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Exploring the factors' effect on physical activity, academic self-efficacy, and depression among junior high school students in Shanghai

Exploración del efecto de los factores en la actividad física, la autoeficacia académica y la depresión entre los estudiantes de secundaria en Shanghái

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Abstract. This study examines the relationship between factors (social support, self-esteem, emotional intelligence [EI], mindfulness, school PA program engagement [SPPE]), physical activity (PA), academic self-efficacy (ASE), and depression in Shanghai junior high school students. A nationwide offline survey was conducted in Shanghai between August and December 2023 using a purposive sampling design. A total of 432 questionnaires were administered to six seventh- and eighth-grade classes from six schools in Shanghai; 416 responses were included in the final analysis. SPSS software version 29, the Correlation and Multiple Linear Regression techniques were employed to analyze the collected data. Social support, self-esteem, EI, mindfulness, SPPE, PA, ASE, and depression were found to be correlated. None of the common factors significantly predict PA, as the p-values were more than 0.05. Social support, self-esteem, EI, and SPPE had a positive significant influence on ASE except for mindfulness. Social support, self-esteem, and mindfulness had a negative significant influence on depression among Shanghai junior high school students. This study highlights the interconnectedness of social support, self-esteem, EI, mindfulness, and SPPE with ASE and depression among junior high school students in Shanghai. While none of the factors predicted PA levels, social support, self-esteem, EI, and mindfulness emerged as important contributors to ASE, while social support, self-esteem, and mindfulness emerged as important contributors to depression.
Keywords: factors, physical activity, academic self-efficacy, depression, junior high school students

Resumen. Este estudio examina la relación entre factores (apoyo social, autoestima, inteligencia emocional [IE], atención plena, participación en el programa de actividad física escolar [SPPE]), actividad física (AF), autoeficacia académica (AA), y depresión en estudiantes de secundaria en Shanghái. Se realizó una encuesta presencial a nivel nacional en Shanghái entre agosto y diciembre de 2023 utilizando un diseño de muestreo intencional. Se administraron un total de 432 cuestionarios a seis clases de séptimo y octavo grado de seis escuelas en Shanghái; 416 respuestas fueron incluidas en el análisis final. Se emplearon la versión 29 del software SPSS, las técnicas de correlación y regresión lineal múltiple para analizar los datos recopilados. Se encontró que el apoyo social, la autoestima, la IE, la atención plena, la SPPE, la AF, la AA, y la depresión estaban correlacionados. Ninguno de los factores comunes predijo significativamente la AF, ya que los valores p fueron superiores a 0,05. El apoyo social, la autoestima, la IE y la SPPE tuvieron una influencia positiva y significativa en la AA, excepto la atención plena. El apoyo social, la autoestima y la atención plena tuvieron una influencia negativa y significativa en la depresión entre los estudiantes de secundaria en Shanghái. Este estudio destaca la interconexión entre el apoyo social, la autoestima, la IE, la atención plena y la SPPE con la AA y la depresión entre los estudiantes de secundaria en Shanghái. Aunque ninguno de los factores predijo los niveles de AF, el apoyo social, la autoestima, la IE y la atención plena emergieron como contribuyentes importantes a la AA, mientras que el apoyo social, la autoestima y la atención plena emergieron como contribuyentes importantes a la depresión.
Palabras clave: factores, actividad física, autoeficacia académica, depresión, estudiantes de secundaria

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Introduction

The level of PA among Shanghai adolescents and middle school students is generally low. Some of the key findings from the search results are of the children and adolescents studied in Shanghai, only 18.4% met the guidelines for PA, 25.5% met the guidelines for sedentary behavior, and 5.7% met the guidelines for both (Chen et al., 2018). In Shanghai's 2016 Report Card on PA for Children and Youth, around 80% of the sampled children and adolescents aged 6–18 did not meet the PA guidelines (Xu & Gao, 2018). Evidence from large-scale cross-sectional and retrospective population studies reveals that less than a quarter (22%) of school students engage in any type of daily PA that lasts 60 minutes or more, with a general downward trend (Chen et al., 2020). In China, two national surveys estimated that the prevalence of having at least 60 minutes per day of moderate-to-vigorous physical activity (MVPA) ranged from 29.9% to 34.1% (Liu et al., 2023). The proportion of Chinese children and adolescents meeting the overall 24-Hour Movement Guidelines was 7.3%, with boys having a higher proportion than girls (Liu et al., 2023). Overall, the level of PA among Shanghai adolescents and middle school students is insufficient and far from ideal from the perspective of public health and disease prevention. Promoting an active and healthy lifestyle among Chinese school-aged children and adolescents remains a significant challenge in practice (Chen et al., 2020). Junior high school students still exhibit concerning psychological tendencies in their academic pursuits, daily lives, and sports engagements. These tendencies encompass weak willpower, deficient social interaction skills, introverted personalities, lack of vitality, as well as feelings of depression and anxiety (Carpenter et

