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Sport Education as a Catalyst for Mental Health: A Predictive Model of Sports Enjoyment and Digital Challenges in China and South Asia

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Abstract: This study investigates the complex relationships among sport education, digital behaviors, and mental health in university students from China and South Asia. We developed an integrated conceptual framework grounded in Self-Determination Theory (SDT) to examine how sports enjoyment and social media addiction jointly mediate the relationship between structured sport education and psychological outcomes. We collected primary data using a cross-sectional design from a balanced multinational sample of N=612 university students (308 from China and 304 from South Asia). We evaluated the data using Partial Least Squares Structural Equation Modeling (PLS-SEM) in two stages: measurement and structural models. The results indicate lower psychological distress, though both the structural components of sport education and the intrinsic level of sports enjoyment predict this outcome differently. Sports enjoyment (β = -0.310) is a stronger predictor of reduced social media addiction than the structural components of sport education (β = -0.190). Social media addiction is an important competing factor, as it can partly reduce the mental health benefits of taking part in sports. The PLSpredict analysis shows strong predictive power, especially for psychological distress ($Q^2_{predict}$ up to 0.428). These findings suggest that sport education primarily helps by playing sports more enjoyable and reducing digital addiction. The study points out that educators should focus on making sports enjoyable to support mental health and digital well-being, especially in demanding academic settings where digital use is high.

Keywords: Sport Education, Sports Enjoyment, Social Media Addiction, Mental Health, PLS-SEM, China, South Asia.

1. Introduction

Mental health challenges are becoming more common among young adults, creating a major public health issue in the 21st century (Wang et al., 2024). At the same time, while digital technology continues to develop rapidly, it also exerts a complex influence on psychological development (Morris et al., 2025). Sport Education, which uses a structured curriculum to build physical skills and values, is now being considered to improve psychological well-being (Hossain et al., 2021; Sifat et al., 2022). While the physical benefits of sport are well known, its use as a teaching method to support mental health, especially in non-Western countries undergoing rapid digital change, has received little study (Singh et al., 2020). This study examines this connection in China and South Asia, focusing on Pakistan and India, where digital technology and academic pressure are particularly strong (MacPhail & Lawson, 2020).

Previous research has established a correlation between physical activity and mental health outcomes (Chen et al., 2024; Samala et al., 2024). However, much of the literature treats "sport" as a uniform category, often neglecting the important distinction between informal recreation and the structured context of Sport Education (Pang & Hill, 2018). Sport Education emphasizes holistic development, including teamwork, leadership, and ethical engagement, and provides unique psychosocial benefits that extend beyond physical exertion (Jayawardena & Gamage, 2022). At the same time, an increasing body of research has documented the negative impact of social media addiction on youth loneliness and anxiety (Gautam & Gautam, 2021). Despite the significance of both areas, sport pedagogy and digital mental health research have largely developed independently (Deci, Olafsen & Ryan, 2017).

This research addresses the absence of an integrated theoretical model that connects sport education, digital behaviors, and mental health within a unified framework. Most existing studies are conducted in "WEIRD" (Western, Educated, Industrialized, Rich, and Democratic) societies, which limits the generalizability of findings to regions such as China and South Asia, where cultural values and digital ecosystems, including platforms like WeChat, Douyin, and localized global applications, differ substantially (Akpan et al., 2024). Additionally, the mechanisms by which sport education affects mental health are frequently regarded as a "black box." Although sports enjoyment is acknowledged as a motivator, its function as a mediator, particularly when empirically tested against negative influences such as social media addiction, remains significantly underexplored.

This study introduces a novel conceptual model that positions sport education as the primary independent variable. The structured pedagogy of sport education is hypothesized to foster Sports Enjoyment, which acts as a key mediator in enhancing Psychological Well-being and reducing Psychological Distress. Additionally, Social Media Addiction (SMA) is presented as a competing mediator. In digitally saturated environments, the appeal of social media may create a push-and-pull dynamic that counteracts the psychological benefits of physical activity.

By examining these variables concurrently, this research makes three theoretical contributions. First, it advances the sport pedagogy literature by empirically testing sports enjoyment as a mechanism for mental health benefits, in alignment with Self-Determination Theory (SDT) (Zamir & Wang, 2023). Second, it offers a holistic perspective on mental health in the digital age, recognizing the interconnectedness

of offline and online experiences. Third, it situates these findings within the context of high-pressure educational systems in the Global South, providing critical insights for educators and policymakers.

