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Does Physical Activity Mediate the Associations between Physical Literacy and Mental Health during the COVID-19 Post-Quarantine Era among Adolescents in Cyprus?

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Abstract: Despite its importance, physical literacy has received scant scholarly attention, notwithstanding the obvious link between physical activity and health promotion (including but not limited to mental health). The purpose of this study was threefold: first, to explore the self-perceived physical literacy, the self-reported physical activity, and the mental health status of adolescents who study in secondary education schools in Cyprus and the potential association of those variables; second, to explore any potential statistically significant gender differences across the variables under examination; and third, to explore whether there is a mediating role of physical activity in the relationship between adolescent Cypriots' physical literacy and their mental health in the post-quarantine period. A total of 285 students, aged 13–18, from regular middle and high schools in Cyprus participated in this study. Physical literacy was measured using the Perceived Physical Literacy Instrument (PPLI). The Depression, Anxiety, and Stress Scale-21 (DASS-21) was utilized to measure mental health status. Physical activity was measured using the Physical Activity Questionnaire for Adolescents (PAQ-A). Independent sample *t*-tests were computed to analyze gender differences. The Pearson correlation test was used to compute bidirectional associations between research variables. Structural equation modeling was used to assess structural associations between research variables. The findings revealed statistically significant differences among boys and girls on depression ($p = 0.0032$), anxiety ($p = 0.008$), and stress levels ($p = 0.003$). Statistically significant and negative correlations had been found among PL and depression, anxiety, and stress levels (all $p < 0.001$), while PL was significantly and positively associated with physical activity ($p < 0.001$). Despite having only indirect effects on mental health (b = 0.51, T = −10.11, $p < 0.001$), physical literacy was found to have substantial direct effects on physical activity levels (b = 0.46, T = 8.66, $p < 0.001$). In addition, physical activity has significant indirect effects on mental health (b = 0.19, T = 5.48, $p < 0.001$). In summary, physical activity has significantly mediated the associations between physical literacy and mental health. Given these findings, it is important to put strategies in place to build up physical literacy and increase physical activity among Cypriot adolescents.

Keywords: adolescents; physical literacy (PL); physical activity; mental health; Cyprus

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1. Introduction

In response to calls to address the persistent problem of physical inactivity across the world, an increasing number of research articles have focused on the concept of physical literacy (PL). Scholarly literature has produced multiple PL definitions and frameworks. Not only do these definitions emphasize the variety of approaches, but they also present many cultural differences (for instance, the Australian framework emphasizes the social element, while in New Zealand, the focus is on the spiritual aspect) [1]. According to the International Physical Literacy Association (IPLA), PL can be described as the motivation, confidence, physical competence, knowledge, and understanding to value and take responsibility for engagement in physical activities for life' [2]. That said, PL can be perceived as the foundation for emotional, physical, and cognitive engagement in physical activity for healthy living and enhancing opportunities for physical recreation [3]. A person demonstrating PL has the motivation and enthusiasm to engage in a diverse range of physical activities, with the act of doing so leading to the natural development of physical and movement skills, and motor competence. It is essential to note here that increasing one's physical well-being increases one's self-confidence and motivation to continue participating in physical activity. Additionally, when people are aware of sport and physical activity's health components, they are more likely to be proactive and seek information about how and where they can get involved [4,5]. This is especially important now in the post-pandemic era due to growing concerns that sedentary lifestyles have contributed to a mental and physical health epidemic in the 21st century. PL can, however, help address this situation as it emphasizes the significance of remaining physically active throughout one's life and helps provide the tools to enable this to happen [6].

PL has numerous positive benefits in regard to both physical and mental health and well-being. Previous research has shown that individuals with high levels of PL exhibit traits such as calmness under pressure, being in tune with their bodies, having positive interactions with the world, and a boosted sense of self-worth and confidence [5–8]. In addition, persons who follow the PL journey can better identify the conditions that influence the efficacy of their motor performance and comprehend the principles of physical health in terms of physical activity, sleep, and nutrition [9]. On the other hand, those who have not yet embraced a PL journey tend to participate less in physical activity and are at higher risk for developing health problems and disease [6,10–12]. The prevalence of inactivity among children in particular further demonstrates the need to improve the behavioral component of PL [13,14]. As noted above, promoting PL is important, as higher levels of physical activity have been linked to various health benefits, such as improved cardiovascular health, bone health, and mental health [15]. It is therefore essential to promote PL among individuals of all ages and encourage everyone to engage in regular physical activity. Adopting a PL outlook will increase levels of physical activity and therefore directly impact one's health.

Nowadays, modern living, especially in urban areas, has led to an increased preference for sedentary lifestyles and decreased mobility, contributing to many of the health problems that plague many societies [16]. Negative impacts on physical activity and health also include individuals' lack of leisure time, their increased screen time due to social media expansion and the development of mobile apps, and a reduction in people's confidence to engage in daily physical and sporting activities, especially among children and young adults [17–19]. The importance of physical activities among this group should not be ignored, as engaging in physical activity has been shown to be very important for children's and young adults' short- and long-term health [20–30]. Physical activity not only has health benefits but also helps prepare adolescents for the challenges and constraints of adulthood and the workplace. Studies that have taken a cross-sectional approach have found associations between children's levels of PL and a variety of other factors, including levels of physical activity, sedentary behavior, cardiorespiratory fitness, screen time, levels of resilience, active school transport, and weight status [4–10]. In addition, research has demonstrated a connection between PL and various measures of children's overall

health [6,8]. These findings, taken together, suggest that PL has important health promotion benefits warranting further study.

