

PEDAGOGY

Social Emotional Competency Change During the Pandemic: Impacts of a Virtual Physical Activity Program

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Abstract

The purpose of this study is to examine how a virtual after-school PA program impacts social-emotional competency (SEC) among elementary school students. Students (N=122) participated, and SEC was measured at the beginning and end of the program. Data analysis included descriptive analysis of demographic variables and SEC. A dependent sample t-test was used to examine changes in SEC, and Cohen's d was computed as the effect size. Independent sample t-test were used to determine changes (Δ) between boys and girls. A chi-squared test examined the potential association between student sex and composite scoring improvement (i.e., $\Delta > 0$). Student's SEC significantly improved from pre- to post-measure. A statistically significant association between sex and SEC improvement was found, with girls

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improving SEC more than boys. These findings suggest that a virtual after-school PA program may benefit the SEC of elementary children.

Introduction

A well-rounded education can teach children the skills they need to become successful and healthy. Social and emotional learning (SEL) can provide children with opportunities to develop these skills. SEL is defined as the “process by which young people acquire and apply the knowledge, skills, and attitudes to develop healthy identities, manage emotions and achieve personal and collective goals, feel and show empathy for others, establish and maintain supportive relationships, and make responsible and caring decisions” (CASEL, 2022). These skills comprise what is known as social and emotional competency (SEC). Specifically, self-awareness, self-management, social awareness, relationship skills, and responsible decision making are the five interrelated areas of SEC (Payton et al., 2008). A school can implement SEL-related activities in the classroom, before or after school, or as a separate program for indicated students. For SEL to be effective, it should develop SEC, provide experiences to practice social and emotional skills, involve the school community, and foster relationships with stakeholders (Greenberg et al., 2003). Current research indicates that SEL programs have positive and lasting effects for many different youth populations (Durlak et al., 2011; Payton et al., 2008).

In two extensive reviews examining the impact of SEL programs, researchers found that students in general classroom programs, after school programs, and indicated programs improved social emotional skills, attitudes, prosocial behavior, and academic performance while decreasing problem behaviors compared to students in control groups (Durlak et al., 2011; Payton et al., 2008). In a separate study about after-school programs designed to develop personal and social skills, youth from elementary and middle school significantly increased self-perceptions and positive social behavior, while decreasing problem behaviors compared to children not in the program (Durlak et al., 2010). SEL can have lasting effects years after exposure, with children having more community involvement, so-

cial emotional skills, well-being, and fewer mental health problems compared to others who did not receive SEL (Hawkins et al., 2008; Taylor et al., 2017).

The impact that physical activity (PA) has on areas like SEC and SEL has been reported as well. For example, older children and adolescents who are physically active report greater levels of physical, social, and mental functioning compared to less active peers (Gu et al., 2016; Gopinath et al., 2012). In addition, there is evidence that PA has been effective in lowering depression (Brown et al., 2013; Fox, 1999) and anxiety (Zhu et al., 2019), and improving self-esteem (Ekeland et al., 2005). Further, a young person's friends and relationships with their peers have been found to be positively associated with their PA levels (Ianotti et al., 2009; Strauss et al., 2001).

Research about how PA programs can affect SEC has primarily taken place at elementary schools with interventions before or after school. For example, a study by Goh et al. (2022) found that a before-school PA program improved children's SEC by 7-10% compared to a control group. Further, kindergarten to 8th-grade students who participated in a before-school PA program reported improved social-emotional wellness compared to students not in the program (Whooten et al., 2018). Additionally, in a similar study using an after-school PA program, Caldwell et al. (2022) found a slight improvement in peer relationships for children who participated. However, there was no significant improvement in the other areas measured: cognitive function, peer and family relationships, physical activity, life satisfaction, sleep, positive affect, and global health (Caldwell et al., 2022). Lastly, an after-school PA program, based on Hellison's Teaching Personal and Social Responsibility Model (2003), did not improve children's SEC based on reporting from before and after the program (Olive et al., 2020). As such, there remain many questions to explore about the impact of PA programs on the SEC of children.