2. Literature Review

2.1. Sport Education and Mental Health

The positive association between physical activity and mental health is well-documented; however, meta-analyses indicate that the context in which individuals engage in physical activity significantly influences psychological outcomes (Liu et al., 2024; Pascua, 2024). Sport Education (SE) is differentiated from general physical activity by its structured pedagogical framework (Evangelio et al., 2018).

According to Siedentop's model, SE incorporates seasons, formal competition, and "festivity" to foster an authentic sport. In contrast to informal recreation, the structured nature of SE promotes social and emotional learning, including the development of leadership, responsibility, and cooperation (Reynolds 3rd et al., 2022). Empirical evidence demonstrates that SE curricula increase perceived social support and intrinsic motivation, both of which are essential for mental health (Wahyudi et al., 2025; Xu, Huang & Shah, 2024). Although a sense of belonging within a sports team can mitigate social isolation, the quality of the educational environment remains crucial. Poorly managed competitive settings may instead contribute to psychological stress (Duan et al., 2022; Yan et al., 2023). Despite these findings, there is a notable gap in understanding the direct mechanisms linking specific pedagogical components of SE to distinct psychological outcomes (Weiss, Kimmel & Smith, 2001).

2.2. The Central Role of Sports Enjoyment as a Mediating Mechanism

Research shows that enjoyment plays a key role in connecting physical activity factors to both behavior and health outcomes. The translation of structured sport participation into mental health benefits is mediated by participants' affective experiences (Lin, 2023). According to Self-Determination Theory (SDT), sports enjoyment represents a deep-seated affective state that emerges when the needs for autonomy, competence, and relatedness are fulfilled (Mahmood et al., 2026).

A well-designed sport education (SE) curriculum supports these psychological needs through role-taking and the pursuit of collective goals (Afzal, Junejo & Khoso, 2025). When students experienced genuine enjoyment, they demonstrated increased effort and developed stronger peer attachments (Hou et al., 2019; Sun & Zhang, 2021). This positive effect mitigates psychological distress by facilitating a flow state and improving mood (Klompstra et al., 2022; Yan et al., 2023). Therefore, sports enjoyment functions as the affective mechanism linking pedagogical structure to long-term mental health outcomes (Burgueño et al., 2022; Chen et al., 2021). Sports enjoyment serves as the affective link between how sport education is taught and long-term mental health outcomes (Burgueño et al., 2022). Sport education encourages enjoyment by supporting students' needs, it boosts engagement right away and helps protect against stress, especially in challenging academic and digital environments like those faced by university students in China and South Asia.

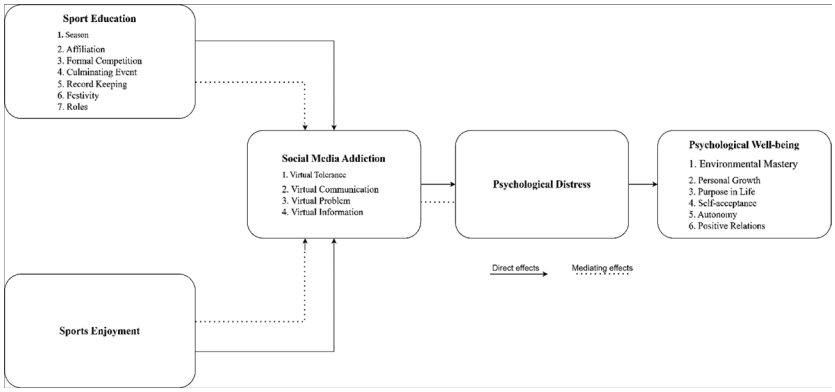
2.3. The Digital Dilemma: Social Media Addiction as a Countervailing Force

In contrast to the active, social nature of sport, social media addiction is marked by compulsive use and mood modification (Chen et al., 2021; Sahin, 2018). Research consistently links this addiction to increased anxiety, depression, and poor sleep quality (Fares et al., 2021; Opree, Buijzen & Van Reijmersdal, 2018). Impairment mechanisms include social comparison, Fear of Missing Out (FoMO), and time displacement (Khoso, Honggang & Afzal, 2024; Shan et al., 2025). This time displacement is central to our study, as sedentary digital use competes with the communal engagement of sport. In the demanding academic environments of China and South Asia, digital platforms often provide an easier means of socialization, which may reduce the benefits of physical education (Kim, Kim & Yun, 2024).