al., 2013). The percentage of junior high school students in Jiading District, Shanghai, detected to have anxiety was 38.5% (Xiangchun, 2014), while in Songjiang District, Shanghai, the rate detected for junior high school students was 38.3% (Xiafang, 2013). In another study, Yaoyao (Yao Yao, 2021) conducted an anxiety and depression survey involving four junior high schools in the Fengxian District of Shanghai. The prevalence rates for anxiety and depressive symptoms were found to be 27.3% and 12.6%, respectively. Notably, as grade levels progressed, the prevalence of depressive symptoms among students exhibited a gradual increase (Yao Yao, 2021). Thus, the prevalence of depression among junior high school students in Shanghai, China, is a serious issue.

The current situation of Shanghai junior high school student's academic pressure is a significant concern (Dandan, 2023). The academic pressure on Chinese students, including those in Shanghai, has been on the rise. This pressure comes from multiple sources, including schools and parents (Dandan, 2023). The run-up to the high school entrance exams, or Zhong Kao, is particularly challenging, with around 50% of middle school students failing the exam. Academic pressure has been linked to various mental health issues, such as depression and anxiety, among Chinese students (Jiang, Ren, Jiang, & Wang, 2021). A study involving 1,527 Shanghai students found a positive correlation between emotional exhaustion in school, depression, and academic stress (Jiang et al., 2021; Zhao, Selman, & Haste, 2015). Academic stress is widespread among students aged 10–19 in Shanghai, as confirmed by a large longitudinal cohort study (Liu et al., 2022). This study also highlighted the need to restrict smartphone use time and total screen time to reduce academic stress and prevent related problems among adolescents (Liu et al., 2022).

At present, the improvement of PA, ASE, and depression among junior high school students is a key issue in education. Based on the literature review conducted in the current study, it is concluded that social support, self-esteem, EI, mindfulness, and school PA program engagement are common factors influencing PA, ASE, and depression among junior high school students. The model is proposed accordingly in Figure 1. Therefore, this study aims to identify the common factors that influence PA, ASE, and depression among Shanghai junior high school students and to determine which of them promote these aspects.

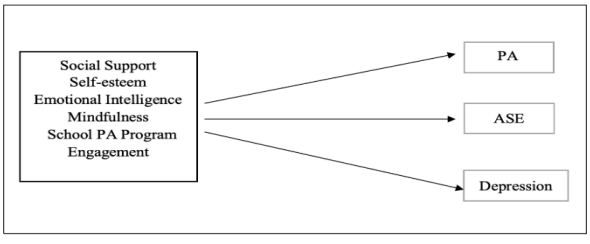

Figure 1. Factors influencing PA, ASE, and depression (ASE = academic self-efficacy)

Literature review

Relationship between Common Factors and Physical Activity

Children's perception of parental support for PA exerts a positive effect on their actual PA (Eskile & Küçükibiş, 2019; Lisboa et al., 2021; Wilk et al., 2018). However, female students are more positively affected by parent and peer social support than male students (Eskile & Küçükibiş, 2019). Compared with physical education (PE) teachers, parents exert greater influence on the PA engagement of adolescents regardless of sex, age, or physical condition (Olivares, Cossio-Bolaños, Gomez-Campos, Almonacid-Fierro, & Garcia-Rubio, 2015). Meanwhile, the significant relationships between MVPA and the physical environment differ considerably between countries and sexes. Consistent negative associations have also been reported between screen time and the social environment variable of having parental rules for spending time outside the home (Bucksch et al., 2019).

