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Physical Activity and Mental Health of Youth During the COVID-19 Pandemic

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Physical Activity and Mental Health of Youth During the COVID-19 Pandemic

Abstract

The COVID-19 Pandemic has globally impacted children's physical activity and mental health outcomes since the transition to remote learning (Štveráková, et al., 2021). Children and adults may encounter negative mental health related consequences, higher stress, and a significant lack of physical activity while in physical and social isolation (Clemente-Suárez, 2022). In particular, school-aged children have experienced a significant reduction in physical activity since transitioning to remote learning and do not have sufficient opportunities to make up for this loss while engaged in remote learning (Štveráková, et al., 2021). Increased physical activity has been consistently correlated with positive mental health outcomes and a reduction of perceived stress in the literature. The purpose of this study, focusing specifically on households participating in remote learning, was to understand the links among access to physical activity opportunities, parental stress, and parent and child mental health outcomes during the Pandemic. In addition, this study will examine how parental stress, mental health and physical activity opportunities may vary depending on the age and socioeconomic status (SES) of the child. Results indicated that most children achieved less than the recommended amount of physical activity and had an increase of at least one mental health concern during remote learning throughout the Pandemic. Parental stress levels were negatively associated with children's time spent in physical activity, and positively associated with the severity of parents' mental health concerns and the number of children's mental health concerns. Implications for school personnel are discussed.

Physical Activity and Mental Health of Youth During the COVID-19 Pandemic

Introduction

Youth Physical Activity During the Pandemic

Within the past year, the Coronavirus Pandemic has negatively impacted the level of physical activity among children and adolescents. Štveráková et al., (2021) discuss the importance of children and adolescents having a sense of daily routine including regular school attendance, meals, and maintaining a healthy lifestyle. When all education, extracurricular activities, and sports were halted under the International Public Health Emergency Plan, many school age students were unable to learn in their natural school setting (Guo et al., 2020). In the United States, only 10% of children and adolescents reached their physical activity goals of 60-minutes of moderate to vigorous activity per day before COVID-19 adversely affected education (Bates et al., 2020). The United States illustrated a significant decrease in physical activity during the COVID-19 Pandemic. Children and adolescents obtained an average of 10.8 minutes per day compared to the national recommendation of 60 minutes per day (Rossi et al., 2021; Tremblay et al., 2016). Yet it is widely known that in the early stages of childhood development, moderate levels of physical activity are needed for proper motor competence and overall physical health (Adank et al., 2018). Maintaining a healthy lifestyle and forming healthy habits such as, cycling, walking, and running have been linked to increasing overall physical activity, physical fitness, and minimizing inactive behaviors (Aires et al., 2011). Due to the Pandemic, one study found an immediate need to increase effective physical activity requirements through virtual learning (Štveráková et al., 2021). Yet it is currently unknown to what extent physical

activity levels have changed among school-aged children and to what extent other areas of health have been adversely affected, particularly given the link between physical activity and mental health (Guan et al., 2020).

Youth Mental Health During the Pandemic

Social isolation, adjustment conflicts, and a lack of school routines have all adversely affected youth mental health during the Pandemic (Guan et al., 2020). School closures have also increased the risk factors for children developing mental health concerns (Danese & Smith, 2020). In a cross-sectional survey in China, 8,079 junior and senior high school students were surveyed and reported increased anxiety and depressive symptoms after the Pandemic closed the educational system (Zhou et al., 2020). Depression, anxiety, emotional distress, disturbances in sleep, and fluctuation in appetite were also found during the first year of the Pandemic when students were transitioning to remote learning (Imran et al., 2020). These emotional and mental distress symptoms were reportedly derived from the closing of schools and the separation of friends for students 5 to 12 years of age (Imran et al., 2020).

Household Stress During the Pandemic

The household stress of families with school-aged children has become more pronounced during the Pandemic (Roos et al., 2021). The social isolation that family members experienced, coupled with the inability to use prior coping mechanisms (traveling, going to the mall, or visiting family members and friends) has exacerbated the stress response in families (Imran et al., 2020). Further, the increased fear and worry of health concerns, in addition to the disruption caused by financial and economic difficulties during the global Pandemic, also contributed to household distress (Imran et al., 2020). As a result of remote learning, there has been a pronounced relationship between parental stress and the academic and psychological outcomes

of children and adolescents within the household (Low and Mounts, 2022). A heightened amount of stress can occur from the emotional tension that can arise when parents lack the resources to meet the demands of virtual learning, including paid childcare and unpaid leave from work. In addition to the financial burdens of remote learning, guardians also experienced high rates of burnout related to caring for the academic needs of their children during remote learning (Nyanamba et al., 2022).