2.4. Research Gap and Proposed Model

Although the independent relationships among sport, enjoyment, digital media, and mental health have been examined, integrated analyses remain limited. Existing research is often siloed, with minimal direct engagement between sport psychology and media studies, particularly in non-Western contexts. The cultural environments of China and South Asia serve as critical contexts for investigating these relationships. In these regions, significant academic pressure often positions sport education as a trivial distraction, while digital platforms serve as a primary means of socialization and escape (Sahin, 2018). The distinctive characteristics of platforms such as Douyin and WeChat, including they're highly engaging, algorithm-driven content, may introduce unique addictive risks. This review identifies a clear gap the absence of an integrated model that concurrently examines the positive, need-satisfying pathway of sport education (through enjoyment) and the negative, need-frustrating pathway of social media addiction, especially within the high-pressure, digitally saturated settings of China and South Asia. The present study synthesizes these separate literatures to propose a competing-mediators model as shown in Figure 1. This model seeks to determine whether the psychological benefits associated with structured, enjoyable sport education can counteract the detrimental effects of social media addiction, thereby offering a more nuanced and contextually relevant understanding of youth mental health in the digital era.

Figure 1: Research Model.



3. Methodology

3.1. Ethical Consideration

The study adhered to the declaration of Helsinki and met all ethical standards for research involving human subjects. The data collection involved different cultures, we obtained ethical approval from both Universiti Putra Malaysia (UPM) and ERB Certificate No: UPM/25/109, and the ethics review board (ERB) of the Guizhou Institute for Lifelong Education (Certificate No: GILE-2025-06-0180) to meet the primary data collection requirements. All participants gave informed consent. They received clear information about the study's goals, their voluntary participation, and their right to withdraw at any time without penalty.

3.2. Research Design and Data Collection Strategy

A cross-sectional, quantitative research design was utilized to examine the relationships among sport education, digital behaviors, and mental health. Data collection was conducted using a structured online questionnaire, administered via Wenjuanxing in China and Qualtrics, Facebook and Whatsapp groups were used in South Asia, to maximize regional accessibility and maintain data integrity.

The target population consisted of university students aged 18 to 25 years from urban and semi-urban universities in East China (including Shanghai, Zhejiang, and Jiangsu) and South Asia (Pakistan and India). This demographic was chosen due to their concurrent engagement in formal higher education and exposure to high-density digital environments. Data collection was implemented through a multi-channel approach was employed, leveraging university communication portals and student associations. To ensure data quality, two attention-check items were included. Participants who failed these checks or completed the survey in less than 10 minutes were excluded.

3.3. Sample and Sampling Technique

A multi-stage sampling approach was employed. Initially, purposive sampling identified universities that incorporate the Sport Education Model (SEM) as a mandatory element of the undergraduate physical education curriculum. Subsequently, quota sampling ensured equal representation from the two geographic regions.

To determine the appropriate sample size, an a priori power analysis was conducted using G* Power software. For a multiple regression analysis with up to 5 predictors, to achieve a statistical power of 0.95, an effect size of $f^2 = 0.15$ (medium), and an alpha level of 0.05, a minimum sample of 138 participants was required. However, given the use of Structural Equation Modeling (SEM) for data analysis, which requires a larger sample, and to ensure robust subgroup analysis across the two regions, we targeted a larger sample. The final analyzed dataset comprised N = 612 valid responses, with 308 participants from China and 304 from South Asia, comfortably exceeding the thresholds for both regression and SEM analyses. The South Asian cohort was intentionally selected from major metropolitan universities in Pakistan (Punjab and Islamabad regions) and India (Delhi and Maharashtra regions). This

approach provides a representative overview of the urban, digitally engaged student population prevalent throughout the subcontinent, where institutional sport education models are standardized.

3.4. Measures and Instrumentation

We measured all constructs using established, multi-item scales. Instruments were translated into Mandarin Chinese, Urdu, and Hindi through a standard back-translation procedure to ensure both linguistic and conceptual equivalence. Sport Education (SE) was measured using the scale developed by Burgueño et al. (2022), which assesses seven dimensions: Season, affiliation, formal competition, culminating event, record keeping, festivity, and roles. Sports enjoyment was assessed using the 16-item scale by Chen et al. (2021), which focuses on the intrinsic affective rewards of participation. Social Media Addiction (SMA) was operationalized using Sahin's (2018) scale, which covers Virtual Tolerance, Communication, Problems, and Information. Psychological Distress was measured using the 12-item scale by Fares et al. (2021), which captures symptoms of anxiety and stress. Psychological Well-being (PWB) was evaluated using the scale by Opree et al. (2018), which is grounded in Ryff's six-dimensional model and includes Autonomy and Environmental Mastery. We controlled for Age, Gender, Socio-Economic Status (SES), and Academic Stress to isolate the specific effects of sport education.

