.3 Descriptive Statistics and Correlation Coefficients of the Key Variables

Table 3 presents the descriptive statistics and correlation coefficients of the four main variables. All inter-factor correlation coefficients were below 0.80, indicating the absence of multicollinearity. Additionally, for every construct, the AVE (0.641–0.762) exceeded the squared inter-factor correlation coefficients (0.183–0.530), thereby confirming discriminant validity [49]. Tests of normality also supported the data's distribution, as skewness and kurtosis values were within ±2.

Table 3: Descriptive statistics and correlation coefficients of the key variables.

Variable	Mean (SD)	Psychological Well-Being	Social Support	Academic Engagement	School-Life Satisfaction	Skewness	Kurtosis
Psychological well-being	3.79 (0.44)	0.643#	—	—	—	0.166	−0.171
Social support	3.83 (0.51)	0.530** (0.281)	0.762#	—	—	−0.048	−0.109
Academic engagement	3.49 (0.64)	0.242** (0.059)	0.259** (0.067)	0.653#	—	−0.024	−0.313
School-life satisfaction	3.83 (0.52)	0.474** (0.225)	0.429** (0.183)	0.183** (0.033)	0.641#	−0.049	−0.651

Note: **p < 0.01; Squared correlations are shown in parentheses; # denotes the AVE for each construct.

3.4 Verification of the Research Model

To clarify the relationships between psychological well-being, social support, academic engagement, and school-life satisfaction among students participating in school-based esports activities, we conducted an SEM analysis. The model-fit indices indicated adequate fit (SRMR = 0.075, CFI = 0.930, TLI = 0.903, and RMSEA = 0.065), and CFI, TLI, and RMSEA exceeded commonly accepted thresholds, confirming the suitability of the proposed model for hypothesis testing.

Table 4 presents the results of the hypothesis testing. H1 was supported, as a significant positive causal effect was found (β = 0.871, t = 5.549, p < 0.001). However, H2 was not supported (β = 0.666,

$p > 0.05$), indicating that the effect of psychological well-being on school-life satisfaction may be entirely mediated by social support. Both H3 ($\beta = 0.435$, $t = 3.060$, $p < 0.001$) and H4 were supported ($\beta = 0.258$, $t = 2.302$, $p < 0.01$), showing that psychological well-being also predicted academic engagement and that social support positively influenced school-life satisfaction By contrast, H5 was not supported ($\beta = -0.097$, $t = -1.022$), suggesting that academic engagement did not contribute directly to school-life satisfaction in this sample. Collectively, these findings highlight the central role of social support as a mediator, while questioning the direct contribution of academic engagement to students' satisfaction with school life.

Table 4: Results of testing hypotheses.

Hypothesis	Path	β	SE	t	Decision
1	Psychological well-being → Social support	0.871	0.157	5.549***	Supported
2	Psychological well-being → School-life satisfaction	0.666	0.362	1.843	Rejected
3	Psychological well-being → Academic engagement	0.435	0.142	3.060**	Supported
4	Social support → School-life satisfaction	0.258	0.112	2.302**	Supported
5	Academic engagement → School-life satisfaction	−0.097	0.095	−1.022	Rejected

Note: ***$p < 0.001$, **$p < 0.01$.

3.5 Selection and Analysis of the Final Model

After testing the proposed model, we removed the two non-significant paths corresponding to Hypotheses 2 and 5. The removal of these paths was justified to improve model parsimony and clarify the mediating role of social support. The revised model exhibited an acceptable fit (SRMR = 0.075, CFI = 0.927, TLI = 0.903, and RMSEA = 0.065), and fit indices remained stable compared to the initial model, confirming the adequacy of the revised specification. In the revised model, psychological well-being exerted a significant positive effect on social support ($\beta = 0.899$, $t = 5.164$, $p < 0.001$; H1) and a moderate positive effect on academic engagement ($\beta = 0.427$, $t = 3.054$, $p < 0.01$; H3). Social support, in turn, strongly predicted school-life satisfaction ($\beta = 0.804$, $t = 5.093$, $p < 0.01$; H4) (Table 5). These effect sizes highlight the central role of social support in linking psychological well-being to students' satisfaction with school life, while academic engagement exerted a comparatively smaller influence.

Table 5: Results of testing hypotheses in the revised model.