Interestingly, the potential of PL for physical activity and health promotion (especially mental health) has gained little attention in the literature. According to the World Health Organization (WHO, Geneva, Switzerland), the term 'mental health' refers to a state of well-being and recovery in which a person is able to realize their potential, deal with the typical pressures and challenges of everyday life, participate in work and activities in a productive manner, and play an important part in the functioning of society [31]. It must be noted that the construct of well-being is complex, and measuring it accurately poses certain difficulties [32]. To be mentally healthy, one must accept and love oneself, as well as develop into a person who is physically fit, intellectually sound, emotionally stable, socially adaptive, politically conscious, professionally successful, and culturally sensitive [33]. Emotional health, psychological health, and social health are the three facets of mental health identified by Keyes [33]. It has been reported, though, that more than 150 million people in the world suffer from neurological, psychological, and social disorders [34]. Mental health is one of the key components of public health. If one's mental health is strong, it will positively affect other aspects of physical and general health. If mental health is compromised, however, other aspects of general health will also suffer [31,34,35]. Promoting positive mental health for adolescents is of paramount importance, as this is a critical developmental stage when young people can face multiple challenges that can significantly impact their mental wellbeing. Adolescence is characterized by various physical, social, and emotional changes that can lead to heightened stress and anxiety, making this a vulnerable time for the onset of mental health problems [36]. Thus, promoting good mental health practices can have significant long-term benefits for adolescents' overall wellbeing and may help prevent the onset of mental health disorders later in life [37]. PL can serve as a foundation for engaging in healthy physical activity, which has numerous benefits for mental health, including reducing symptoms of depression and anxiety, increasing feelings of happiness and positivity, and building resilience and self-esteem.

To our knowledge, studies examining the associations between PL and aspects of youth's mental health are scarce. Melby et al. [3] recently published a study in which they investigated the link between Danish children's PL (aged 7–13 years old) and their physical and psychosocial well-being, as well as whether any associations were mediated by moderate- to vigorous-intensity physical activity (MVPA). They found that PL appeared to have a moderately positive effect on physical health, with this effect being mediated in part by MVPA. Despite this study, there is still a dearth of research on how PL may be connected to mental health (i.e., conditions such as anxiety, stress, and depression), particularly in the populations of adolescents. In addition, more evidence is needed to increase our understanding of the relationships that exist between PL, physical activity, and overall health. This study therefore aims to fill this gap by: (a) first, exploring the self-perceived PL, the self-reported physical activity, and the mental health status of adolescents who study in secondary education schools in Cyprus and the potential association of those variables; (b) second, exploring any potential statistically significant gender differences across the variables under examination; and (c) investigating to what extent the associations are mediated by level of physical activity. We hypothesized that adolescents' PL would be associated with mental health and that the relationship between PL and mental health would be mediated by physical activity.

2. Materials and Methods

2.1. Study Design

This study employed a cross-sectional design, which allowed for the examination of the associations between PL, physical activity, and mental health at a specific point in time. Data were extracted from the students of regular middle- and high schools in Cyprus in 2022. The questionnaire was administered online, with the second author present during the process. The average time taken by participants to complete the online questionnaire

was approximately 20 min. The administration of the questionnaire was conducted in the presence of both the second author and the students' teacher. The study was conducted in accordance with the Declaration of Helsinki and approved by the Cyprus National Bioethics Committee. Both parents and their children were apprised of all study procedures, and parents provided informed consent in writing.

2.2. Participants

A total of 285 students, aged 13–18, from regular middle and high schools in Cyprus participated in this study, out of which 148 (51.9%) were females and 128 (44.9%) males, while 9 (3.2%) students either preferred not to say or did not specify their gender (Table 1). Participants were selected using a convenience sampling method. Namely, students participating in this study were recruited from eleven private and English-speaking schools in Cyprus.

Table 1. Demographic characteristics of the participants.

Gender		**Age**	
Female	148 (51.9%)	13–15 years old	222 (77.9%)
Male	128 (44.9%)	16–18 years old	63 (22.1%)
Prefer not to say	5 (1.8%)		
Other	4 (1.4%)		

2.3. Measures

2.3.1. Physical Literacy

The 'Perceived Physical Literacy Instrument' (PPLI) was utilized to assess PL [38]. The PPLI comprises nine five-point Likert scale items (1 = strongly disagrees and 5 = strongly agrees). The nine items of the PPLI are equally distributed across three subscales: 'knowledge and comprehension' (three items), 'self-expression and communication with others' (three items), and 'sense of self and self-confidence' (three items). Moreover, for each one of the three sub-scales, mean and SD values were calculated, as well as the total mean and SD scores across all nine items. Previous studies have shown satisfactory composite reliability for the three factors of this scale (ranging from 0.70 to 0.78) [39]. Cronbach's alpha indices for the three factors of this scale were calculated from 0.78 to 0.86, indicating satisfactory internal consistency of the items.