Self-esteem exerts a significant positive effect on sports participation; higher self-esteem leads to a tendency to engage in and be attached to sports, while lower self-esteem results in the denial and alienation of sports. These trends are consistent with the findings of You et al.(2017). Meanwhile, Birkimer et al. (1996) proved that self-esteem helps promote sports participation. Self-esteem also appears to be an appropriate target for interventions in health risk behaviors, especially alcohol abuse and PA (Arsandaux et al., 2020). A pilot study of a school-based mindfulness intervention found that mindfulness training, in addition to traditional health education, may improve dietary habits and PA among adolescents (Salmoirago-Blotcher et al., 2015).

Laborde et al. (2016) found that the EI trait is related to PA levels and positive attitudes toward PA. EI is also considered an influencing factor in sports performance (Kopp & Jekauc, 2018). In addition, EI is associated with positive feelings and inversely related to negative emotions. Positive emotions predict self-motivation and resilience in PE sessions, while resilience positively predicts self-motivation. Another study successfully demonstrated the importance of focusing on emotions in PE classes, as emotions boost the likelihood of obtaining excellent marks and maintaining active lifestyle habits. In this sense, concentrating on students' emotions in PE could be beneficial (Trigueros et al., 2019). Feng et al. (2017) suggested that a policy-driven, school-based, and multicomponent PA intervention in China may raise PA levels among Chinese children while preventing the onset of obesity. Exercise alone may not be as effective as combined therapies incorporating health education. Promoting social support, self-esteem, EI, mindfulness, and SPPE is crucial to improving PA among adolescents. Therefore, this study proposes the following hypothesis:

H1: Social support, self-esteem, EI, mindfulness, and SPPE will positively influence the PA of junior high school students in Shanghai.

Relationship between Common Factors and Academic Self-efficacy

Farooq and Asim (2020) revealed that parenting dimensions have been observed to impact students' attitudes toward self-regulated learning in home settings, possibly leading to the empowerment of their learning at school and improved academic scores. School–home relationships should be more structured to facilitate children's coaching in self-regulatory processes at home by satisfying their psychological needs to improve their learning development. Self-esteem increases students' perceived ASE (Di Giunta et al., 2013). Meanwhile, the parent-child relationship indirectly influences academic stress through self-esteem (Mulyadi, Rahardjo, & Basuki, 2016).

Mindfulness is positively associated with ASE after perceived failures (Hanley, Palejwala, Hanley, Canto, & Garland, 2015). Menges and Caltabiano (2019) examined the effects of a brief mindfulness intervention on ASE. Meanwhile, Hen and Goroshit (2014) suggested that EI is related to lower levels of self-regulated learning and ASE and is associated with higher levels of illness, stress, and anxiety. Secondary school students' ASE has been found to be improved by EI skills (Umaru & Umma, 2015) and correlated with subjective well-being (Wang et al., 2022). Based on available evidence, the authors conclude that PA positively influences cognition, brain structure, and function. However, more research is necessary to identify the mechanisms and long-term effects and how to translate laboratory findings to the school environment. According to a previous study, PA and PE have little effect on academic achievement (Donnelly et al., 2016). All articles

Cámara Martínez, Martínez López, Suarez-Manzano, Loureiro, & Ruiz Ariza (2023) showed that integrating physical activity into academic classes is beneficial in improving physical, cognitive, and academic performance, but these effects varied according to the type, duration, and intensity of physical activity employed. Hence, promoting social support, self-esteem, EI, mindfulness, and SPPE is crucial to improving ASE among adolescents. Therefore, this study proposes the following hypothesis:

H2: Social support, self-esteem, EI, mindfulness, and SPPE will positively influence the ASE of junior high school students in Shanghai.