The emotional health of guardians and other primary caretakers can become contagious within a household (Imran et al., 2020). In frequent cases, children and adolescents utilize their primary caretakers as sources of security and emotional well-being. Therefore, when there is individual stress within a household, there is a high risk that this stress will result in a substantial level of overall household stress (Imran et al., 2020). As a consequence of the Pandemic, youth are in need of more parental psychological support and other external support to assist in their emotional regulation (Spinelli et al., 2020). Due to the distress parents and guardians have experienced during the Pandemic, it is becoming more difficult to meet the needs of all family members, which may result in mental health concerns for youth and parents during this time of uncertainty and social isolation.

Household Stress and Physical Activity

The amount of household stress during the Pandemic may also be one consideration for the fluctuation of physical activity levels during the Pandemic. Houston et al., (2017) found that prior to the Pandemic, stress was associated with poor academic performance, unhealthy relationship behaviors, and adverse physical and psychological outcomes. In a sample of college students, Oaten and Cheng (2005) investigated real-world stress, such as the COVID-19 Pandemic, and examined the relationship between academics and weak self-control, which leads

to impairments in unrelated regulatory behaviors. The unrelated regulatory behaviors included consumption behavior, physical activity, self-care habits, sleep patterns, sleep habits, and keeping appointments. Overall, it was found that physical activity significantly decreased during the time of real-life stress (Oaten & Cheng, 2005). In a sample of young adults and adolescents, youth participated in significantly less physical activity on the days when they experienced high levels of stress (Lines et al., 2021). Thus, it is possible that elevated stress levels during the Pandemic negatively affect levels of physical activity.

As stress appears to impact physical activity levels, one would expect remote learning to have an inverse relationship with physical activity levels unless intentional efforts were made to ensure youth had access to quality physical activity opportunities. One study to date found that there has been a dearth of physical activity opportunities during remote learning for children and adolescents (Duton et al., 2020). During the Pandemic, parental guardians took on the role of implementing physical fitness for their households due to the closure of schools, parks, playgrounds, and sports facilities; yet the higher parental anxiety and stress, the lower the physical activity levels of youth (McCormack et al., 2020). Although, it remains unclear on the direct impact of parental stress having on children and adolescent mental health levels during the Pandemic.

Impact of Child Age and SES on Mental Health

Certain variables have been shown to either increase the chance of poor mental health outcomes or to buffer adverse influences and thereby improve mental health. Risk factors are defined as conditions or events that increase the probability that a child or family will have poor outcomes in the future, while protective factors are conditions that moderate risk and act as safeguards that can help children and families find resources and support and encourage

strategies that promote healthy development (Smart et al., 2017). Child age and socioeconomic status (SES) have been shown to act as both risk and protective factors. The age of the child is inversely correlated to physical activity levels, as younger children are significantly more active than adolescents (Howie et al., 2020). Also, younger children are less (I think this is what you mean, but not sure) likely to exhibit clinically significant mental health concerns, such as anxiety and depression (Sampasa-Kanyinga et al., 2020). Therefore, it is likely that young children will be more physically active and exhibit fewer mental health concerns.

In addition to child age, access to resources is another important factor with respect to physical activity and mental health outcomes (Perez et al., 2021; Vandoni et al., 2021). Families who live in safe neighborhoods and who report higher levels of income and educational attainment also report higher levels of physical activity (Perez et al., 2021). Therefore, lower SES has an existing relationship with increased levels of mental health concerns in children, adolescents, and adults (George et al., 2021). Although, it remains unclear how both age and SES have affected the relationship between parental and child mental health and physical activity opportunities during the COVID-19 Pandemic. Lastly, it is also unclear if remote physical activity opportunities were effective for youth physical activity and mental health across diverse SES groups.