Regular PA is associated with abundant physical health benefits for children and adolescents, such as improved bone health, weight status, cardiorespiratory and muscular fitness, and cardiometabolic health (U.S. Department of Health and Human Services, 2018). An individual's health is a multifaceted concept of physical, mental, and social well-being (World Health Organization, 1948). Previous studies have investigated how PA relates to health-related quality

of life, attitudes, emotional distress, and social health, but relatively few studies have examined how it relates to SEC. In addition, PA programs have been primarily in-person and have taken place before, during, or after school hours. In the context of the COVID-19 pandemic, many schools moved to a virtual environment and have continued to offer virtual options for learning. Children have found virtual PA programming a valuable experience (Barcelona et al., 2021). Further, a review of online PA programs discovered favorable outcomes among children, with increases in self-efficacy and connections with game enjoyment, mood experience, and attitude towards PA (Goodyear et al., 2023). There is evidence that virtual PA programs can provide opportunities for PA accumulation and possible benefits to the affective domain. However, research is limited about how virtual PA programs affect SEC. Therefore, the purpose of this study is to examine the effect of a virtual after-school PA program on SEC among elementary school students.

Method

Research Design and Context

This study used an observational design through pre-post measures of existing data from the elementary students who participated in the online after-school physical activity program, *Move 60!*. The program aimed to increase students' participation in physical activity and sports outside of school hours. The program offered one-hour sessions on Mondays to Thursdays during after-school hours on Zoom during the pandemic (from October to December 2021), and the activities included guided exercises such as jogging, jump roping, yoga, and other activities that can be done by the students, without additional equipment. The program was directed by certified physical educators trained for *Move 60!*. The program was free of charge to all elementary school students from grades 2 to 6 in a school district in a Northwestern state. The district's student population demographics included 13.1% Asian, 7.6% Black, 22% Hispanic/Latino of any race, 0.5% Native American, 0.9% Native Hawaiian/other Pacific Islander, 11% two or more races, and 44% white. The students and parents voluntarily registered for the program or withdrew from it any time after the registration.

Participants

The participants were 122 elementary school students from six elementary schools. The students were enrolled in 2nd to 6th grades; their mean age was 11.69 ± 1.66 years. About half (50.6%) of the participants were girls, and 49.4% were boys. The students included 11.4% Asian, 7.6% Black, 20.7% Hispanic/Latino of any race, 48.1% white, 12.2% multiracial/Native American, and others at the schools. All participants voluntarily registered for the program and participated in the study, with their parental/guardian consent. Based on the attendance record on Zoom that the instructors kept, students ($n = 122$) who attended at least 80% of the sessions were included in this study. Since this study used the teacher-collected and de-identified data, the school district and the researchers' college human subject review committee approved this study.

Variables and Measures

The measures of this study included the participant demographic variables and social and emotional competency.

Demographic Variables

The demographic variables included the elementary school student's age, race, ethnicity, sex, and grade level. These variables were collected directly through an online system that imported student information with the school district's approval. As such, the participants did not have to self-report them. It should be noted that the researchers only had access to the de-identified data, so the student and school names were not revealed to the researchers.

Social and Emotional Competency

We used the Washoe County School District (WCSD) Social and Emotional Competency Assessments – Short Form (SECAs), a free, open-source instrument that measures students' self-reported social and emotional competencies. The SECAs have been validated and tested among school-aged children in previous studies within large public-school contexts (Crowder et al., 2019; Davidson et al., 2018). The students completed the short form of the SECAs at the beginning (pre) and end (post) of the *Move 60!*. The WCSD Short Form contained 17 items that measured students' self-awareness ([four items]s elf-concept, emotional knowledge), social awareness

(three items), self-management ([six items] emotional regulation, goal management, schoolwork), relationship skills (two items), and responsible decision-making (two items). Each item begins with a short statement asking students to rate how easy or difficult it is. For example, an item on emotion knowledge reads “Knowing the emotions I feel”, and another on self-management reads “Doing my schoolwork even when I do not feel like it.” Each item has four response options: 1 = “Very Difficult,” 2 = “Difficult,” 3 = “Easy,” 4 = “Very Easy.” The total composite score from all 17 items was used to reflect the global social and emotional competence (Crowder et al., 2019), with higher scores representing greater social-emotional competency. The 17-item WCSO Short Form showed good internal consistency in this study, with a Cronbach $\alpha = 0.88$ based on the collected dataset.