3.5. Data Analysis

Data analysis used the two-step PLS-SEM procedure and was conducted with SmartPLS 4.0. Internal consistency was assessed with Cronbach's alpha and composite reliability (threshold: > 0.70). Convergent validity was determined by average variance extracted (AVE > 0.50), and discriminant validity was confirmed using the Fornell–Larcker criterion and indicator cross-loadings. Harman's single-factor test was used to assess potential Common Method Bias (CMB).

All hypothesized relationships were tested with non-parametric bootstrapping (5,000 resamples). Path coefficients, t-values, and 95% bias-corrected confidence intervals were reported. Mediation effects were considered significant if the confidence interval for the indirect effect did not include zero. Model predictive relevance was evaluated using the PLSpredict algorithm, with positive Q^2 values ($Q^2 > 0$) indicating meaningful out-of-sample predictive capability.

4. Results

We conducted preliminary analyses to screen the data, assess sample characteristics, and evaluate key relationships among variables. This step ensures data integrity, confirms suitability for multivariate analysis, and provides an initial understanding of dataset patterns to inform later model testing.

Table 1 shows a balanced distribution across key demographic variables. Gender is nearly evenly split, with a slight male majority (52.3%). The sample mainly consists of younger adults, with 46.9% aged 21-23 years. Regional representation is nearly equal between China (50.3%) and South Asia (49.7%), supporting robust comparative analysis between these cultural contexts.

Table 1: Sample Demographics (N=612).

Demographic Variable	Category	Frequency	Percentage (%)
Gender	Male	320	52.3
	Female	292	47.7
Age	18-20 years	245	40
	21-23 years	287	46.9
	24+ years	80	13.1
Region	China	308	50.3
	South Asia	304	49.7

Table 2: Descriptive Statistics and Distributional Properties (N=612).

Variable	Theoretical Range	Mean	Standard Deviation	Skewness	Kurtosis
Sport Education	5-Jan	3.45	0.78	-0.32	0.45
Sports Enjoyment	5-Jan	3.92	0.65	-0.58	1.12
Social Media Addiction	5-Jan	3.18	0.89	0.23	-0.34
Psychological Distress	5-Jan	2.95	0.94	0.41	-0.28
Psychological Well-being	5-Jan	3.61	0.71	-0.45	0.67

Table 2 shows the main distribution characteristics of the study variables. All variables had skewness between -1 and +1 and kurtosis between -2 and +2, so the data are suitable for parametric analysis. On average, participants reported fairly high Sports Enjoyment (M=3.92, SD=0.65) and Psychological Well-being (M=3.61, SD=0.71), and moderate Sport Education engagement (M=3.45, SD=0.78). Scores for Social Media Addiction (M=3.18, SD=0.89) and Psychological Distress (M=2.95, SD=0.94) were close to the midpoint, showing a wide range of responses in the sample.

Table 3: Bivariate Correlations.

Variable	1	2	3	4	5
Sport Education	—				
Sports Enjoyment	.58**	—			
Social Media Addiction	-.21**	-.32**	—		
Psychological Distress	-.37**	-.51**	.46**	—	
Psychological Well-being	.49**	.62**	-.41**	-.67**	—
Note: ** p < .01					

Table 3 presents the bivariate correlations and shows that the relationships were statistically significant ($p < .01$) and aligned. A strong positive correlation was observed between Sport Education and Sports Enjoyment ($r = .58$), suggesting that structured pedagogical environments are linked to positive affective experiences. Sport education and Sports enjoyment showed significant negative associations with Social Media Addiction ($r = -.21$ and $r = -.32$, respectively) and Psychological Distress ($r = -.37$ and $r = -.51$). Conversely, both variables were positively correlated with Psychological Well-being, with Sports Enjoyment exhibiting a particularly strong association ($r = .62$). The strong inverse relationship between Psychological Distress and Psychological Well-being ($r = -.67$) indicates that, while these constructs are distinct, they are closely related within the mental health context of the sampled population.

Table 4 demonstrates robust psychometric properties for all constructs, thereby

providing a strong basis for subsequent structural model analysis. For higher-order constructs, both Composite Reliability (CR) and Cronbach's Alpha (alpha) exceeded the recommended threshold of 0.70, indicating high internal consistency. Additionally, the Average Variance Extracted (AVE) for each construct was above the critical value of 0.50, supporting convergent validity. The multidimensional constructs demonstrated particularly strong measurement properties. Sport education (CR = 0.934, AVE = 0.632), social media addiction (CR = 0.926, AVE = 0.608), and psychological well-being (CR = 0.945, AVE = 0.623) each exhibited high reliability and validity. Their respective first-order dimensions also showed robust metrics, with all CR values above 0.85 and AVEs consistently above 0.55. These findings suggest that the indicators effectively represent their theoretical constructs, enabling rigorous testing of the structural paths.