Relationship between Common Factors and Depression

Low self-esteem is also a risk factor for depression in early adolescence (Zhou et al., 2020). Moreover, an association has been reported between lower self-esteem and increased anxiety, depression, and suicidal ideation (Bum & Jeon, 2016). Depression and anxiety are also known as major predictors of self-esteem (Moksnes& Reidunsdatter,2019). Higher family support predicts lower stress, and peer support predicts greater emotional well-being; however, mindfulness is a stronger predictor than social support (Kingery, Bodenlos, & Lathrop, 2020). Mindfulness is also associated with self-esteem, anxiety, and depression. It indirectly affects anxiety and depression through self-esteem (Bajaj, Robins, & Pande, 2016). Meanwhile, mindfulness practices have been consistently linked to a higher level of PA participation among students and improved health behaviors (Roychowdhury, 2021). Mindfulness can also improve students' mental health(Díaz-Silveira, Alcover, Burgos, Marcos, & Santed, 2020; Semple & Burke, 2018; Zollars, Poirier, & Pailden, 2019), academic emotions (Senker et al., 2021), and academic performance (Senker et al., 2021; Vorontsova-Wenger, Ghisletta, Ababkov, & Barisnikov, 2021) through integrated practice (Shankland, Tessier, Strub, Gauchet, & Baeyens, 2021).

Cejudo et al. (Cejudo, Rodrigo-Ruiz, López-Delgado, & Losada, 2018) confirmed the positive relationship between trait EI and subjective well-being and a negative association between EI and stress and between EI and social anxiety. Based on multinomial logistic regression and receiver operating characteristic (ROC) curve analysis, Guerra-Bustamante et al. (2019) suggested that happiness increases with the capacity to understand and regulate EI. Poor EI has also been found to lead to increased depression. People with a history of clinical depression show less activity in the left frontal lobe and more activity in the right lobe than those who have never experienced depression (Goldman, Kraemer, & Salovey, 1996). Resaland et al. (2016) suggested that combining physical exercise and academics appears to be a promising approach for stimulating learning in schoolchildren who are struggling academically. PA interventions were effective in changing behavior and improving personality traits of children in both urban and rural areas (Chaeroni et al., 2024). Future research should consider the intervention period when selecting academic-related outcome measures and use an objective measure of PA to determine intervention fidelity and its impact on overall PA levels (Watson, Timperio, Brown, Best, & Hesketh, 2017). Hence, promoting social support, self-esteem, EI, mindfulness, and SPPE is crucial to decreasing depression among adolescents. Therefore, this study proposes the following hypothesis:

H3: Social support, self-esteem, EI, mindfulness, and SPPE will negatively influence depression of junior high school students in Shanghai.

Measures

PA

In this study, PA referred to all physical and sports activities that junior high school students might be involved in as one of the healthy lifestyles to adopt, whether on or off campus. Participants' PA was assessed by frequency in a typical week (ranging from 0 to 8) in which they engaged in light physical activity (LPA), moderate physical activity (MPA), and vigorous physical activity (VPA) during leisure time for at least 15 min. Based on the scoring guidelines (Godin, 2011), the three intensity levels of PA were based

on the corresponding metabolic equivalents of Task (MET) values (3 MET, MPA = 5 MET, and VPA = 9 MET). The PA intensity level was calculated as follows: LPA = frequency × 3 metabolic equivalents (MET), MPA = frequency × 5 MET, and VPA = frequency ×9 MET. The calculated total scores for PA = LPA (range, 0–24) + MPA (range, 0–40) + VPA (range, 0–72) were used for data analysis.

Social Support

In this study, social support referred to junior high school students obtaining support from family, friends, and significant others. The Multidimensional Scale of Perceived Social Support (MSPSS) (Zimet & Dahlem, 1988) was applied to assess the social support symptoms among participants. In view of the situation and particularity of junior high school students, this research modified some questions and deleted some questions with low outer loading through a pilot study. Participants responded to items regarding how often they obtain support from family, friends, and significant others. such as "My family really tries to help me, I get the emotional help and support I need from my family, my friends really try to help me…" A 4-point Likert scale was used for each statement that ranged from 0 (not at all) to 3 (all of the time), and the average score of the six items was calculated for data analysis.

Emotional Intelligence

In this study, EI includes self-emotion appraisals, others' emotion appraisals, regulation of emotion, and use of emotion. The Wong and Law Emotional Intelligence Scale (Wong & Law, 2002) was applied to assess the EI symptoms among participants. In view of the situation and particularity of junior high school students, this research modified some questions and deleted some questions with low outer loading through a pilot study. Participants responded to items regarding perceiving, understanding, managing, and utilizing emotions in daily life, such as "I have a good sense of why I have certain feelings most of the time, I have a good understanding of my own emotions…" The 4-point Likert scale used for each statement ranged from 0 (not at all) to 3 (all of the time), and the average score of these eight items was calculated for data analysis.