Data Analysis

Three types of data analyses were conducted to meet the purposes of the study. First, descriptive analysis on demographic variables and social-emotional competency was conducted. A frequency analysis was conducted to show the percentage of students whose social-emotional competency has improved. Then, examine which student’s social-emotional competency has changed from pre- to post-measures of the online physical activity program. A dependent sample t-test was conducted, and Cohen’s d was computed as the effect size. Finally, to examine whether there were differences in student social emotional competency in the pre-test and changes (Δ) between boys and girls, independent sample t-tests were conducted.

A chi-squared test was also conducted to examine the potential association between student sex and whether the composite scores were improved (i.e., $\Delta > 0$). These analyses were conducted using SPSS (version 27; IBM, Armonk, NY), and statistical significance tests were done with $\alpha = .05$.

Results

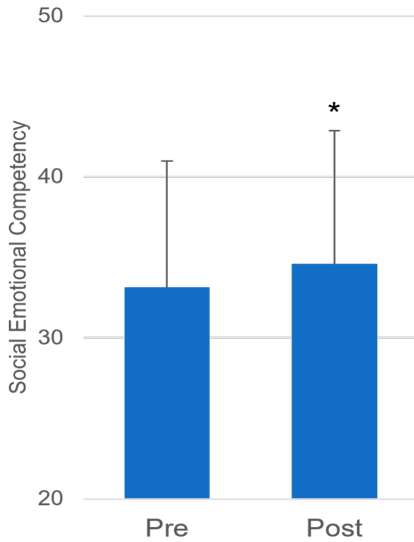
When examining the student social emotional competency in the premeasure, we did not find a statistically significant difference between boys and girls, $t = -.76$, $df = 120$, $p = .45$. Overall, student social emotional competency was significantly improved from the pre- to post-measure, as indicated by the total composite score changes.

Table 1
Student Social Emotional Competency Composite Score

Measure	Mean	SD	Δ	d	t	p
Pre for boys	33.59	8.37				
Pre for girls	32.50	7.40	1.09	.14	-.76	.45
Pre for all students	33.09	7.92				
Post for all students	34.56	8.32	1.47	.23	2.57	.01
Post-Pre (Δ) for boys	.73	.69				
Post-Pre (Δ) for girls	2.34	.92	1.61	-.25	1.41	.16

Note: SD = Standard deviation

Figure 1
Student Social Emotional Competency Measures Pre- and Post-Move 60!

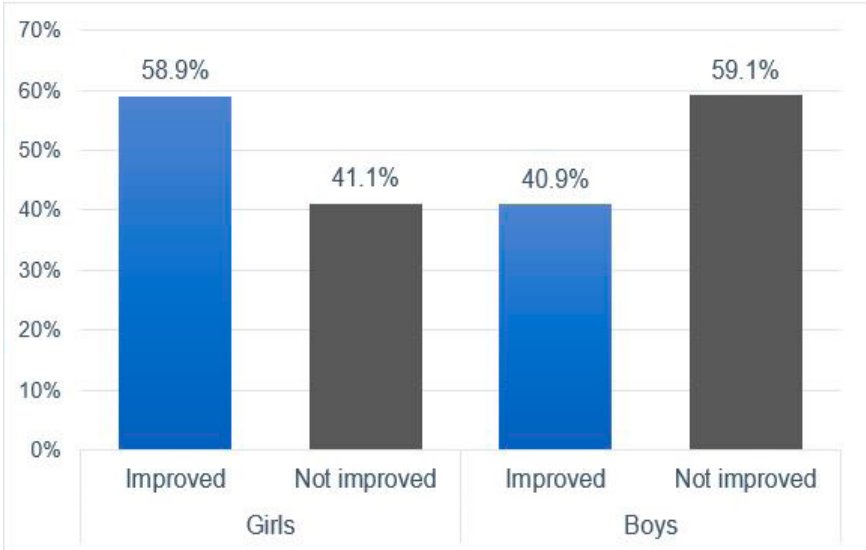


As shown in Figure 1 and Table 1, the student composite scores for social emotional competency increased from pre = 33.09 ± 7.92 to post = 34.56 ± 8.32 , on average improving about $\Delta = 1.47 \pm .57$ from pre to post *Move 60!* program, $t = 2.57$, $df = 121$, $p = .01$. The effect size Cohen $d = .23$, showed a small positive effect size.