2.3.2. Mental Health

In this study, the Depression, Anxiety, and Stress Scale-21 (DASS-21) was used to assess adolescents' mental health. DASS-21 is a widely used self-report measure that was utilized in this study to assess individuals' mental health. The scale is specifically designed to evaluate the three emotional states of depression, anxiety, and stress, which are commonly associated with mental health problems [40]. This 21-item scale consists of three subscales (Depression, Anxiety, and Stress) with seven items each. The Depression subscale assesses feelings of hopelessness, sadness, and loss of interest in activities that were previously enjoyable. The Anxiety subscale evaluates symptoms of fear, nervousness, and panic, while the Stress subscale measures the perception of stress and tension experienced in the previous week. Respondents use a four-point Likert scale to indicate the degree to which each item applied to them during the previous week. Respondents rate each item on a four-point Likert scale ranging from 0 (did not apply to me at all) to 3 (applied to me very much or most of the time). The scores for each subscale are calculated by adding up the scores for each of the seven items, with higher scores indicating greater symptom severity. Namely, and as suggested by the authors [40], the survey items were first categorized into three scales: D for Depression, A for Anxiety, and S for Stress. To calculate the scores for each scale (D, A, and S), the scores of the identified items within each scale were summed. Since the DASS-21 is a shorter version of the DASS (which has 42 items), the final score for

each scale (Depression, Anxiety, and Stress) was multiplied by two. The DASS-21 has been shown to have good reliability ($\alpha = 0.74$) and validity in measuring depressive, anxious, and stressful symptoms in various populations, including adolescents [41]. It is therefore a useful tool for assessing mental health and identifying individuals who may require further evaluation and treatment. In this study, Cronbach's alpha was calculated at 0.95, indicating excellent internal consistency of the items.

2.3.3. Physical Activity

Adolescents' levels of physical activity were assessed using the self-administered questionnaire, Physical Activity Questionnaire for Adolescents (PAQ-A) [42]. The PAQ-A is designed to evaluate the general levels of physical activity among adolescents during the middle and high school years. The PAQ-A questionnaire requires participants to recall their physical activities over the course of the previous seven days. The questionnaire is straightforward and can be easily administered in a classroom setting, making it an efficient tool for assessing physical activity levels among adolescents. It comprises eight items that are scored on a five-point scale, with a summary score representing the overall level of physical activity. The calculation of the final score for participants' responses to the PAQ-A items was based on the instructions provided by Kowalski et al. [42]. Studies have demonstrated the good reliability ($\alpha = 0.89$) and validity of the PAQ-A questionnaire, indicating its usefulness in measuring physical activity levels in adolescents [42]. By using the PAQ-A questionnaire, this study aimed to evaluate the physical activity levels of adolescents and assess whether there is a relationship between physical activity and mental health outcomes. In this study, Cronbach's alpha was calculated at 0.91, indicating excellent internal consistency of the items.

2.4. Data Analysis

The statistical analysis of the data collected in this study was conducted using IBM SPSS 29.0 software [43]. Descriptive statistics were used to summarize the data, with means and standard deviations calculated to provide an overview of the variables under study. For proceeding with the comparison tests, first the normality of the data distribution was tested by examining the skewness and kurtosis of dependent variables. The results showed that skewness ranged between −1.037 and 1.129, while the values of kurtosis ranged between −0.602 and 0.828, indicating that the data distributions were close to expected values under normality. To examine potential gender differences, an independent sample *t*-test was conducted to compare the means of the PAQ-A, PPLI, and DASS-21 scores for males and females. Bidirectional associations between the variables were analyzed using the Pearson r correlation test, which is a measure of the strength and direction of the relationship between two variables. To assess the structural associations between the variables, structural equation modeling (SEM) was employed. SEM is a statistical technique used to evaluate complex relationships among multiple variables and test theoretical models. The level of statistical significance was set at $p < 0.05$. The proposed theoretical model for this study is presented in Figure 1.

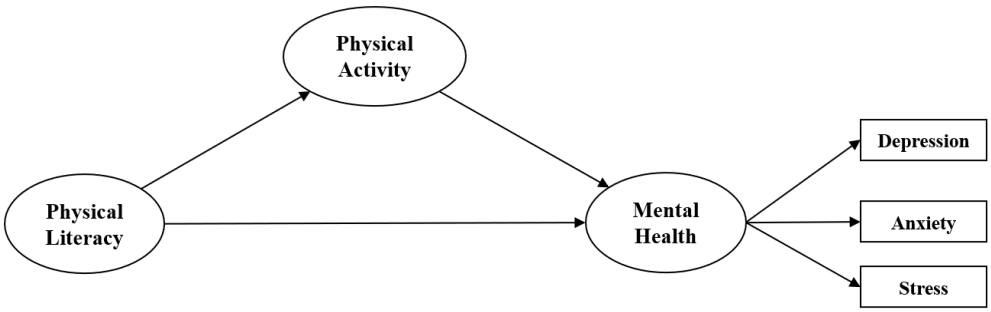

Figure 1. Proposed theoretical model for this study.

As illustrated in Figure 1, the proposed model has three observed or endogenous variables. Causal explanations between the variables were established on the basis of observed linkages, measurement reliability, and specific indicators, including measurement error. In addition, the arrows in the model represent the lines of influence between the variables, which are interpreted by the regression weights. To calculate model fit, we calculated the Standard Root Mean Square Residual Index (SRMR), Normalized Fit Index (NFI), and Goodness of Fit Index (GOF). For GOF, values higher than 0.37 are a sign of strong model fit; for SRMR, values less than 0.08 are a sign of strong model fit; and for NFI, values above 0.90 indicate strong fit [44].

3. Results

A total of 276 children, comprising 128 boys (46.3%) and 148 girls (53.6%), were included in the analysis (9 participants who did not define their gender were excluded from this analysis). Table 2 shows the mean and standard deviation of research variables.

Table 2. Independent sample *t*-test results for comparing the PPLI, DASS-21, and PQA-A scores among boys and girls.