Mindfulness

In this study, mindfulness is a mental state in which students focus their awareness on daily life. The Mindfulness Attention Awareness (MAAS) (Brown & Ryan, 2003) was applied to assess the mindfulness symptoms among participants. In view of the situation and particularity of junior high school students, this research modified some questions and deleted some questions with low outer loading through a pilot study. Participants responded to items regarding their mindfulness state in daily life, such as "I find it difficult to consistently focus on what I'm doing on what happened, I wasn't quite aware of what I was doing…" The 4-point Likert scale used for each statement ranged from 0 (not at all) to 3 (all of the time), and the average score of the six items was calculated for data analysis.

School PA Program Engagement

In this study, School PA program engagement referred to students participating in and applying themselves to learning and other activities in their PA programs at school. The School PA Program Engagement Scale (Sayyd, 2021) was applied to assess these symptoms among participants. Participants responded to items regarding their learning and other activities at school, such as "The school allowed me to participate in my favorite sports activities. The scheduled times for sports programs are consistent with my studies…" The 4-point Likert scale used for each statement ranged from 0 (not at all) to 3 (all of the time), and the average score of the six items was calculated for data analysis.

Academic Self-efficacy

The 4-item questionnaires were adapted to assess participants' ASE academic (Midgley et al., 2000), and some amendments were made regarding the class situation of junior high school students in Shanghai. Participants responded to items regarding how often they get good performance/fail in class and school; they were asked to rate five items using a 4-point Likert-type scale ranging from 0 (none of the time) to 3 (all of the time). Such as "I am confident in my ability to learn, I can focus on studying subjects, I can master the knowledge points taught by the teacher…" The average score of these five items was calculated for data analysis.

Self-esteem

In this study, self-esteem was typically understood as an individual's overall subjective evaluation of their own worth or value. The Rosenberg Self-Esteem Scale (Rosenberg, 1979) was applied to assess the self-esteem symptoms among participants. In view of the situation and particularity of junior high school, this research modified some questions and deleted some questions with low outer loading through a pilot study. Participants responded to items regarding how often they understood overall subjective evaluation of their worth or value, such as "I feel like I am a valuable person, at least equal to others. I think I have many advantages…" The four-point Likert scale that was used for each statement ranged from 0 (not at all) to 3 (all of the time). The average score from these six items was calculated for data analysis.

Depression

The depression anxiety stress scale (DASS)-depression subscale (Lovibond & Lovibond, 1995) was applied to assess depressive symptoms among participants. In view of the situation and particularity of junior high school students in Shanghai, this research modified some questions. Participants responded to items regarding how often they have felt or behaved during the past week, such as "I feel

like life is meaningless, I feel like I have nothing to look forward to, I can't seem to experience any positive feelings…" The 4-point Likert scale was used to rate each statement ranging from 0 (not at all) to 3 (all of the time). The average score from these 7 items was calculated for data analysis.

Participants

This study was restricted to junior high school students in Shanghai during the first semester of 2023–2024. Participants were selected using the purposive sampling method. Three junior high schools in urban and suburban districts of Shanghai were chosen. These are Jingan, Hongkou, and Xuhui in the urban district and Minghang, Qingpu and Jinshan in the suburban district. This research selected one junior high school from each district. One sixth-grade and one seventh-grade class were chosen to test the projects on PA, social support, EI, mindfulness, self-esteem, School PA program engagement, ASE, and depression. Before distributing the questionnaire, the students and their parents agreed and signed the informed consent form. All students completed the questionnaires, and the researcher ensured they were not confused with PA and physical education class exercises. A total of 432 responses were received, and 416 questionnaires were effective. The participants consisted of 216 male and 200 female students.

Data Analysis Technique

This study used SPSS software, version 29, to perform the correlation and multiple linear regression. The primary objective of this study is to explore the correlation between PA, social support, EI, mindfulness, self-esteem, School PA program engagement, ASE, and depression. The final objective is to investigate the impact of common factors (social support, EI, mindfulness, self-esteem, SPPE) on PA, ASE, and depression among Shanghai junior high school students.