Hypothesis	Path	β	SE	t	Decision	Direct Effect	Indirect Effect	Total Effect
1	Psychological well-being → Social support	0.899	0.153	5.164***	Supported	0.897	—	0.897
3	Psychological well-being → Academic engagement	0.427	0.140	3.054**	Supported	0.353	—	0.353
4	Social support → School-life satisfaction	0.804	0.158	5.093***	Supported	0.753	—	0.753

Note: ***$p < 0.001$, **$p < 0.01$.

3.6 Testing Mediating Effects

Table 6 shows the results of the comparison of competing model fit indices and bootstrapping analysis to test the mediating effect of social support. Because the direct path from academic engagement to school satisfaction was not statistically significant, we did not test the mediating effect of academic engagement. According to MacKinnon [50] and Kline [51], when the chi-square difference ($\Delta\chi^2$) between a partial-mediation model and a full-mediation model is ≤3.84 at 1 degree of freedom, full mediation can be assumed. In this study, the comparison yielded a $\Delta\chi^2$ of 3.779 with $\Delta df = 2$, which indicates that social support fully mediates the relationship between psychological well-being and school-life satisfaction.

Table 6: Results of competing model analysis and bootstrapping.

Model	χ^2	df	SRMR	TLI	CFI	RMSEA
Partial mediation model	236.513	130	0.075	0.903	0.930	0.065
Full mediation model	240.292	132	0.075	0.903	0.927	0.065

Model	Path	95% Confidence Interval			
		Indirect effect	sig	Lower	Upper
Full mediation	Psychological well-being → Social support → School-life satisfaction	0.676	0.008	0.549	0.782
Model comparison: $\Delta\chi^2 = 3.779$, $\Delta df = 2$					

Note: df, degree of freedom; SRMR, standardized root mean square residual; TLI, Tucker-Lewis Index; CFI, comparative fit index; RMSEA, root mean square error of approximation.

In the bootstrapping analysis (1000 resamples; 95% confidence interval), the 95% confidence interval did not include zero (lower bound = 0.597, upper bound = 0.870), indicating a statistically significant indirect effect at $p < 0.05$ ($\alpha = 0.002$) and confirming full mediation [52]. These results suggested that social support completely mediates the relationship between psychological well-being and school-life satisfaction among students participating in school-based esports activities, thereby partially supporting H6. In other words, H6a was supported, whereas H6b was not supported by our results. Figs. 2 and 3 present the results of SEM and full mediation analyses.

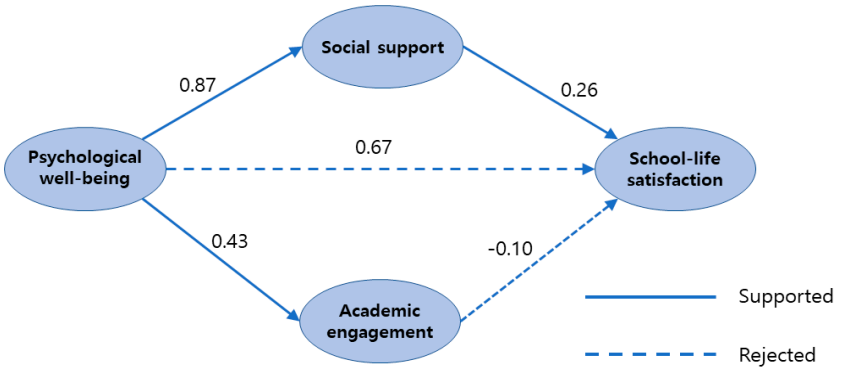

Figure 2: Results of structural equation modeling (SEM) analysis. Note: All values represent standardized path coefficients (β).

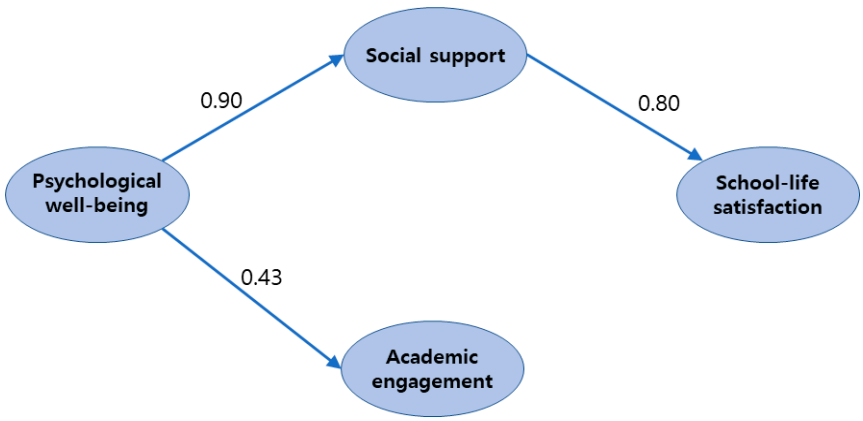

Figure 3: Results of full mediation analysis. Note: All values represent standardized path coefficients (β).