Variables	Gender					
	Females (n = 148)		Males (n = 128)			
	Mean	SD	Mean	SD	t	*p*
Physical Literacy (PPLI scores)						
Sense of self and self-confidence	3.53	0.95	3.67	1.06	−1.121	0.263 ^{ns}
Self-expression and communication with others	3.41	0.98	3.61	0.99	−1.700	0.90 ^{ns}
Knowledge and understanding	3.88	0.89	4.07	0.98	−1.719	0.87 ^{ns}
Total score	3.60	0.83	3.78	0.92	−1.684	0.93 ^{ns}
Mental Health (DASS-21 scores)						
Depression	24.20	11.41	21.48	9.53	2.155	0.032 *
Anxiety	24.47	9.37	21.50	8.86	2.705	0.008 **
Stress	25.45	9.89	22.10	8.56	2.984	0.003 **
Physical Activity (PAQ-A scores)						
Total score	2.61	0.74	3.08	0.83	−4.963	<0.001 ***

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, ns = not significant.

Independent sample *t*-tests were then performed to explore statistically significant differences among the two genders. The results demonstrated no significant gender differences concerning the total score of the self-perceived physical literacy inventory and its three dimensions (all $p > 0.05$). Concerning mental health, our results showed that girls reported significantly higher levels of depression, anxiety, and stress than boys. Specifically, girls reported higher levels of depression (M = 24.20, SD = 11.41) than the self-reported depression levels of boys (M = 21.48, SD = 9.53), t (274) = 2.155, $p = 0.032$. Likewise, girls reported higher levels of stress (M = 25.45, SD = 9.89) in comparison to their counterparts' (M = 22.10, SD = 8.56), t (274) = 2.984, $p = 0.003$. Furthermore, statistically significant differences were observed among the two groups in relation to their anxiety levels (t (274) = 2.705, $p = 0.008$) and physical activity levels as measured through the PAQ-A total score of t (274) = −4.963, $p < 0.001$.

Bidirectional relationships between research variables are shown in Table 3. First, the results of data normality showed that all our data were normally distributed (all $p > 0.05$). As shown, we observed significant indirect associations between PL and depression, anxiety, and stress (all $p < 0.001$). PL was also significantly and directly associated with physical activity ($p < 0.001$). Finally, we observed significant indirect associations between physical activity and depression, anxiety, and stress (all $p < 0.001$).

Table 3. Bidirectional relationships among research variables.

Examined Variables	1	2	3	4	5
1. Physical literacy	-				
2. Depression	r = −0.350 $p < 0.001$ ***	-			
3. Anxiety	r = −0.271 $p < 0.001$ ***	r = 0.796 $p < 0.001$ ***	-		
4. Stress	r = −0.282 $p < 0.001$ ***	r = 0.827 $p < 0.001$ ***	r = 0.824 $p < 0.001$ *	-	
5. Physical activity	r = 0.460 $p < 0.001$ ***	r = −0.211 $p < 0.001$ ***	r = −0.148 $p = 0.014$ **	r = −0.170 $p = 0.005$ **	-

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 4 and Figure 2 show the results of structural equation modeling. PL appeared to have significant and indirect effects on mental health (b = 0.51, T = −10.11, $p < 0.001$) and significant and direct effects on physical activity (b = 0.46, T = 8.66, $p < 0.001$). In addition, physical activity had significant and indirect effects on mental health (b = 0.41, T = −7.90, $p < 0.001$). Finally, physical activity has significantly mediated the associations between PL and mental health (b = 0.19, T = 5.48, $p < 0.001$).

Table 4. Results of path analysis.

	Path	b	T-Value	*p*
1	Physical literacy -> Mental health	0.51	−10.11	<0.001
2	Physical literacy -> Physical activity	0.46	8.66	<0.001
3	Physical activity -> Mental health	0.41	−7.90	<0.001
4	Physical literacy -> Physical activity -> Mental health	0.19	5.48	<0.001

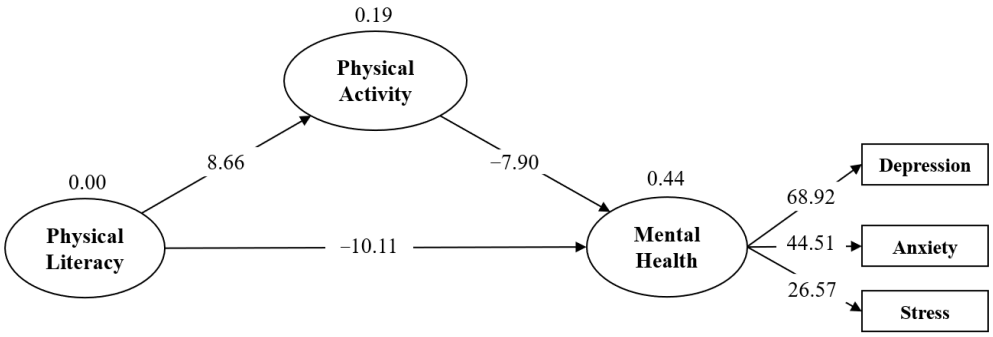

Figure 2. Research model in the form of a T-value.

In addition, the results of the model fit (Table 5) showed that Q2 values are above zero. Therefore, the observed values are well reconstructed, and the model has good predictive ability; that is, the model is of good quality. In addition, the value of R2 for the endogenous variable of mental health is equal to 0.62, which is significant. Finally, the goodness-of-fit index (GOF) for measuring the performance of the model is equal to 0.60 (values higher than 0.37 are a sign of strong model fit), the SRMR value is equal to 0.07 (values less than 0.08 are a sign of strong model fit), and the NFI value is equal to 0.88 (upper values of 0.90 indicate strong fit). In the context of this model, the SRMA and the GOF indices demonstrate a robust fit. The NFI index registers at 0.88, nearing the strong-fit criterion of 0.90 and thus achieving an acceptable level. Consequently, an aggregate assessment of these three indices suggests that the proposed model has a good fit.

Table 5. Model fit indices.