Figure 2: Measurement model using PLS SEM.

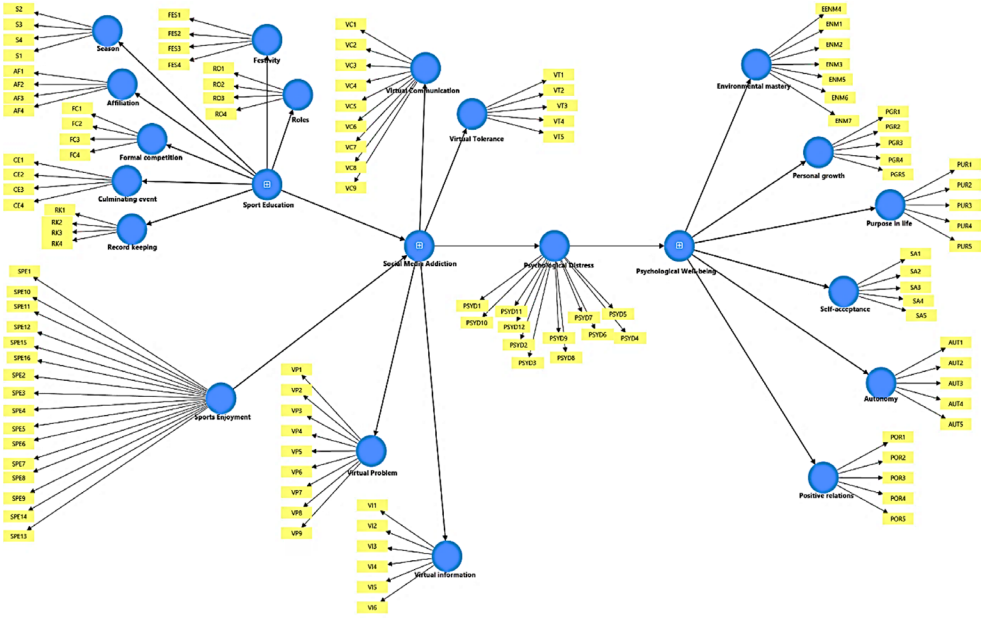


Table 4: Measurement Model Assessment: Reliability and Convergent Validity.

Construct & Dimensions	CR	AVE	Cronbach's α
Sport Education	0.934	0.632	0.921
Season	0.891	0.674	0.832
Affiliation	0.885	0.658	0.806
Formal Competition	0.882	0.652	0.798
Culminating Event	0.874	0.635	0.785
Record Keeping	0.868	0.623	0.776
Festivity	0.871	0.628	0.781
Roles	0.877	0.641	0.792
Sports Enjoyment	0.941	0.568	0.928
Social Media Addiction	0.926	0.608	0.910
Virtual Tolerance	0.889	0.667	0.823

Construct & Dimensions	CR	AVE	Cronbach's α
Virtual Communication	0.912	0.602	0.885
Virtual Problem	0.905	0.587	0.874
Virtual Information	0.884	0.558	0.836
Psychological Distress	0.912	0.551	0.889
Psychological Well-being	0.945	0.623	0.933
Environmental Mastery	0.901	0.605	0.862
Personal Growth	0.887	0.612	0.831
Purpose in Life	0.894	0.629	0.842
Self-acceptance	0.891	0.624	0.838
Autonomy	0.882	0.602	0.825
Positive Relations	0.918	0.592	0.892

Figure 2 shows the measurement model evaluated with PLS-SEM. It displays the structural relationships between the observed indicators and their underlying constructs. All indicator outer loadings are above 0.70, which confirms that the items strongly represent their dimensions.

Table 5: Assessment of Discriminant Validity: Cross-Loadings.