Purpose of Present Study

The Coronavirus Pandemic has introduced factors such as social isolation, confinement, and lack of social activities to children, adolescents, and family households. These factors have the potential to affect the mental health, stress, and physical activity opportunities of parents and youth. Yet it is unclear how parental stress and access to physical activity opportunities during remote learning have affected parental and youth mental health. The present study will answer

the following questions: (1) Have youth mental health and physical activity levels changed from in-person to remote learning during the Pandemic? (2) What is the relationship of parental stress, parental mental health, youth physical activity opportunities, and youth mental health during remote learning? (3) How is the relationship of parental stress, mental health, and youth physical activity different depending on the age and SES of the child?

Methods

Participants and procedure

Participation was completely voluntary, confidential, and available to men and women 18 years and older. The current study analyzed questions which were answered by participants regarding their and their child's remote learning experience(s) during the COVID-19 pandemic for the 2020 and 2021 school years. Only those who were parents or caregivers of school-aged children that attended school remotely during the 2020 school year were considered. The questions, "Are you currently the parent or caregiver of a grade school (Pre-K through 12th grade) aged child?" and "Did you have grade school-aged children who attended school remotely (distance learning) during any part of the 2020 school year because of the COVID-19 pandemic?" established that criterion. Children who were homeschooled were excluded. Parents or caregivers who had more than one child were asked to respond based on their child who was most affected by remote learning. There were 121 participants who were parents or caregivers of school-aged children who attended school remotely.

Participants self-identified their individual characteristics, including (1) race/ethnicity: White or Caucasian ($n = 115$, 95%), American Indian ($n = 1$, 0.8%), Black or African American ($n = 3$, 2.5%), Other ($n = 1$, 0.8%), and did not report ($n = 1$, 0.8%); (2) marital status: married ($n = 89$, 73.6%), separated ($n = 1$, 0.8%), divorced ($n = 18$, 14.9%), widowed ($n = 5$, 4.1%), single,

never married ($n = 7, 5.8\%$), and did not report ($n = 1, 0.8\%$); (3) sexual orientation: heterosexual ($n = 111, 91.7\%$), Lesbian ($n = 1, 0.8\%$), Bisexual ($n = 6, 5\%$), Queer ($n = 1, 0.8\%$), and did not report ($n = 2, 1.7\%$); (4) sex at birth: female ($n = 117, 96.7\%$) and male ($n = 4, 3.3\%$); (5) education: less than college ($n = 1, .8\%$), college degree ($n = 51, 42.1\%$), advanced degree ($n = 65, 53.7\%$) and did not report ($n = 4, 3.3\%$); (6) income level: lower than 35K ($n = 2, 1.7\%$), between 35K and 75K ($n = 2, 1.7\%$), above 75K ($n = 11, 9.1\%$), and did not report ($n = 106, 87.6\%$). In addition, participants' age ranged from 33 to 81.85 years old ($M = 50.63, SD = 9.80, n = 119$) and their children were PK-K ($n = 5, 4.1\%$), grade 1 – 2 ($n = 13, 10.7\%$), grade 3 – 5 ($n = 16, 13.2\%$), grade 6 – 8 ($n = 35, 28.9\%$), and grade 9 – 12 ($n = 52, 43\%$).

Measures

All questions were devised by the lead researchers to gauge parent and child experiences of remote learning and mental health during the global Pandemic. Along with demographic questions, the survey for the present study included questions that assessed parental and child (from the parental perspective) experiences of remote-learning and mental health. First, a single item was used to measure children's level of physical activities per day on a 5-point Likert scale (1 = less than 15 minutes, 2 = 15–30 minutes, 3 = 30 –45 minutes, 4 = 45 –60 minutes, and 5 = over an hour). Five items were used to assess children's physical activities from the parental perspective on a dichotomous scale of yes [1] and no [0]. These items were children's engagement in leisure sports, free play outdoors, video games or other screen activities involving movement, dance, and other activities. For statistical analysis, the total number of children's physical activities was computed by summing participants' responses on five items. As shown in Table 1, an internal consistency of the scale measured using KR-20 was .46, indicating a low level of reliability. Second, a single item was used to assess parental stress level on a 5-point

Likert scale.: “On a scale of 1 – 5, with 5 being the highest stress level, how would you rank your level of stress while your child was learning remotely?”)