4 Discussion

This study examined the structural relationships between psychological well-being, social support, academic engagement, and school-life satisfaction among students participating in school-based esports activities. The results revealed that psychological well-being exerts significant positive effects on social support and academic engagement, while social support has a significant positive effect on school-life satisfaction. The results also demonstrated that social support fully mediates the relationship between psychological well-being and school-life satisfaction.

These results can be further interpreted through the lens of SDT, which posits that individuals' motivation and well-being depend on the fulfillment of three basic psychological needs—autonomy, competence, and relatedness [36]. Within school-based esports, students frequently experience autonomy by selecting game roles, strategies, and collaborative methods; they gain a sense of competence through continuous skill improvement and performance feedback; and they fulfill relatedness through teamwork and shared achievements. The satisfaction of these needs provides a theoretical basis for understanding how esports participation promotes psychological well-being and engagement when implemented in structured and supportive environments [37,38].

These findings suggest that the mechanisms identified in this study cannot be fully accounted for by the frameworks of conventional classroom instruction or traditional sports activities. Esports, as a digitally mediated team-based activity, reinforces the role of social support through dynamic processes such as online collaboration, strategic performance, and digital identity formation. In this regard, the theoretical contribution of the present study lies in extending established psychological constructs into the domain of esports, thereby demonstrating that digital citizenship and gamified collaboration operate as distinctive pathways to students' psychological well-being and school-life satisfaction.

First, psychological well-being strongly predicted social support ($\beta = 0.899$, $p < 0.001$). This finding is consistent with a Swiss longitudinal study showing that decreases in well-being coincide with reduced emotional and tangible support [53], a study conducted in the United States of America indicates that higher well-being enhances social well-being [54]. An Italian study further demonstrated that greater emotional stability fosters prosocial behavior, which increases peer support [55]. Together, these findings suggest that well-being enables students to cultivate emotional, informational, and instrumental support, a pattern also evident in esports contexts. This finding resonates with the need for relatedness, a central component of SDT. Students who experience higher levels of psychological well-being tend to communicate more openly and empathetically, fulfilling their relational needs through mutual support, trust, and shared team goals. In esports settings, digital collaboration allows adolescents to satisfy this need for relatedness by developing cohesive, emotionally supportive peer networks [37].

Second, psychological well-being significantly predicted academic engagement ($\beta = 0.427$, $p < 0.01$). Similar effects have been observed among Swiss adolescents, where well-being boosted school engagement and improved grades [14], and in the Philippines, where well-being was a direct predictor of academic engagement [56]. A meta-analysis of youth samples confirmed a positive correlation between subjective well-being and engagement [27], with comparable patterns reported in higher education [57,58]. These results indicate that psychological well-being functions as an emotional infrastructure that provides the vigor and focus needed for academic persistence, which can be reinforced through esports-related flow and mastery experiences. This association can also be interpreted through the need for competence in SDT [36]. When students experience success and mastery in esports—such as improving gameplay strategy, achieving in-game milestones, or receiving recognition from teammates—they satisfy their competence need. These experiences enhance their confidence and persistence, which may generalize to academic learning contexts and sustain engagement even when challenges arise.

Third, social support strongly predicted school-life satisfaction (β = 0.804, p < 0.001). This result aligns with evidence that relational resources serve as benchmarks in students' evaluations of their school environment [19,25]. Emotional, informational, and instrumental support from peers and teachers help students interpret academic and social demands positively, consistent with the stress-buffering perspective [18]. Our study extends this supportive effect from classrooms and traditional sports into the esports setting.

Fourth, the direct effect of psychological well-being on school-life satisfaction was not significant, but an indirect effect through social support was confirmed (indirect effect = 0.676, 95% CI [0.549, 0.782]). This suggests that satisfaction depends less on internal well-being than on the relational support experienced in school. Even students with high well-being may fail to feel satisfied without peer and teacher support. Similar findings in collectivist contexts emphasize that relational cues are central in shaping school satisfaction [19,25].