Indicator	Sport Education	Sports Enjoyment	Social Media Addiction	Psychological Distress	Psychological Well-being
SE_S1	0.812	0.412	-0.158	-0.245	0.351
SE_S2	0.785	0.388	-0.142	-0.231	0.332
SE_S3	0.801	0.401	-0.151	-0.238	0.344
SE_A1	0.823	0.425	-0.162	-0.252	0.362
SE_FC1	0.811	0.419	-0.159	-0.248	0.357
SE_FC2	0.802	0.395	-0.153	-0.239	0.341
SE_CE1	0.792	0.387	-0.147	-0.230	0.329
SE_CE2	0.778	0.379	-0.144	-0.225	0.321
SENJ1	0.452	0.812	-0.245	-0.382	0.485
SENJ2	0.438	0.798	-0.238	-0.371	0.472
SENJ3	0.425	0.785	-0.229	-0.358	0.456
SMA_VT1	-0.172	-0.265	0.815	0.358	-0.312
SMA_VC1	-0.169	-0.261	0.811	0.352	-0.307
SMA_VP1	-0.175	-0.269	0.822	0.362	-0.318
SMA_VI2	-0.161	-0.248	0.790	0.338	-0.293
PSD1	-0.312	-0.428	0.370	0.802	-0.528
PSD2	-0.298	-0.409	0.360	0.788	-0.505
PSD3	-0.305	-0.419	0.360	0.795	-0.518
PWB_EM1	0.385	0.512	-0.330	-0.512	0.825
PWB_PG1	0.378	0.504	-0.330	-0.504	0.818
PWB_PL1	0.391	0.521	-0.340	-0.521	0.829

Table 5 shows strong evidence for the discriminant validity of the measurement model. Each indicator loads much higher on its own construct than on any other. This means the indicators are more closely related to their intended construct than to others in the model. All sport education indicators had their highest loadings on their own construct (from 0.778 to 0.823) and much lower cross-loadings with other constructs, such as Psychological Distress (from -0.225 to -0.252). Social Media Addiction indicators also had strong main loadings (from 0.790 to 0.822) and lower

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cross-loadings with unrelated constructs. These results show that each latent variable measures a distinct concept, supporting the model's reliability and the testing of the study's hypotheses.

Table 6: Results of Hypothesis Testing for Direct and Indirect Effects.

Hypothesis	Path Relationship	β Coefficient	t-statistic	p-value	Supported?
Direct Effects					
H1	Sport Education → Social Media Addiction	-0.19	4.32	< 0.001	Yes
H2	Sports Enjoyment → Social Media Addiction	-0.31	6.87	< 0.001	Yes
H3	Social Media Addiction → Psychological Distress	0.41	9.45	< 0.001	Yes
H4	Psychological Distress → Psychological Well-being	-0.59	13.12	< 0.001	Yes
Indirect Effects (Mediation)					
H5	Sport Education → Social Media Addiction → Psychological Distress	-0.78	3.91	< 0.001	Yes
H6	Sports Enjoyment → Social Media Addiction → Psychological Distress	-0.12	5.84	< 0.001	Yes

Table 6 shows that all four direct hypotheses were statistically significant, confirming the main relationships. Sport education ($\beta = -0.19$, $p < 0.001$) and sports enjoyment ($\beta = -0.31$, $p < 0.001$) both showed significant negative effects on social media addiction. In turn, Social Media Addiction had a strong positive effect on psychological distress ($\beta = 0.41$, $p < 0.001$). The strong negative link between Psychological Distress and Psychological Well-being ($\beta = -0.59$, $p < 0.001$) shows how mental health outcomes are connected. Mediation analysis supported the model's main mechanism, with both indirect effects being significant. Specifically, Social Media Addiction partly explained the relationships between Sport Education and Psychological Distress ($\beta = -0.078$, $p < 0.001$), and between Sports Enjoyment and Psychological Distress ($\beta = -0.127$, $p < 0.001$). These findings suggest that the benefits of structured and enjoyable physical education in reducing psychological distress are partly because they help lower addictive social media use.

These findings reveal a previously underexplored mechanism in the relationship between physical activity and mental health, indicating that the psychological benefits of sport education are not solely direct but are substantially mediated by reduced digital maladaptation. Although prior research has established a general association between sports participation and well-being, the present study quantitatively demonstrates that structured sport education functions as an effective intervention against the specific modern challenge of social media addiction. The significant negative associations from both sport education and sports enjoyment to social media addiction suggest that the engaging, structured, and socially rewarding aspects of formal sport pedagogy can actively replace compulsive digital behaviors. This insight adds important nuance to the understanding of how lifestyle interventions may address mental health risks in the digital era, advancing beyond a simplistic "sport is good" perspective to demonstrate that the protective effect of sport education partly operates by alleviating a prominent contemporary source of psychological distress.