Third, seventeen items were used to assess parent and child (from the parental perspective) mental health status. Eight items measured negative mental health status (e.g., “increased anxiety,” “increased irritability”), eight items measured positive mental health status (e.g., “decreased difficulties with sleep,” “decreased difficulties with verbal aggression”), and one item measured no effect (“no noticeable change in mental health status”). These items were measured on a dichotomous scale of yes [1] and no [0], which were measured two times: (1) parental mental health change due to remote learning and (2) child mental health change due to remote learning (from parent’s perspective). As shown in Table 1, internal consistencies of dichotomous measurements using the Kuder-Richardson Formula 20 (KR-20) ranged from .23 (low) to .77 (acceptable). A low internal consistency of the scale for measuring positive mental health status was due to no variability in the item response (most participants chose 0, indicating no positive mental health). For statistical analysis, a total number of negative mental health status or positive mental health status was computed by summing participants responses on each of eight items.

Analyses

The IBM Statistical Package for the Social Sciences (SPSS) Version 26 was used to summarize the characteristics of survey participants and their children using descriptive statistics and frequency tables. Second, reliability analyses were performed for a checklist of mental health symptoms using Kuder-Richardson Formula 20 (KR-20), which measures an internal consistency of dichotomous measurements. Third, the Pearson Product Moment Correlation was performed to examine if any significant relationships exist among parental stress, parental mental health, child physical activity opportunities, and child mental health during remote learning.

Fourth, a path model was performed using Mplus to understand whether children's mental health during remote learning is affected by parental stress, parental mental health, and children's physical activity opportunities, when controlling for participants' individual background variables. Covariates used were race/ethnicity (white vs. not), sexual orientation (heterosexual vs. not), education (college degree vs. not), income (high income vs. not), marital status (married vs. not), and children's grade level (grade 9–12 vs. not).

Results

Children's Physical Activity during Remote Learning

During remote learning, 62% of participants ($n = 34$) reported that their children received either somewhat less ($n = 41$, 33.9%) or much less ($n = 34$, 28.1%) physical activity, while 16.6% ($n = 20$) reported somewhat more ($n = 18$, 14.9%) or much more ($n = 2$, 1.7%). However, a total of 20 participants (21.5%) indicated no change in children's physical activities during remote learning. The majority of parents reported that they ($n = 89$, 73.6%) pushed their child to be more physically active while doing remote learning at home. It was reported that children were engaged in different physical activities, including leisure ($n = 43$, 35.5%), free play outdoors ($n = 65$, 53.7%), video games ($n = 46$, 38.0%), dance ($n = 18$, 14.9%), and others ($n = 28$, 23.1%) such as walking/running, horseback riding, yoga, swimming, and hiking. In terms of minutes per day their children engaged in physical activities, the majority of participants reported 31–45 minutes ($n = 23$, 19.0%), 16–30 minutes ($n = 21$, 17.4%), over an hour ($n = 19$, 15.7%), followed by 45–60 minutes ($n = 15$, 12.4%) and less than 15 minutes ($n = 10$, 8.3%). When asked to elect a primary responsible individual to ensure children were physically active, nearly half ($n = 59$, 48.8%) elected themselves as the primary person, followed by child ($n = 25$, 20.7%), teacher ($n = 3$, 2.5%), and other such as coach ($n = 2$, 1.7%). Various reasons were

reported as the main obstacles to children's physical activities. These included insufficient time ($n = 15$, 12.4%), too much academic engagement/homework ($n = 3$, 2.5%), no interest from the child ($n = 17$, 14%), and not a priority ($n = 11$, 9.1%),

Children's Mental Health during Remote Learning

Seventy-four percent of participants indicated that their children showed an increase in (of?) at least one mental health concern during remote learning when compared to in-person learning. Of the eight mental health areas, 45% of participants reported that they observed an increase in children's anxiety and difficulties with attention and hyperactivity, followed by irritability (40%), difficulties with social skills (36%), depression (26%), and difficulties with sleep (17%). The total number of children's mental health concerns ranged from 0 to 8, with a mean of 2.28 ($SD = 2.05$, $n = 121$), while the total number of children's positive mental health ranged from 0 to 3, with a mean of 0.11 ($SD = 0.44$, $n = 121$).