Variable	SSO	SSE	Q2	R2	GOF	SRMR	NFI
Mental health	855	478.5	0.44	0.62	0.60	0.07	0.88
Physical activity	285	228.2	0.20	0.21			
Physical literacy	285	285	-	-			

4. Discussion

The concept of PL has received relatively little attention in the literature concerning physical activity and health promotion, particularly regarding mental health outcomes. In fact, only one study has examined the relationship between PL and adolescent mental health, highlighting a gap in our understanding of the potential benefits of PL on mental health outcomes [3]. Therefore, the present study aimed to address this gap in the literature by examining the association between PL and mental health outcomes in adolescents as well as the extent to which such potential associations are mediated by levels of physical activity. We hypothesized that PL would be positively associated with mental health outcomes in adolescents and that this relationship would be partially mediated by the level of physical activity. That is, PL would be positively associated with physical activity levels, which in turn would be positively associated with mental health outcomes. The contribution of the present study to the existing literature lies in its potential to inform health promotion strategies that focus on the development of PL, particularly in schools and communities where adolescents spend a significant amount of time.

In terms of physical activity, based on their responses to the PAQ-A questionnaire, adolescents were found to engage in less than median levels of physical activity. These findings are consistent with previous research [29,30] indicating that adolescents do not engage in sufficient physical activity as recommended by WHO guidelines [27]. The findings highlight the fact that adolescents require special consideration and strategies to increase their physical activity levels. In terms of gender differences, the results indicate that male adolescents participated in significantly more physical activity than their female counterparts. This finding is also consistent with a large body of research, which has consistently demonstrated that girls are less active than boys [45–49]. There are a number of factors that have been identified as potential contributors to gender differences in adolescents' physical activity levels. These include differences in access to opportunities for physical activity and sport at school, lower levels of parental support, lower participation in organized sports activities, and gender-specific socialization in terms of sports and mobility [46–50]. Therefore, it is important for health promotion strategies to consider the specific needs of female adolescents in order to encourage greater levels of physical activity. Such interventions may involve creating more opportunities for girls to engage in physical activity, providing support for parents to encourage physical activity among girls, and addressing societal attitudes and gender norms that may discourage girls from being physically active.

The study's results further revealed that adolescent females reported significantly higher levels of depression, anxiety, and stress compared to their male counterparts. This finding is surprising considering that previous studies have suggested that the COVID-19 pandemic and related containment measures have had a similar detrimental impact on the mental health of both genders [51–55]. It is possible that the psychological risks associated with the pandemic have affected girls more severely than boys, given that gender is a social determinant of health and wellbeing. Previous studies have consistently shown that women, on average, have worse mental health outcomes than men [55]. Furthermore, the findings of the present study may indicate that the COVID-19 pandemic has exacerbated pre-existing gender inequalities in terms of social, economic, and health well-being, with adolescent girls being particularly vulnerable to negative consequences. The pandemic has been identified as a major stressor, and its potential to negatively impact mental health and well-being has been widely highlighted [56,57]. Therefore, it is important for public

health interventions to consider the pandemic's differential gender impact, particularly with regard to the mental health of adolescent girls. This may involve providing targeted support and resources for adolescent girls to promote their mental health and well-being.

However, the study results suggest that PL can be a significant factor in improving adolescents' mental health. PL is an individualized journey that involves motivation, self-confidence, physical competence, knowledge, and understanding to value and take responsibility for engaging in physical activities for a healthy lifestyle [2]. This concept appears to be a very suitable framework for evaluating physical activity and its impact on the physical and mental health of individuals. Research conducted with children aged 7 to 13 [3] has shown positive associations between PL and physical and psychosocial well-being within that age group. The present study's findings also demonstrate that physical activity mediates the relationship between PL and mental health, highlighting the potential mental health benefits of physical activity in older age groups. Therefore, it would seem very important to promote physical activity and PL among adolescents as a way to improve their mental health. In other words, our results suggest that by promoting PL, individuals may be better equipped to engage in regular physical activity and potentially improve their mental health outcomes.

In summary, the concept of PL has the potential to contribute to a more inclusive consideration of person-centered characteristics for physically active lifestyles. Despite the growing amount of scholarly attention being given to PL, its implementation in practice and policy is still slow, but its popularity is expected to increase in the coming years [1]. Consequently, promoting PL and incorporating it into interventions aimed at improving mental health may be a promising approach for enhancing the physical and mental well-being of adolescents.

5. Conclusions

This study explored the self-perceived physical literacy, self-reported physical activity, and mental health status of adolescents in secondary education schools in Cyprus in the post-quarantine period. It also explored gender differences and whether physical activity mediates the relationship between physical literacy and mental health. Our findings indicated that Cypriot adolescents had low levels of physical activity, which highlights the importance of addressing physical activity as a critical concern for this population. Gender differences were also observed, with male adolescents engaging in significantly more physical activity than females. In addition, gender differences were observed in self-reported depression, anxiety, and stress levels. Our study provides evidence that PL is positively associated with mental health among adolescents, which emphasizes the need to promote PL as a means to improve mental health and well-being in this population. Specifically, our study underscores the importance of promoting PL among females, as gender disparities in physical activity participation continue to be a challenge. Overall, our study provides important insights into the potential benefits of PL promotion for adolescent mental health and well-being. The incorporation of PL into interventions aimed at improving physical activity and mental health outcomes appears vital in efforts towards fostering a more active and mentally healthy generation of young people.