Additionally, the analysis offers a novel examination of the distinct contributions of sport's structural and affective components. The stronger negative association of Sports Enjoyment with Social Media Addiction (β = -0.31) compared to that of Sport Education (β = -0.19) indicates that, while a well-designed curriculum is valuable, the intrinsic pleasure and satisfaction derived from participation are more effective in reducing the appeal of digital platforms. This suggests that the quality of the sporting experience, which promotes enjoyment, is ultimately more influential than its structured nature in fostering psychological resilience against addiction. Consequently, this finding redirects strategic emphasis from simply implementing sport programs to carefully designing them to enhance intrinsic motivation and affective engagement. It suggests that the most effective mental health interventions in educational contexts are those that transform physical activity from a routine requirement into a source of authentic enjoyment and social connection, thereby providing a competing reward that reduces the attraction of virtual validation.

Table 7: PLSpredict Results: Predictive Power Assessment.

Construct	Indicator	PLS-SEM RMSE	LM RMSE	PLS-SEM MAE	LM MAE	Qpredict 2	RMSE Diff (PLS-LM)	Performance
Social Media Addiction	SMA_VT1	0.712	0.735	0.568	0.589	0.321	-0.023	High
	SMA_VC2	0.698	0.724	0.552	0.581	0.335	-0.026	High
	SMA_VP3	0.721	0.741	0.574	0.596	0.315	-0.020	High
	SMA_VI1	0.705	0.718	0.561	0.572	0.328	-0.013	High
Psychological Distress	PSD1	0.685	0.723	0.538	0.578	0.352	-0.038	High
	PSD3	0.674	0.715	0.527	0.567	0.365	-0.041	High
	PSD5	0.691	0.728	0.543	0.583	0.341	-0.037	High
	PSD7	0.682	0.721	0.535	0.574	0.355	-0.039	High
Psychological Well-being	PWB_EM2	0.634	0.652	0.498	0.518	0.412	-0.018	High
	PWB_PL3	0.628	0.648	0.492	0.514	0.421	-0.020	High
	PWB_SA1	0.641	0.657	0.503	0.522	0.405	-0.016	High
	PWB_PR4	0.623	0.642	0.487	0.508	0.428	-0.019	High

Table 7 demonstrates the substantial out-of-sample predictive power of the proposed theoretical model. For all key endogenous constructs, the indicators yielded positive $Q^2_{predict}$ values ranging from 0.315 to 0.428, which indicates medium to high predictive relevance.

In accordance with the guidelines of Shan et al. (2025), the model's predictive performance was evaluated by comparing root mean square errors (RMSEs) from the partial least squares structural equation modeling (PLS-SEM) approach with those from a simple linear model (LM) benchmark. The results indicate high predictive power across all constructs, as the PLS-SEM yielded lower RMSE values for all indicators than the LM benchmark. The greatest predictive superiority was observed for psychological distress, with RMSE differences ranging from -0.037 to -0.041. These findings confirm that integrating sport education, enjoyment, and social media addiction into a single framework yields a significantly more accurate prediction of youth mental health states than standard linear approaches.

5. Discussion

This study examined the relationships among sport education (SE), digital behaviors, and mental health in the under-researched contexts of China and South

Asia. The findings move beyond the general link between physical activity and well-being, demonstrating that enjoyment derived from sport rather than the structural curriculum alone acts as a powerful buffer against digital addiction and adolescent psychological distress. The results confirm that sport education (SE) significantly reduces psychological distress and enhances well-being, aligning with research by Wang et al. (2024) on sport-induced social development and cognitive focus in Chinese higher education. Using the Sport Education Scale (Burgueño et al., 2022), this study further reveals that elements such as "Affiliation" and "Festivity" foster a sense of belonging that directly counters the social isolation and anxiety prevalent among post-pandemic Asian student populations (Hossain et al., 2021; Sifat et al., 2022; Singh et al., 2020). In this context, the appeal of SE functions as a protective factor against digital compulsions, a finding that extends prior observations on resilience-building through sports training in China (Morris et al., 2025). These findings suggest that the affective appeal of sport education may be more critical than its formal structure in mitigating problematic digital behaviors.

By prioritizing affiliation and festivity, educators can harness sport as a relational tool that competes directly with digital platforms for young adult's time and attention. This reframes SE not merely as a pedagogical model, but as a viable intervention for promoting mental health in digitally saturated environments.

One key finding is that Social Media Addiction acts as a mediator, partially reducing the benefits of sport education (H5: β= -0.078). This result aligns with the "digital dilemma" described by Samala et al. (2024) in which digital-native generations face unique psychological challenges stemming from excessive screen time.