Relationships among Study Variables

Table 2 displays Pearson Product Moment Correlations among all study variables: minutes per day that children engaged in physical activities, total number of children's physical activities, total number of children's mental health concerns, total number of children's positive mental health traits, total number of parental mental health concerns, and total number of positive parental mental health traits. Although no significant relationship between children's physical activities and their mental health status was found, parental stress levels were negatively related to the minutes per day that children engaged in physical activities ($r = -.20$, $p = .03$, $n = 114$), total number of children's mental health concerns ($r = .49$, $p < .01$, $n = 114$), and the severity of their mental health concerns ($r = .56$, $p < .01$, $n = 114$). These results indicate that children who engaged in more physical activities had parents with lower levels of stress.

Predicting Children's Mental Health Status

Based on the significant relationship among study variables shown, a path analysis predicting children's mental health concerns was examined after controlling for individual characteristics. Predictors used in a path analysis were the total number of children's engagement in physical activities, minutes per day that children were engaged in physical activities, parental stress levels, and parental mental health concerns. Controlled variables included in the model were children's grade level and other parental background variables including sexual orientation, income level, race/ethnicity, and education level.

Results from a path model (as shown in Figure 1) indicated that children's level of mental health concerns was positively predicted by parental stress ($b = .59, SE = .18, p = .001$) and parental mental health concerns ($b = .57, SE = .13, p < .01$). These results suggest that when other covariates were controlled, children's level of mental health concerns was more likely to be increased when parents' stress and mental health concerns were increased. However, the level of children's physical activities was not predictive of children's level of mental health concerns during remote learning. As shown in Pearson Product Moment Correlation results, parental mental health concerns were significantly increased by their stress level ($b = .79, SE = .11, p < .01$). No direct or moderating (interaction) effect was found by children's grade level and other parental background variables including education and income level. One exception was found, demonstrating that children who were younger than grade 6 were more engaged in physical activities than those who were older than grade 6. The overall model was found to be acceptable in its quality (RMSEA = .09 [\sim .80], CFI = .90 [$>$.90], SRMR = .09 [$<$.10]).

Discussion

COVID-19 has presented new challenges for children, adolescents, and their families, and further understanding is needed to demonstrate the relationship between these obstacles and children's physical health, in addition to children's and caregivers' mental health. This study investigated the relationship between children's physical activity and child and parent mental health effects throughout remote learning during the Pandemic. Results indicated that the pandemic has adversely affected the level of physical activity and the mental health of school-age children. Findings suggested that children engaged in less physical activity than recommended and had an increase in mental health difficulties during remote learning compared to in-person learning, although there was no direct relationship between physical activity and mental health. However, an association was found between parental mental health and children's physical activity and mental health.

Children's time spent in physical activity was widely dispersed across intervals, with most participants reporting engaging in physical activity for less than an hour, which is the recommended amount of daily physical activity for children and adolescents (US Department of Health and Human Services, 2008). Results from this study indicated fewer children met the national recommendations, suggesting that children's duration of physical activity was lower during remote learning than in-person learning. These results are consistent with findings from Rossi and colleagues (2021), who found that on average children engaged in less than the recommended duration of physical activity during the Pandemic. Prior to the Pandemic it was reported that 21.6% of children and adolescents met the United States physical activity recommendations (Katzmarzyk et al., 2016). Over time, rates of physical activity have diminished due to lack of prioritization, lack of interest, lack of time, and too many academic

engagements (Imran et al., 2020). Previous literature has linked increased physical activity to minimized inactive behaviors (Aires et al., 2011). Due to the aforementioned barriers, school-age children have not had opportunities for an adequate healthy lifestyle or to form more healthy habits (i.e., cycling, walking, and running) to minimize these sedentary behaviors. These findings and preexisting literature suggest that social confinement has restricted children's opportunities to investigate alternate ways to maintain their physical health (Štveráková et al., 2021).

As expected, there was a strong relationship between minutes of physical activity per day and the total number of actual physical activities. Children and adolescents are likely to be more physically active if they are engaging in numerous activities throughout the day (Rossi et al., 2021; Tremblay et al., 2016). Physical activity was greater among elementary aged children than children in middle or high school grades, which is consistent with prior literature (Fedewa & Ahn, 2011). In general, during in-person learning, more time is structured for physical activities such as dedicated recess time and regular physical education classes (Committee on Physical Activity and Physical Education, 2013). As children progress through school, academic engagements often take priority over physical activity (Guo et al., 2020). During remote learning, children mostly participated in leisure activities, free outdoor play, and video games, which limited time spent in physical exertion (Guan et al., 2020; Štveráková et al., 2021). In contrast, children typically participate in active recess during school hours which may include performance tests, sports, and dances that range from low to moderate to high intensity (Chen et al., 2018). It was also noted that children and adolescents participated in these various activities outside of natural school grounds prior to the Pandemic.