6. Limitations and Future Research

The limitations of this study should be considered when interpreting the findings. Firstly, the sample used in this study was not representative of the total population of adolescents in Cyprus, limiting the generalizability of the results. Therefore, caution should be exercised when applying these findings to other adolescent populations. Secondly, the measurement of physical activity and mental health relied on self-reported surveys, which may be subject to recall bias and social desirability bias. Participants' responses may not always accurately reflect their actual levels of physical activity or mental health status. The use of objective measures, such as accelerometers or clinical assessments, could provide more reliable and valid data in future studies. Furthermore, PL was assessed based on

participants' perceptions rather than objective measures. Future research should consider incorporating objective measures or performance-based and behavioral-based assessments to obtain a more comprehensive understanding of PL in adolescents. Another limitation to acknowledge is the cross-sectional design of this study, which prevents us from establishing causal relationships between PL, physical activity, and mental health. Longitudinal studies would be valuable in examining the temporal associations and potential directionality of these relationships over time.

Additionally, this study focused on selected factors, such as gender differences, without exploring other potential mediators or moderators that could influence the relationship between PL, physical activity, and mental health. Future research should consider examining additional variables such as social support, self-efficacy, and body image to provide a more comprehensive understanding of the underlying mechanisms. Finally, the study primarily emphasized the role of PL in improving mental health outcomes, but it is important to recognize that mental health is a multifaceted construct influenced by various individual, social, and environmental factors that extend beyond PL alone. Future studies should consider a more holistic approach, incorporating a wider range of determinants and outcomes related to mental health. Despite these limitations, integrating PL into interventions and educational initiatives remains a promising avenue for promoting physical activity and enhancing mental health outcomes in adolescents.

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References

1. Carl, J.; Bryant, A.S.; Edwards, L.C.; Bartle, G.; Birch, J.E.; Christodoulides, E.; Emeljanovas, A.; Fröberg, A.; Gandrieau, J.; Gilic, B.; et al. Physical literacy in Europe: The current state of implementation in research, practice, and policy. *J. Exerc. Sci. Fit.* **2023**, *21*, 165–176. [CrossRef]
2. IPLA. IPLA Definition. Available online: https://www.physical-literacy.org.uk/ (accessed on 20 December 2022).
3. Melby, P.S.; Nielsen, G.; Brønd, J.C.; Tremblay, M.S.; Bentsen, P.; Elsborg, P. Associations between children's physical literacy and well-being: Is physical activity a mediator? *BMC Public Health* **2022**, *22*, 1267. [CrossRef]
4. Edwards, L.C.; Bryant, A.S.; Keegan, R.; Morgan, K.; Jones, A.M. Definitions, Foundations and Associations of Physical Literacy: A Systematic Review. *Sports Med.* **2016**, *47*, 113–126. [CrossRef]
5. Cairney, J.; Dudley, D.; Kwan, M.; Bulten, R.; Kriellaars, D. Physical literacy, physical activity and health: Toward an evidence-informed conceptual model. *Sports Med.* **2019**, *49*, 371–383. [CrossRef]
6. Whitehead, M.; Durden-Myers, E.; Pot, N. The value of fostering physical literacy. *J. Teach. Phys. Educ.* **2018**, *37*, 252–261. [CrossRef]
7. Elsborg, P.; Heinze, C.; Melby, P.S.; Nielsen, G.; Bentsen, P.; Ryom, K. Associations between previous sport and exercise experience and physical literacy elements among physically inactive Danes. *BMC Public Health* **2021**, *21*, 1248. [CrossRef]
8. Whitehead, M. *Physical Literacy Throughout the Life-Course*; Routledge: London, UK, 2010.
9. Serafini, G.; Parmigiani, B.; Amerio, A.; Aguglia, A.; Sher, L.; Amore, M. The Psychological Impact of COVID-19 on the Mental Health in the General Population. *QJM Int. J. Med.* **2020**, *113*, 531–537. [CrossRef]
10. Giblin, S.; Collins, D.; Button, C. Physical Literacy: Importance, Assessment and Future Directions. *Sports Med.* **2014**, *44*, 1177–1184. [CrossRef] [PubMed]