In the high-pressure academic settings of China and South Asia, digital platforms like Douyin, WeChat, Facebook and WhatsApp are the main, but often unhelpful, ways students socialize (Chen et al., 2024; Gautam & Gautam, 2021). The current model shows that sport education is not separate from these influences. Instead, it has to compete for students' time and attention. This supports displacement theory, which says that real-world activities that help people recover are often replaced by sitting and using digital media (Hou et al., 2019; Sun & Zhang, 2021).

The results show that sports enjoyment (β = -0.310) is a much stronger deterrent to social media addiction than the structural curriculum (β = -0.190). This supports Self-Determination Theory (SDT) (Deci et al., 2017). When people's needs for autonomy, competence, and relatedness are met in sports, the enjoyment they feel helps them reach a flow state, making virtual validation less appealing (Duan et al., 2022; Lin, 2023). Recent studies by Wahyudi et al. (2025) and Shan et al. (2025) show that enjoyment acts as the "affective glue" linking physical activity to better relationships and less internet addiction. These results suggest that the quality of the sporting experience, not just taking part, is the main factor behind psychological resilience (Chen et al., 2021; Mahmood et al., 2026).

5.1. Theoretical and Practical Policy Implications

The results of this study have significant implications for both educational and public health governance. Promoting mental health in digitally saturated environments necessitates an integrated, system-wide approach. Educational ministries in China and South Asia are encouraged to shift from traditional, performance-focused physical

education toward the pedagogically distinct Sport Education model. The findings suggest that mere exposure to general physical activity is inadequate; rather, the structured features of Sport Education are the principal determinants of digital resilience. Policymakers should mandate teacher training programs that emphasize Self-Determination Theory (SDT), equipping educators to foster autonomy and relatedness within the Sport Education framework. This strategy ensures that participation is perceived as intrinsically rewarding rather than a compulsory academic requirement.

Public health campaigns should extend beyond general screen-time warnings. As Social Media Addiction is identified as a critical mediator that diminishes the mental health benefits of Sport Education, interventions must target the underlying psychological mechanisms. Institutional policies should incorporate digital literacy modules that elucidate the neurological effects of dopamine-driven feedback loops. These modules help students understand the relationship between their online behaviors and their offline well-being. The adoption of "active-digital detox" initiatives is recommended, whereby universities incentivize digital-free hours by granting access to premium social-sporting events, including culminating festivals (Kim et al., 2024). By cultivating a communal and celebratory environment, institutions can effectively substitute addictive digital behaviors with restorative engagement grounded in the Sport Education model.

6. Conclusion

This study finds that Sport Education is a key, though complex, driver of mental health in the digitally saturated environments of China and South Asia. Rather than serving as a passive remedy for modern stressors, it operates through a dynamic interaction of emotional and behavioral factors. The research shows that the psychological benefits of structured sport participation are primarily delivered through two mechanisms: increased intrinsic enjoyment of sports and reduced social media addiction. This supports a competing-mediators model in which physical and digital environments both shape adolescent well-being.

A key finding is that the subjective experience of enjoyment is a stronger predictor of reduced digital addiction ($\beta = -0.310$) than the curriculum's formal structure ($\beta = -0.190$). This highlights the importance of prioritizing joy as a measurable and essential element of psychological resilience in both theory and practice. These findings highlight the need to move beyond isolated approaches to health promotion. We recommend integrated strategies that build rewarding real-world experiences while developing critical digital literacy. Addressing both aspects of this dynamic will better prepare young people to succeed in an increasingly hybrid world.

6.1. Limitations and Future Work

The cross-sectional design of this study restricts the ability to draw causal inferences. Future research should employ longitudinal or experimental methodologies to clarify temporal relationships. Because this study relied on self-reported data, subsequent investigations should incorporate objective measures, such as accelerometer-based activity tracking and smartphone usage logs, to minimize recall bias. Additionally, while structural equation modeling was conducted following standard practices, the analytical approach assumes linear relationships among variables. Nonlinear patterns

or threshold effects may exist; for instance, moderate levels of physical education engagement may enhance sport enjoyment, whereas excessive amounts could induce fatigue and inadvertently increase susceptibility to digital addiction. Such complexities are not captured by the current model and warrant further examination using nonlinear analytical techniques.

Although the focus on urban China and South Asia provides valuable regional insights, these findings may not be generalizable to rural populations or other developing regions. Investigating moderators such as gender, socioeconomic status, and platform-specific effects, for instance, comparing Douyin to WhatsApp, could yield a more nuanced understanding of the competing-mediators model.

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