Results

Table 1 explains the demographic characteristics of respondents consisting of gender and age. It shows the details of the demographic variables analysis result. Frequency and percentage were used to analyse the respondents' profiles. As shown in Table 1, the samples encompassed 216 male (51.9%) and 200 female (48.1%) students. About 57 students (13.7%) students aged 12, 169 students (40.6%) aged 13, 177 students (42.5%) aged 14, and 13 students aged 15.

As shown in Table 2, a higher level of PA was associated with a higher level of social support ($r = 0.155$, $p < 0.01$), self-esteem ($r = 0.201$, $p < 0.01$), EI ($r = 0.205$, $p < 0.01$), mindfulness ($r = 0.158$, $p < 0.01$), SPPE ($r = 0.163$, $p < 0.01$), ASE ($r = 0.267$, $p < 0.01$), and lower level of depression ($r = -0.150$, $p < 0.01$). In this research, ASE was positively correlated with social support ($r = 0.523$, $p < 0.01$), self-esteem ($r = 0.647$, $p < 0.01$), EI ($r = 0.674$, $p < 0.01$), mindfulness ($r = 0.453$, $p < 0.01$), SPPE ($r = 0.432$, $p < 0.01$), and negatively correlated with depression ($r = -0.449$, $p < 0.01$). Depression was negatively correlated with social support ($r = -0.441$, $p < 0.01$), self-esteem ($r = -0.610$, $p < 0.01$), EI ($r = -0.454$, $p < 0.01$)), mindfulness ($r = -0.503$, $p < 0.01$), SPPE ($r = -0.303$, $p < 0.01$). In this research, common factors, PA, ASE, and depression were highly interrelated, indicating that improvements in one area often correlate with improvements in other areas.

Table 1.
Demographic characteristics of the respondents among Shanghai junior high school

Demographic	Category	Frequency	Percentage (%)
Gender	Male	216	51.9
	Female	200	48.1
Age	12	57	13.7
	13	169	40.6
	14	177	42.5
	15	13	3.1

Table 2.
Correlation Analysis of Social Support, Self-esteem, EI, Mindfulness, SPPE, PA, ASE, and Depression Among Shanghai Junior High School Students

variables	1	2	3	4	5	6	7	8
SS	1							
SE	.551**	1						
EI	.534**	.633**	1					
MD	.382**	.519**	.493**	1				
SPPE	.404**	.406**	.407**	.240**	1			
PA	.155**	.201**	.205**	.158**	.163**	1		
ASE	.523**	.647**	.674**	.453**	.432**	.267**	1	
DP	-.441**	-.610**	-.454**	-.503**	-.303**	-.150**	-.449**	1
Mean	2.0	1.9	1.9	2.2	2.1	69.0	1.8	0.6
SD	0.7	0.7	0.6	0.5	0.8	27.5	0.7	0.6

Notes: * $p < 0.05$; ** $p < 0.01$, SS = social support, SE = self-esteem, EI = emotional intelligence, MD = mindfulness, PP = school PA program engagement, PA = physical activity, ASE = academic self-efficacy, DP = depression

As shown in Table 3, the regression analysis of PA, ASE, and depression as the dependent variables, social support, self-esteem, EI, mindfulness, and SPPE as the independent variables, and the regression equation VIF values were between 1–3, indicating no multicollinearity between the model variables. The Durbin-Watson coefficients of the three models ranged from 1.5 to 2.5, which was close to 2, indicating no autocorrelation in the models. Model 1 indicated that none of the common factors significantly predict PA, as the p-values were all more than 0.05. Model 2 indicated that social support ($\beta = 0.105$, $p<0.05$), self-esteem ($\beta = 0.281$, $p<0.001$), EI ($\beta = 0.365$, $p<0.001$), and SPPE ($\beta = 0.112$, $p<0.05$) were significant positive predictors for ASE, except for mindfulness. Model 3 indicated that social support ($\beta = -0.108$, $p<0.05$), self-esteem ($\beta = -0.409$, $p<0.001$), and mindfulness ($\beta = -0.239$, $p<0.001$) were significant negative predictors for depression, except for EI and SPPE. In the PA, ASE, and depression as the dependent variables of the models, social support, self-esteem, EI, mindfulness, and SPPE explain only 4.6% of the variance in the PA, indicating that none of