The average improvement on social-emotional competency composite did not differ significantly between boys and girls. In contrast, girls ($\Delta = 2.34$) did have higher though not statistically significant improvement than boys ($\Delta = .73$), $t = 1.41$, $df = 120$, $p = .17$. When examining the association between student sex and whether their social-emotional competency composite scores were improved (i.e., $\Delta > 0$), we found a statistically significant association between sex and whether there was an improvement in the composite score, $\chi^2 = 3.94$, $df = 1$, $p < 0.05$. As seen in Figure 2, about 60% of girls' social-emotional competency scores improved, while about 40% of boys had such improvement.

In summary, there was no significant difference in the pre-measure of student social-emotional competency composite score.

Figure 2
Percent of Students Whose Social Emotional Competency Composite Score Improved, $\chi^2 = 3.94$, $df = 1$, $p < 0.05$



On average, students improved their social-emotional competency scores from pre- to post-Move 60! program. There was a statistically significant association between student sex and whether they had improvement in their social-emotional competency scores. The average improvement was slightly higher for girls than boys, though not statistically significant.

Discussion

The purpose of this study was to examine the impacts that *Move 60!* had on SEC among elementary school students. Students who participated in *Move 60!* improved SEC from pre to post, showing a small effect size (Cohen $d = .23$). This result aligned with previous research investigating the effects of PA programs on elementary-aged children. Prior studies found improvements in SEC and social-emotional wellness among children who participated in before-school PA programs (Goh et al., 2022; Whooten et al., 2018). Another similarity to previous research is that *Move 60!* does not specifically teach SEL but is used as a PA opportunity. The differences in the PA programs should be noted. *Move 60!* was offered as an online program for children four times per week, and the physical activities were mostly self-sufficient with limited use of equipment. Previous research investigated in-person programs that met two to three times per week, focused on exercise and playing sports/games (Goh et al., 2022; Whooten et al., 2018). Considering the effect size ($r^2 = .136$) of a similar study by Goh et al. (2022), there is limited evidence to suggest that offering children different types of physical activities may help improve SEC.

Additionally, most of the existing literature examining how PA programs affect SEC has not addressed differences among girls and boys (Caldwell et al., 2022; Olive et al., 2020; Whooten et al., 2018). Goh et al. (2022) reported no statistically significant effect between girls and boys. This study's key addition is how the SEC changed between girls and boys. While there were no significant differences in average SEC composite scoring between girls and boys before *Move 60!* (girls = 32.50, boys = 33.59, $p = .45$), after the online program, there were differences in average improvement. Although not significantly different, girls improved by almost two points more than boys. Additionally, there was a significant association between sex and improvement in the composite score, with about 60% of girls improving compared to about 40% of boys. This finding of uneven SEL improvement is unique and could potentially result from the nature of the activities offered in the online program. As described earlier, the online program's activities, such as jogging, jumping rope, and yoga, were mainly self-sufficient. These activities may appeal more to girls than boys, as boys tend to participate in more team sports

and active play (Peral-Suárez et al., 2020). As such, this could be a probable source for the higher portion of SEL improvement in girls than in boys.

The study adds to the limited research on PA programs and their impact on SEC and introduces differences between girls and boys. Several limitations should be noted for this study. First, we used children's self-reports to measure SEC. Even though the SECAs have been validated, the participants may not be able to respond to them accurately. Further, SEL is growing in popularity among schools nationally, and has increased from 2018 to 2021 (Schwartz et al., 2022). If children in this study received SEL instruction, that may have led to greater increases in SEC. Another limitation was that the sample size was relatively small, and the researchers did not directly monitor program attendance, but only by the teachers implementing the program through Zoom. Directly monitoring the program implementation may have led to more meaningful results and interpretation regarding a dose-response relationship between *Move 60!* participation and SEC. Lastly, the study did not have a control group to investigate differences between students who participated in *Move60!* and those who did not participate.