Fifth, academic engagement did not significantly predict school-life satisfaction (β = −0.097, p > 0.05). While prior studies in Romania, the U.S., and Angola have reported positive links between engagement and satisfaction [25,28,59], our results indicate that this relationship is not universal. In our sample, engagement may have been driven by externally regulated or test-oriented participation, limiting its impact on satisfaction. According to SDT, only autonomous, intrinsically motivated engagement enhances school satisfaction, whereas controlled motivation undermines it [56,60].

Taken together, these non-significant findings suggest that the pathways from psychological well-being and academic engagement to school-life satisfaction are contingent on contextual and cultural conditions. In collectivist educational settings, students often rely on relational cues such as peer and teacher support when evaluating school satisfaction, which explains why well-being did not predict satisfaction without the mediating role of social support [19,25]. Similarly, when academic engagement is externally regulated or test-oriented, it may fail to foster school attachment and can contribute to fatigue or burnout. Prior studies based on SDT confirm that only autonomous, intrinsically motivated engagement yields positive outcomes, whereas controlled motivation undermines satisfaction [56,60]. These findings underscore the importance of focusing on the quality rather than the quantity of engagement.

From the perspective of autonomy, this non-significant relationship may suggest that much of the engagement observed among participants was controlled rather than autonomous—driven by external pressures such as academic evaluation or competitive ranking rather than intrinsic interest. According to SDT, only autonomous engagement, which satisfies the need for self-endorsement and volition, fosters genuine satisfaction and well-being [36]. Future esports programs should therefore cultivate autonomy-supportive conditions that encourage voluntary participation, reflection, and choice.

Although psychological well-being positively predicted both social support and academic engagement, esports should not be regarded as inherently beneficial. Its positive impact depends on contextual safeguards, such as structured program design, supportive coaching, and digital-citizenship education. Without these, esports may also involve risks, including excessive play, gender disparities, or toxic interactions [17]. Beyond these risks, it is equally important to consider the protective factors that can maximize the educational benefits of esports while minimizing potential harm. International research conducted in Western contexts has emphasized that the quality of program design and coach supervision critically determines whether esports participation leads to positive developmental outcomes or problematic behavior [8,61]. In collectivist educational environments such as South Korea—where social cohesion and teacher authority are highly valued—structured program design can function as a protective scaffold, transforming competition into opportunities for cooperation and shared growth [5]. Similarly, supportive coaching, characterized by autonomy support, emotional guidance, and feedback on teamwork, helps students internalize positive

values and maintain balance between gaming and academic responsibilities [36,37]. Digital-citizenship education also serves as a crucial safeguard, equipping students with the awareness and skills to navigate online interactions responsibly and to prevent toxic or exclusionary behavior [62,63]. Collectively, these protective mechanisms contribute to a psychologically safe and educationally meaningful esports ecosystem that nurtures both engagement and well-being.

Furthermore, cross-cultural comparisons indicate that while Western students often value autonomy and self-expression in esports participation, students in collectivist settings tend to emphasize team harmony, relational belonging, and peer approval [12,21,22]. These cultural distinctions highlight that effective esports education must adopt a context-sensitive approach—one that balances individual motivation with collective responsibility and adapts program structures to the surrounding educational culture [61]. In this respect, we conceptualized esports as a digital collaborative space—a digitally mediated, team-based environment in which students coordinate strategies, communicate in real time, and solve problems collectively. Under appropriate conditions, these processes can promote persistence, focus, and cooperative learning. However, poorly managed environments may instead generate conflict or disengagement.

Overall, the evidence suggests that esports should not be regarded as a guaranteed pathway to improved well-being and engagement, but as a conditional educational context that requires careful structuring. By integrating both positive findings [4,6] and critical perspectives [29], this study highlights that the educational value of esports depends on balancing opportunities for collaboration with strategies to mitigate potential risks. Collectively, these interpretations reaffirm the explanatory value of Self-Determination Theory, demonstrating that the fulfillment of autonomy, competence, and relatedness constitutes the key psychological mechanism linking well-being, social support, and engagement in school-based esports.

4.1 Limitations and Directions for Future Research

This study has several methodological constraints that also suggest directions for future refinement. First, the sample was drawn exclusively from Gwangju Metropolitan City, a region characterized by a collectivist educational culture and a highly competitive school environment. Such contextual features may shape how students perceive well-being, social support, and school satisfaction, potentially leading to results that differ from those observed in more individualistic or less competitive educational systems. Consequently, the generalizability of these findings should be interpreted with caution.