the factors can predict PA. Whereas social support, self-esteem, EI, mindfulness, and SPPE explain 55.3% of the variance in ASE. This analysis outcome highlighted the importance of social support, self-esteem, EI, and SPPE in improving ASE among Shanghai junior high school students. Social support, self-esteem, EI and SPPE explain 42.3% of the variance in the dependent variable depression, highlighting the importance of social support, self-esteem, and mindfulness in decreasing depression among Shanghai junior high school students. However, EI and SPPE appeared less impactful.

Table 3.
Regression Analysis of Social Support, Self-esteem, EI, Mindfulness, SPPE on PA, ASE, and Depression Among Shanghai Junior High School Students

DVS	IVS	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	R^2	Adj.R^2	VIF
		B	SE	β					
1. PA	Constant	43.004	6.337		6.786	<.001	0.057	0.046	
	SS	0.499	2.513	0.012	0.199	0.843			1.631
	SE	3.276	2.852	0.079	1.149	0.251			2.062
	EI	4.152	2.948	0.095	1.408	0.16			1.961
	MD	2.488	3.039	0.048	0.819	0.414			1.467
	SPPE	2.668	1.923	0.076	1.387	0.166			1.3
2. ASE	Constant	-0.068	0.107		-0.637	0.524	0.558	0.553	
	SS	0.106	0.042	0.105	2.501	0.013			1.631
	SE	0.286	0.048	0.281	5.973	<.001			2.062
	EI	0.394	0.05	0.365	7.941	<.001			1.961
	MD	0.077	0.051	0.06	1.507	0.133			1.467
	SPPE	0.097	0.032	0.112	2.996	0.003			1.3
3. DP	Constant	2.163	0.107		20.277	<.001	0.43	0.423	
	SS	-0.096	0.042	-0.108	-2.267	0.024			1.631
	SE	-0.366	0.048	-0.409	-7.628	<.001			2.062
	EI	-0.005	0.05	-0.006	-0.109	0.913			1.961
	MD	-0.27	0.051	-0.239	-5.28	<.001			1.467
	SPPE	-0.026	0.032	-0.034	-0.808	0.419			1.3

Notes: DVS = Dependent variables, IVS = Independent variables, B = unstandardized coefficient, β = standardized coefficient, SS = social support, SE = self-esteem, EI = emotional intelligence, MD = mindfulness, PP = school PA program engagement, PA = physical activity, ASE = academic self-efficacy, DP = depression

Discussion

The correlation analysis reveals that higher levels of PA are associated with higher levels of social support, self-esteem, EI, mindfulness, SPPE, and ASE, and lower levels of depression. This result aligned with previous research suggesting that PA can be positively correlated with psychological and academic outcomes (Andermo et al., 2020; Anderson & Shivakumar, 2013; Basso & Suzuki, 2017; Mandolesi et al., 2018; Wang & Peiper, 2022). However, the regression analysis shows that none of the common factors significantly predicted PA levels. Nevertheless, other research findings differ from this research; for instance, Sanz-Martín et al. (2022) explained the relationship between MVPA, peer support, family support, and screen time. Peer support plays a particular role in PA time, while family support plays a specific role in screen time. Ouyang et al. (2020) suggested that self-esteem, self-efficacy, and body image significantly influence participation in sports among college students. Another study investigated the feasibility and acceptability of integrating mindfulness training into school health education to promote healthy behaviors among adolescents; it is reported that mindfulness training improves exercise and food habits (Salmoirago-Blotcher et al., 2018). Acebes-Sánchez et al. (2019) found a significant association between EI dimensions and PA levels. However, in this research, these factors did not affect PA, which may suggest that other unexamined variables might play a more critical role in determining PA levels among these students.