The results of this study support the idea that a virtual after-school PA program may improve SEC among 2nd-6th-grade students. Further, girls may experience greater improvement in SEC by participating in a PA program. Another important finding is the effectiveness of a virtual PA program. This would help schools and students create programs and participate in PA without the challenges of in-person programs. For example, securing facilities and staffing would not be as difficult because teachers or trainers could run the PA program from their own space at home or in a classroom. It is apparent that youth today are struggling with health problems. Childhood obesity remains high (Ogden et al., 2015), and the American Academy of Pediatrics declared a National Emergency in Child and Adolescent Mental Health (American Academy of Pediatrics, 2021). Youth do not meet daily aerobic PA guidelines, and only 29% of children receive daily physical education (Centers for Disease Control and Prevention, 2014). The physical, social, and emotional benefits that PA programs have for children are well established (Bonhauser et al., 2005; Brown et al., 2012; Ekeland et al.,

2005; Goh et al., 2022; Gu et al., 2016; Whooten et al., 2018). Lastly, the opportunity for children to be physically active at home, with their peers and teacher online, may provide similar benefits.

References

- American Academy of Pediatrics. (2021). *AAP-AACAP-CHA declaration of a national emergency in child and adolescent mental health*. <https://www.aap.org/en/advocacy/child-and-adolescent-healthy-mental-development/aap-aacap-cha-declaration-of-a-national-emergency-in-child-and-adolescent-mental-health/>
- Barcelona, J., Centeio, E., Arvidson, P., & Hijazi, K. (2021). Dearborn SHINES during COVID-19 pandemic: Youth experiences and outcomes with virtual physical activity and healthy eating programming. *Journal of Teaching in Physical Education, 40*(4), 674–681. <https://doi.org/10.1123/jtpe.2020-0296>
- Bonhauser, M., Fernandez, G., Püschel, K., Yañez, F., Montero, J., Thompson, B., & Coronado, G. (2005). Improving physical fitness and emotional well-being in adolescents of low socioeconomic status in Chile: Results of a school-based controlled trial. *Health Promotion International, 20*(2), 113–122. <https://doi.org/10.1093/heapro/dah603>
- Brown, H. E., Pearson, N., Braithwhite, R. E., Brown, W. J., & Biddle, S. J. H. (2013). Physical activity interventions and depression in children and adolescents. *Sports Medicine, 43*(3), 195–206. <https://doi.org/10.1007/s40279-012-0015-8>
- Caldwell, H. A. T., Miller, M. B., Tweedie, C., Zahavich, J. B. L., Crockett, E., & Rehman, L. (2022). The effect of an after-school physical activity program on children’s cognitive, social, and emotional health during the COVID-19 pandemic in Nova Scotia. *International Journal of Environmental Research and Public Health, 19*, 2401. <https://doi.org/10.3390/ijerph19042401>
- Centers for Disease Control and Prevention. (2014). *State indicator report on physical activity*. U.S. Department of Health and Human Services.
- Collaborative for Academic, Social, and Emotional Learning. (2022). *What is the CASEL framework?* <https://casel.org/fundamentals-of-sel/what-is-the-casel-framework/>

- Crowder, M. K., Gordon, R. A., Brown, R. D., Davidson, L. A., & Domitrovich, C. E. (2019). Linking social and emotional learning standards to the WCSD Social-Emotional Competency Assessment: A Rasch approach. *School Psychology, 34*(3), 281–295. <https://doi.org/10.1037/spq0000308>
- Davidson, L. A., Crowder, M. K., Gordon, R. A., Domitrovich, C. E., Brown, R. D., & Hayes, B. I. (2018). A continuous improvement approach to social and emotional competency measurement. *Journal of Applied Developmental Psychology, 55*, 93–106. <https://doi.org/10.1016/j.appdev.2017.03.002>
- Durlak, J. A., Weissberg, R. P., Dymnicki, A. B., Taylor, R. D., & Schellinger, K. B. (2011). The impact of enhancing students' social and emotional learning: A meta-analysis of school-based universal interventions. *Child Development, 82*(1), 405–432. <https://doi.org/10.1111/j.1467-8624.2010.01564.x>
- Durlak, J. A., Weissberg, R. P., & Pachan, M. (2010). A meta-analysis of after-school programs that seek to promote personal and social skills in children and adolescents. *American Journal of Community Psychology, 45*, 294–309. <https://doi.org/10.1007/s10464-010-9300-6>
- Ekeland, F., Heian, F., & Hagen, K. B. (2005). Can exercise improve self-esteem in children and young people? A systematic review of randomized controlled trials. *British Journal of Sports Medicine, 39*, 792–798. <https://doi.org/10.1136/bjism.2004.017707>
- Fox, K. R. (1999). The influence of physical activity on mental well-being. *Public Health Nutrition, 2*(3a), 411–418.
- Goh, T. L., Leong, C. H., Fede, M., & Ciotto, C. (2022). Before-school physical activity program's impact on social and emotional learning. *Journal of School Health, 92*(7), 674–680. <https://doi.org/10.1111/josh.13167>
- Goodyear, V. A., Skinner, B., McKeever, J., & Griffiths, M. (2023). The influence of online physical activity interventions on children and young people's engagement with physical activity: A systematic review. *Physical Education and Sport Pedagogy, 28*(1), 94–108. <https://doi.org/10.1080/17408989.2021.1953459>
- Gopinath, B., Hardy, L. L., Baur, L. A., Burlutsky, G., & Mitchell, P. (2012). Physical activity and sedentary behaviors and health-related quality of life in adolescents. *Pediatrics, 130*(1), e167–e174. <https://doi.org/10.1542/peds.2011-3637>