Second, the sample was heavily male-dominated (over 80%), reflecting the current gender imbalance in school-based esports participation. This imbalance may have influenced the observed outcomes, as male students often emphasize competition and achievement-oriented play, which could amplify engagement and peer-support dynamics while underrepresenting the perspectives of female participants. Future research should therefore include gender-balanced samples across multiple regions and examine whether the structural pathways among psychological well-being, social support, engagement, and satisfaction differ by gender or cultural background.

Third, the structural model did not incorporate esports-specific variables such as game genre, interaction quality, or team role dynamics. Including these contextual factors could clarify how digital collaboration shapes well-being and satisfaction.

Finally, although constructs were treated as composite variables for model parsimony, future research could conduct dimension-level or multi-group analyses to capture nuanced effects across subdimensions and demographic groups. Together, these refinements will help advance a more comprehensive understanding of how school-based esports contribute to adolescents' psychosocial and academic development.

4.2 Practical Applications

The results of this study suggest the following practical applications. First, schools should strengthen relationship-based support systems, considering that psychological well-being enhanced social support, which fully mediates the effect of psychological well-being on school-life satisfaction. Programs aimed at esports team coaching, peer mentoring, and teacher–student emotional coaching ought to be institutionalized so that students can experience structured support. Second, clear educational guidelines are needed for esports. Given that esports demand cooperation, strategy, and communication, they should be explicitly linked to curricular and co-curricular learning objectives to embed a positive feedback loop that reinforces school-life satisfaction. Third, it is essential to manage the quality of participation and to deliver digital-citizenship instruction. The absence of a direct effect of academic engagement on satisfaction suggests that qualitative dimensions—such as autonomy and meaningfulness—are more critical than the sheer amount of participation, and digital-citizenship and conflict-mediation training can preempt the online conflicts and flaming that sometimes arise in esports settings.

While these applications are primarily school-based, their scope and generalizability may be limited. Considering cultural and national differences in educational practices and attitudes toward esports, the suggested strategies should be adapted flexibly to local contexts. Future initiatives should therefore emphasize adaptability and responsiveness, ensuring that program design, coaching approaches, and digital-citizenship education can be tailored to diverse cultural and institutional environments.

5 Conclusions

This study investigated the structural relationships among psychological well-being, social support, academic engagement, and school-life satisfaction in school-based esports. The findings supported Hypotheses 1, 3, and 4, while Hypotheses 2 and 5 were not supported.

Psychological well-being was a strong predictor of social support and a moderate predictor of academic engagement. Social support, in turn, significantly predicted school-life satisfaction and fully mediated the effect of well-being on satisfaction. By contrast, academic engagement did not directly influence satisfaction, highlighting the importance of distinguishing between the quality and quantity of engagement in future research.

These results suggest that esports can serve as an educational context under structured conditions. Their positive impact depends on program design, supportive coaching, and explicit digital-citizenship education. Without such safeguards, esports participation may also involve risks such as excessive play, gender disparities, or toxic interactions.

Overall, the findings extend established psychological constructs into digitally mediated, team-based environments. When thoughtfully implemented, esports can strengthen relational resources and foster students' satisfaction with school life. These results underscore the practical implication that integrating structured esports programs with supportive coaching can promote both well-being and school satisfaction, while adaptability to cultural and institutional contexts remains essential for broader applications.

Acknowledgement: None.

Funding Statement: The authors received no specific funding for this study.

Author Contributions: The authors confirm their contributions to the paper as follows: Study design: Myeong-Hun Bae; conceptualization: Gwang-Soo Oh; study conduct: Gwang-Soo Oh, Je-Seong Lee; data collection: Je-Seong Lee, Myeong-Hun Bae; data analysis: Gwang-Soo Oh, Je-Seong Lee; data interpretation: Je-Seong Lee, Myeong-Hun Bae; drafting the manuscript: Gwang-Soo Oh, Je-Seong Lee; revising manuscript content: Je-Seong Lee, Myeong-Hun Bae. All authors reviewed the results and approved the final version of the manuscript.

Availability of Data and Materials: Further inquiries can be directed to the corresponding author.

Ethics Approval: All participants signed the informed consent in this study. The survey collection process was approved by the Korea National University of Education Ethics Review Committee (approval number: KNUE-202309-SB-0329-01) and conducted according to the principles outlined in the Declaration of Helsinki.

Conflicts of Interest: The authors declare no conflicts of interest to report regarding the present study.

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