Our results found a direct relationship between an increase in mental health concerns and children participating in remote learning. A high average of participants indicated an increase of

at least one mental health concern, such as high levels of anxiety, inattention, hyperactivity, irritability, and social skills impairments. These findings are related to previous research that suggests school belongingness enhances individual feelings of connection while gaining support from adults and other peers (Perkins et al., 2021). Remote learning, stay at home orders, and social distancing have reduced children's opportunities to engage in interactions with peers (Magson et al., 2020). While physically at school, social interactions are more readily accessible, potentially allowing children to feel an enhanced sense of connection while providing increased opportunities for positive peer interactions. Feelings of connectedness and positive peer interactions have been found to be associated with positive mental health outcomes, such as decreased risk of depression and anxiety (La Greca & Harrison, 2005; Perkins et al., 2021). Therefore, the Pandemic has hindered opportunities for children to feel a sense of belonging within the school social environment. Zhang and colleagues (2020) also found that symptoms of ADHD worsened and that these symptoms were linked to increases in negative moods, such as irritability. Additionally, remote learning presented obstacles for maintaining daily educational routines. Children with symptoms of inattention and hyperactivity tend to perform well with structured schedules. In addition to physical school closures, many mental health supports afforded by school staff were not as easily accessible or were halted, leading some children to have inadequate access to social and mental health support typically provided during in-person learning, likely resulting in decreased mental health (Reupurt et al., 2022).

Although not significant, an inverse relationship was found between children's physical activity and mental health concerns during remote learning. Researchers consistently demonstrate that engagement in aerobic physical activity, such as jogging, walking, and dancing, decreases anxiety and depression and improves mood, self-esteem, and motivation (McCormack

et al., 2020; Imran et al., 2020). Therefore, results likely imply that, for children's mental health, the challenges brought by the Pandemic outweighed the benefits of engaging in a sufficient amount of physical activity. Moreover, findings revealed a negative relationship between parental stress and children's engagement in physical activities, indicating that when parents have lower levels of stress, children were likely to participate in more physical activities. The majority of parental guardians reported themselves as the main individual responsible for their children's activity engagement. Research has demonstrated that when parents are less stressed, they are more likely to be involved with their children's lives (Neece et al., 2016). Further, parental support of physical activity, in addition to joint engagement in physical activity, has been shown to predict adolescents' physical activity (Tabak et al., 2017). Thus, the findings in the present study reinforce the need to support parents since parents who are less stressed will be more likely to encourage active behaviors in their children.

Higher parental stress levels and health concerns predicted a greater likelihood of children experiencing mental health difficulties. Parenting alone evokes significant stress, and parental stress has been linked to increased depression, poorer physical health among, and less effective parenting (Neece et al., 2016). Additionally, parental stress and mental health difficulties have been associated with increased child behavior problems, such as defiance, aggression, hyperactivity, and inattention (Houston et al., 2017). A reciprocal relationship between parental stress/mental health and child mental health exists. However, it is unclear whether parental challenges result in increased mental health concerns among children or vice versa. Findings suggest that COVID-19 exacerbated these concerns, and the promotion of positive mental well-being in parental guardians may encourage resilience and prevent poor mental health outcomes in children and adolescents. Although most learning has transitioned

back to in-person, the effects of the Pandemic persist. COVID-19 continues to cause economic hardships within the United States, including food shortages, job scarcity, and housing insecurity, all of which likely impact parent stress and mental health (Center on Budget and Policy Priorities, 2022).