Conversely, social support, self-esteem, EI, and SPPE are significant positive predictors of ASE. The result is in line with a previous study by Farooq and Asim (2020), which revealed four key parenting dimensions: autonomy support, structure facilitation, academic assistance, and relatedness. All of which exert a considerable effect on academic achievement and self-regulated learning. Parent-child relationships, self-esteem, and ASE are good predictors of academic stress in homeschooling students (Mulyadi et al., 2016). Hen and Goroshit (2014) suggested that EI is the ability to assess, manage, and use emotions, which has been linked to ASE and several positive outcomes, including academic achievement. Resaland et al. (2016) conducted a cluster randomized controlled trial on 10-year-old children and recognized the inadequate evidence to conclude that increased PA in schools enhances academic achievement in all children.

Meanwhile, social support, self-esteem, and mindfulness are significant negative predictors of depression. The result is in line with Bum and Jeon (2016), who indicated that social support from parents, professors, and peers is also a significant antecedent variable. Social support from parents and professors was associated with lower depression, and strong self-esteem was associated with greater happiness and lower depression. Likewise, Chang et al. (2018) concluded that parental and peer support are directly and indirectly related to depression levels. In particular, the indirect effects of social support on depression are mediated by self-esteem. Wilson et al. (2020) suggested social support is significantly associated with greater mindfulness and positive psychological well-being outcomes, with mindfulness improving psychological well-being and predicting social support. Similar findings of this research underscored the importance of a supportive and emotionally intelligent school environment in fostering academic confidence and reducing depressive symptoms.

In this research, EI did not significantly impact depression levels among junior high school students, the possibility is that the effectiveness of EI in influencing mental health may depend on contextual factors, such as the availability of supportive relationships or coping mechanisms. If students lack adequate social support or are unable to apply their emotional skills in real-life situations, the protective effects of EI may be diminished. Additionally, the developmental stage of junior high school students may

lead to fluctuating emotional states, making it difficult for EI to exert a consistent influence on depression. Lastly, the relationship between EI and depression might be more complex, potentially involving mediating factors like self-esteem or social support. Future research should explore these dynamics further to understand the nuanced role of EI in adolescent mental health more comprehensively.

This study also did not find significant predictions of PA on ASE or depression, While PA is often linked to improved mental health and academic performance in the literature, the psychological benefits may not be as immediate or direct in this population. For example, the potential positive effects of PA on ASE and depression may be mediated by other factors, such as self-esteem, social support, or school engagement. These mediators may overshadow the direct impact of PA, explaining why PA did not emerge as a significant predictor in this study. The other reason is that short-term or irregular participation in PA may not be sufficient to produce measurable effects on ASE and depression. While this study did not find significant predictions of PA on ASE or depression, further exploration into measurement methods, cultural context, and the mediating effects of other factors could provide deeper insights.

Limitations and Directions for Further Research

A cross-sectional research design was used in this research and data were collected from different individuals at a single time. This design is able to examine the relationships between variables at a specific moment. Common factors (social support, self-esteem, EI, mindfulness, SPPE) are a complex system that influences students' PA, ASE, and depression. Quantitative research may struggle to fully capture students' overall social support, self-esteem, EI, ASE and mindfulness levels. Scholars need to acknowledge this complexity and strive to incorporate these factors into their study design. Owing to the cross-sectional nature of this study, it may be challenging to determine the long-term social support, self-esteem, EI, mindfulness, and SPPE on students' PA, ASE, and depression. Longitudinal tracking studies may be more effective in revealing these relationships. Considering these limitations, subsequent research efforts could enhance the credibility and effectiveness of this study by employing various research methods and incorporating qualitative research, among other approaches.

Conclusion

While the study's cross-sectional design and reliance on self-reported data presented limitations, the findings provide valuable insights for educators, policymakers, and mental health professionals. Schools should focus on enhancing social support, self-esteem, EI, and SPPE to boost students' ASE and reduce depression. Interventions aimed at improving these factors could lead to better academic and psychological outcomes. For instance, Schools can enhance students' social support systems by establishing peer mentorship programs, encouraging supportive relationships between teachers and students, and providing designated spaces and time for counseling services. By implementing classroom activities that promote self-confidence and self-awareness, offering leadership roles, and recognizing achievements, schools can foster students' self-esteem and a growth mindset. Additionally, schools can introduce EI education to help students identify, understand, and manage their emotions, improving interpersonal skills through role-playing, emotional regulation, and mindfulness exercises. By incorporating mindfulness practices and extracurricular activities, schools can help students manage stress and improve mental well-being.

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