11. Lang, J.J.; Chaput, J.-P.; Longmuir, P.E.; Barnes, J.D.; Belanger, K.; Tomkinson, G.R.; Anderson, K.D.; Bruner, B.; Copeland, J.L.; Gregg, M.J.; et al. Cardiorespiratory fitness is associated with physical literacy in a large sample of Canadian children aged 8 to 12 years. *BMC Public Health* **2018**, *18* (Suppl. S2), 1041. [CrossRef] [PubMed]
12. Lizotte, C.; Larouche, R.; LeBlanc, A.G.; Longmuir, P.E.; Tremblay, M.S.; Chaput, J.P. Investigation of New Correlates of Physical Literacy in Children. *Health Behav. Policy Rev.* **2016**, *3*, 110–122. [CrossRef]
13. Nyström, C.D.; Traversy, G.; Barnes, J.D.; Chaput, J.-P.; Longmuir, P.E.; Tremblay, M.S. Associations between domains of physical literacy by weight status in 8- to 12-year-old Canadian children. *BMC Public Health* **2018**, *18*, 1043.
14. Caldwell, H.A.; Di Cristofaro, N.A.; Cairney, J.; Bray, S.R.; MacDonald, M.J.; Timmons, B.W. Physical Literacy, Physical Activity, and Health Indicators in School-Age Children. *Int. J. Environ. Res. Public Health* **2020**, *17*, 5367. [CrossRef] [PubMed]
15. Warburton, D.E.R.; Nicol, C.W.; Bredin, S.S.D. Health benefits of physical activity: The evidence. *Can. Med. Assoc. J.* **2006**, *174*, 801–809. [CrossRef] [PubMed]
16. Martins, L.C.G.; Lopes, M.V.D.O.; Diniz, C.M.; Guedes, N.G. The Factors Related to a Sedentary Lifestyle: A Meta-Analysis Review. *J. Adv. Nurs.* **2021**, *77*, 1188–1205. [CrossRef] [PubMed]
17. Regis, M.F.; Oliveira, L.M.F.T.D.; Santos, A.R.M.D.; Leonidio, A.D.C.R.; Diniz, P.R.B.; Freitas, C.M.S.M.D. Urban versus rural lifestyle in adolescents: Associations between environment, physical activity levels and sedentary behavior. *Einstein* **2016**, *14*, 461–467. [CrossRef] [PubMed]
18. Chillón, P.; Ortega, F.B.; Ferrando, J.A.; Casajus, J.A. Physical fitness in rural and urban children and adolescents from Spain. *J. Sci. Med. Sport* **2011**, *14*, 417–423. [CrossRef]
19. Loucaides, C.A.; Chedzoy, S.M.; Bennett, N. Differences in physical activity levels between urban and rural school children in Cyprus. *Health Educ. Res.* **2004**, *19*, 138–147. [CrossRef]
20. Caspersen, C.J.; Powell, K.E.; Christenson, G.M. Physical activity, exercise, and physical fitness: Definitions and distinctions for health-related research. *Public Health Rep.* **1985**, *100*, 126–131.
21. Thivel, D.; Tremblay, A.; Genin, P.M.; Panahi, S.; Rivière, D.; Duclos, M. Physical activity, inactivity, and sedentary behaviors: Definitions and implications in occupational health. *Front. Public Health* **2018**, *6*, 288. [CrossRef]
22. Marker, A.M.; Steele, R.G.; Noser, A.E. Physical activity and health-related quality of life in children and adolescents: A systematic review and meta-analysis. *Health Psychol.* **2018**, *37*, 893–903. [CrossRef]
23. Janssen, I.; LeBlanc, A.G. Systematic review of the health benefits of physical activity and fitness in school-aged children and youth. *Int. J. Behav. Nutr. Phys. Act.* **2010**, *7*, 40. [CrossRef] [PubMed]
24. Warburton, D.E.R.; Bredin, S.S.D. Health benefits of physical activity: A systematic review of current systematic reviews. *Curr. Opin. Cardiol.* **2017**, *32*, 541–556. [CrossRef] [PubMed]
25. Telama, R. Tracking of Physical Activity from Childhood to Adulthood: A Review. *Obes. Facts* **2009**, *2*, 187–195. [CrossRef] [PubMed]
26. Huotari, P.; Nupponen, H.; Mikkelsson, L.; Laakso, L.; Kujala, U. Adolescent Physical Fitness and Activity as Predictors of Adulthood Activity. *J. Sports Sci.* **2011**, *29*, 1135–1141. [CrossRef] [PubMed]
27. World Health Organization. WHO Guidelines on Physical Activity and Sedentary Behaviour. 2020. Available online: https://www.who.int/publications/i/item/9789240015128 (accessed on 10 February 2023).
28. Bull, F.C.; Al-Ansari, S.S.; Biddle, S.; Borodulin, K.; Buman, M.P.; Cardon, G.; Carty, C.; Chaput, J.-P.; Chastin, S.; Chou, R.; et al. World Health Organization 2020 guidelines on physical activity and sedentary behavior. *Br. J. Sports Med.* **2020**, *54*, 1451–1462. [CrossRef]
29. Sallis, J.F.; Bull, F.; Guthold, R.; Heath, G.W.; Inoue, S.; Kelly, P.; Oyeyemi, A.L.; Perez, L.G.; Richards, J.; Hallal, P.C. Progress in physical activity over the Olympic quadrennium. *Lancet* **2016**, *388*, 1325–1336. [CrossRef]
30. Poitras, V.J.; Gray, C.E.; Borghese, M.M.; Carson, V.; Chaput, J.P.; Janssen, I.; Katzmarzyk, P.T.; Pate, R.R.; Connor Gorber, S.; Kho, M.E.; et al. Systematic review of the relationships between objectively measured physical activity and health indicators in school-aged children and youth. *Appl. Physiol. Nutr. Metab.* **2016**, *41*, 197–239. [CrossRef]
31. World Health Organization. Mental Health. 2022. Available online: https://www.who.int/news-room/fact-sheets/detail/mental-health-strengthening-our-response (accessed on 20 December 2022).
32. Krueger, A.B.; Schkade, D.A. The Reliability of Subjective Well-Being Measures. *J. Public Econ.* **2008**, *92*, 1833–1845. [CrossRef]
33. Keyes, C.L. Mental health in adolescence: Is America's youth flourishing? *Am. J. Orthopsychiatry* **2006**, *76*, 395–402. [CrossRef]
34. NCD Alliance. Mental Health and Neurological Disorders. Available online: https://ncdalliance.org/why-ncds/ncds/mental-health-and-neurological-disorders (accessed on 20 December 2022).
35. Adams, T.B.; Moore, M.T.; Dye, G. The relationship between physical activity and mental health in a national sample of college females. *Women Health* **2007**, *45*, 69–85. [CrossRef]
36. Feiss, R.; Dolinger, S.B.; Merritt, M.; Reiche, E.; Martin, K.; Yanes, J.A.; Pangelinan, M. A Systematic Review and Meta-Analysis of School-Based Stress, Anxiety, and Depression Prevention Programs for Adolescents. *J. Youth Adolesc.* **2019**, *48*, 1668–1685. [CrossRef]
37. Bjørnsen, H.N.; Espnes, G.A.; Eilertsen, M.E.B.; Ringdal, R.; Moksnes, U.K. The Relationship Between Positive Mental Health Literacy and Mental Well-Being Among Adolescents: Implications for School Health Services. *J. Sch. Nurs.* **2019**, *35*, 107–116. [CrossRef] [PubMed]