Implications for School Personnel

COVID-19 has clearly been a crisis across various domains and has presented many unpredicted challenges for schools and the individuals that schools serve. It is expected that schools will have a preliminary plan to respond to various crises should one occur. Plans include designated staff with specific roles to aid in the crisis. The drastic impacts of the Pandemic reiterated the importance of school crisis response teams. School responses can continue to be enhanced through monitoring the effectiveness of current practices (Nickerson & Sulkowski, 2021). The physical safety and mental well-being of students and their families may be evaluated and needs identified. School staff may intervene with regular implementation of telehealth counseling services for students and families. School support, such as regular contact with teachers, has been shown to assist in directly alleviating anxiety and depression and indirectly decreasing stress among parents (McGoron, et al., 2022). School staff should engage in regular contact with families to provide an overall welcoming atmosphere that allows caregivers to feel supported and provides a safe space to express concerns. Further, it is critical that schools build collaborative relationships within the community in which the school is placed in order to connect families with local agencies that may assist in providing mental health services, assistance with food, housing, medical care, childcare, or safe recreational spaces for children and adolescents. School and community resources may be limited due to structural and financial

restraints. Thus, larger systemic changes within the United States are needed in order to address these barriers.

To foster healthy habits and reduce sedentary behaviors, teachers may incorporate physical activity within their lessons or provide active breaks during online or in-person instruction regardless of children's grade levels. Teachers have reported that they like integrating these strategies (Gibson et al., 2008) and physical activity enhances mood, academic performance, and attention (Castelli et al., 2015). To provide a more holistic approach to well-being outside of the educational environment, school staff may also educate parents and children on the importance of physical activity and encourage families to engage in physical activity together.

Limitations

Further parental stress levels and mental health difficulties are more likely among parents of children with disabilities, families from culturally and linguistically diverse backgrounds, and those of low SES (George et al., 2021). A majority of the sample within this study identified as White, heterosexual, and highly educated. Therefore, no significant interactions among variables were found likely due to the heterogeneity of the sample. Future research should explore differences across a more diverse sample of families including children with disabilities.

Conclusion

In conclusion, it was found that children's physical activity levels displayed a significant decrease when they transitioned to remote learning. These findings suggest children and adolescents are more at-risk for mental health concerns and low physical activity when parents have high levels of stress. In addition, parental stress was found to predict the likelihood of children's mental health outcomes. The COVID-19 pandemic has affected the nation as a whole,

in particular, children and adolescents. These effects have the potential to put youths' physical, emotional, and social development at risk throughout their schooling. Therefore, this study is needed to assess these risks, and to identify and form treatment plans for at-risk families.

Table 1

Internal consistencies of a dichotomous scale for measuring mental health status and children's physical activities

Scale	KR-20
Child's negative mental health during remote learning (8 items)	0.74
Child's positive mental health during remote learning (8 items)	0.53
Parent's negative mental health during remote learning (8 items)	0.64
Parent's positive mental health during remote learning (8 items)	0.23
Total number of children's physical activities (5 items)	0.59

Note. $n = 121$;

Table 2*Correlations among Study Variables*

		1	2	3	4	5	6
2	<i>r</i>	.46**					
	<i>n</i>	88					
3	<i>r</i>	0.02	-0.01				
	<i>n</i>	121	88				
4	<i>r</i>	-0.01	0.02	0.003			
	<i>n</i>	121	88	121			
5	<i>r</i>	.20*	0.09	.49**	-0.03		
	<i>n</i>	114	81	114	114		
6	<i>r</i>	0.15	0.19	.56**	0.02	.56**	
	<i>n</i>	121	88	121	121	114	
7	<i>r</i>	-0.03	-0.06	-0.15	.41**	-.21*	-.18*
	<i>n</i>	121	88	121	121	114	121

Note. ** $p < .01$; * $p < .05$; 1 = Minutes per day that children engage with physical activities; 2 = Total number of children's physical activities; 3 = Total number of children's mental health concerns; 4 = Total number of children's positive mental status; 5 = Total number of parental mental health concerns; 6 = Total number of parental positive mental status.

Table 3.*Results from a Path Analysis*

Predictors on outcome	<i>b</i>	<i>SE</i>	<i>p</i>
Children's mental health concerns			
Minutes per day on physical activities	-0.12	0.15	0.42
Total physical activities	-0.1	0.13	0.47
Parental distress	0.59	0.18	0.001
Parental mental health concerns	0.57	0.13	< .01
Grade 6-9 or not	0.53	0.34	0.12
Heterosexual or not	-0.7	0.56	0.21
White or not	-0.32	0.7	0.64
College degree or not	0.71	1.65	0.67
Middle income or not	-0.26	0.55	0.64
Minutes per day on physical activities			
Parental distress	-0.11	0.17	0.51
Parental mental health concerns	0.18	0.1	0.07
Grade 6-9 or not	-0.63	0.29	0.03
Parental distress			
Parental mental health concerns	0.79	0.11	< .01

Note. Outcomes are in bold.

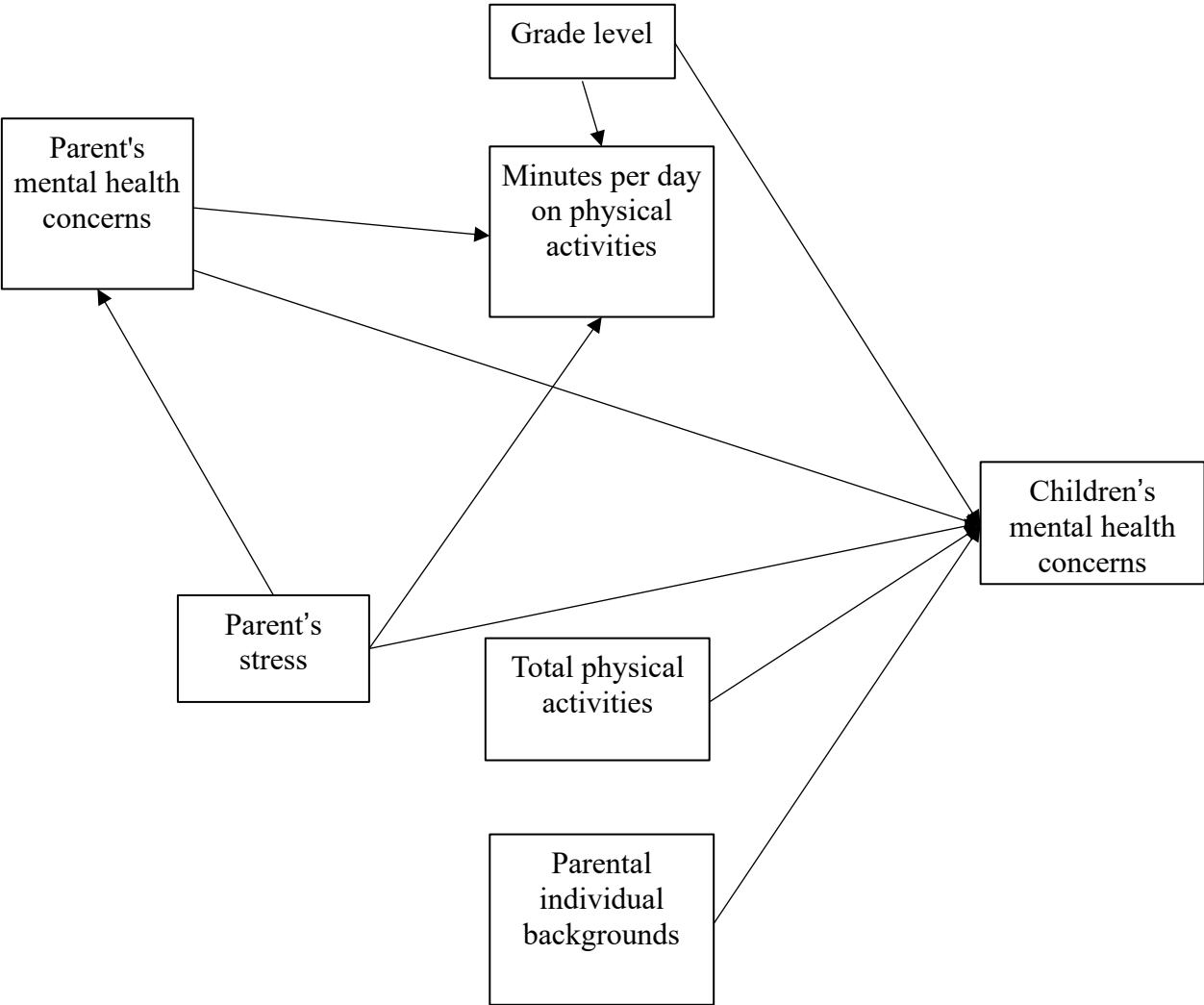


Figure 1. A Path Model

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