38. Sum, R.K.W.; Ha, A.S.C.; Cheng, C.F.; Chung, P.K.; Yiu, K.T.C.; Kuo, C.C.; Yu, C.K.; Wang, F.J. Construction and validation of a perceived physical literacy instrument for physical education teachers. *PLoS ONE* **2016**, *11*, e0155610. [CrossRef] [PubMed]
39. Sum, R.K.; Cheng, C.F.; Wallhead, T.; Kuo, C.C.; Wang, F.J.; Choi, S.M. Perceived physical literacy instrument for adolescents: A further validation of PPLI. *J. Exerc. Sci. Fit.* **2018**, *16*, 26–31. [CrossRef] [PubMed]
40. Lovibond, S.H.; Lovibond, P.F. *Manual for the Depression Anxiety & Stress Scales*, 2nd ed.; Psychology Foundation: Sydney, Australia, 1995.
41. Moya, E.; Larson, L.M.; Stewart, R.C.; Fisher, J.; Mwangi, M.N.; Phiri, K.S. Reliability and validity of depression anxiety stress scale (DASS)-21 in screening for common mental disorders among postpartum women in Malawi. *BMC Psychiatry* **2022**, *22*, 352. [CrossRef]
42. Kowalski, K.C.; Crocker, P.R.; Donen, R.M. The Physical Activity Questionnaire for Older Children (PAQ-C) and Adolescents (PAQ-A) Manual. Ph.D. Thesis, College of Kinesiology, University of Saskatchewan, Saskatchewan, Canada, 2004; Volume 87, p. 35.
43. IBM Corp. *IBM SPSS Statistics for Windows, Version 28.0*; IBM Corp: Armonk, NY, USA, 2021.
44. Henseler, J.; Sarstedt, M. Goodness-of-Fit Indices for Partial Least Squares Path Modeling. *Comput. Stat.* **2013**, *28*, 565–580. [CrossRef]
45. Ishii, K.; Shibata, A.; Adachi, M.; Nonoue, K.; Oka, K. Gender and grade differences in objectively measured physical activity and sedentary behavior patterns among Japanese children and adolescents: A cross-sectional study. *BMC Public Health* **2015**, *15*, 1254. [CrossRef]
46. Trost, S.G.; Pate, R.R.; Sallis, J.F.; Freedson, P.S.; Taylor, W.C.; Dowda, M.; Sirard, J. Age and gender differences in objectively measured physical activity in youth. *Med. Sci. Sports Exerc.* **2002**, *34*, 350–355. [CrossRef]
47. Saller, F.V.I.; Khaled, S.M. Potential psychosocial influences on gender differences in physical activity among Qatari adolescents: A first insight through descriptive observation. *Int. J. Adolesc. Youth* **2019**, *24*, 234–251. [CrossRef]
48. Lenhart, C.M.; Hanlon, A.; Kang, Y.; Daly, B.P.; Brown, M.D.; Patterson, F. Gender disparity in structured physical activity and overall activity level in adolescence: Evaluation of youth risk behavior surveillance data. *ISRN Public Health* **2012**, *2012*, 674936. [CrossRef]
49. Abawi, O.; Welling, M.S.; van den Eynde, E.; van Rossum, E.F.C.; Halberstadt, J.; van den Akker, E.L.T.; van der Voorn, B. COVID-19 related anxiety in children and adolescents with severe obesity: A mixed-methods study. *Clin Obes.* **2020**, *10*, e12412. [CrossRef] [PubMed]
50. Sallis, J.F.; Prochaska, J.J.; Taylor, W.C. A Review of Correlates of Physical Activity of Children and Adolescents. *Med. Sci. Sports Exerc.* **2000**, *32*, 963–975. [CrossRef] [PubMed]
51. De Miranda, D.M.; Athanasio, B.S.; Oliveira, A.C.S.; Simoes-e-Silva, A.C. How is COVID-19 pandemic impacting mental health of children and adolescents? *Int. J. Disaster Risk Reduct.* **2020**, *51*, 101845. [CrossRef] [PubMed]
52. Ravens-Sieberer, U.; Kaman, A.; Erhart, M.; Devine, J.; Schlack, R.; Otto, C. Impact of the COVID-19 pandemic on quality of life and mental health in children and adolescents in Germany. *Eur. Child Adolesc. Psychiatry* **2021**, *31*, 879–889. [CrossRef]
53. Zhang, Y.; Zhang, H.; Ma, X.; Di, Q. Mental health problems during the COVID-19 pandemics and the mitigation effects of exercise: A longitudinal study of college students in China. *Int. J. Environ. Res. Public Health* **2020**, *17*, 3722. [CrossRef]
54. Almeida, D.M.; Kessler, R.C. Everyday stressors and gender differences in daily distress. *J. Pers. Soc. Psychol.* **1998**, *75*, 670–680. [CrossRef]
55. Xie, X.; Xue, Q.; Zhou, Y.; Zhu, K.; Liu, Q.; Zhang, J.; Song, R. Mental health status among children in home confinement during the coronavirus disease 2019 outbreak in Hubei Province, China. *JAMA Pediatr.* **2020**, *174*, 898–900. [CrossRef]
56. Nolen-Hoeksema, S. Gender Differences in Depression. *Curr. Dir. Psychol. Sci.* **2001**, *10*, 173–176. [CrossRef]
57. Pfefferbaum, B.; North, C.S. Mental Health and the COVID-19 Pandemic. *N. Engl. J. Med.* **2020**, *383*, 510–512. [CrossRef]