- Greenberg, M. T., Weissberg, R. P., O'Brien, M. U., Zins, J. E., Fredericks, L., Resnik, H., & Elias, M. J. (2003). Enhancing school-based prevention and youth development through coordinated social, emotional, and academic learning. *American Psychologist*, *58*(6–7), 466–474. <https://doi.org/10.1037/0003-066X.58.6-7.466>
- Gu, X., Chang, M., & Solmon, M. A. (2016). Physical activity, physical fitness, and health-related quality of life in school-aged children. *Journal of Teaching in Physical Education*, *25*, 117–126.
- Hawkins, J. D., Kosterman, R., Catalano, R. F., Hill, K. G., & Abbott, R. D. (2008). Effects of social development intervention in childhood 15 years later. *Archives of Pediatrics & Adolescent Medicine*, *162*(12), 1133–1141. <https://doi.org/10.1001/archpedi.162.12.1133>
- Hellison, D. (2003). *Teaching responsibility through physical activity* (2nd ed.). Human Kinetics.
- Iannotti, R. J., Janssen, I., Haug, E., Kololo, H., Annaheim, B., Borraccino, A., & HBSC Physical Activity Focus Group. (2009). Interrelationships of adolescent physical activity, screen-based sedentary behaviour, and social and psychological health. *International Journal of Public Health*, *54*(S2), S191–S198. <https://doi.org/10.1007/s00038-009-5410-z>
- Ogden, C. L., Carroll, M. D., Fryar, C. D., & Flegal, K. M. (2015). *Prevalence of obesity among adults and youth: United States, 2011–2014* (NCHS Data Brief No. 219). National Center for Health Statistics.
- Olive, C., McCullick, B. A., Tomporowski, P., Gaudreault, K. L., & Simonton, K. (2020). Effects of an after-school program focused on physical activity and social-emotional learning. *Journal of Youth Development*, *15*(6), 292–305. <https://doi.org/10.5195/jyd.2020.889>
- Payton, J., Weissberg, R. P., Durlak, J. A., Dymnicki, A. B., Taylor, R. D., Schelling, K. B., & Pachan, M. (2008). *The positive impact of social and emotional learning for kindergarten to eighth-grade students: Findings from three scientific reviews*. Collaborative for Academic, Social, and Emotional Learning.
- Peral-Suárez, Á., Cuadrado-Soto, E., Perea, J. M., Navia, B., López-Sobaler, A. M., & Ortega, R. M. (2020). Physical activity practice and sports preferences in a group of Spanish schoolchildren depending on sex and parental care: A gender perspective. *BMC Pediatrics*, *20*, 337. <https://doi.org/10.1186/s12887-020-02229-z>

- Schwarz, H. L., Bongard, M., Bogan, E. D., Boyle, A. E., Meyers, D. C., & Jagers, R. J. (2022). *Social and emotional learning in schools nationally and in the Collaborating Districts Initiative: Selected findings from the American Teacher Panel and the American School Leader Panel surveys*. The RAND Corporation. <https://casel.org/sel-in-schools-nationally-and-in-the-cdi/?view=true>
- Strauss, R. S., Rodzilsky, D., Burack, G., & Colin, M. (1992). Psychosocial correlates of physical activity in healthy children. *Archives of Pediatrics & Adolescent Medicine*, *155*, 897–902. <https://doi.org/10.1001/archpedi.155.8.897>
- Taylor, R. D., Oberle, E., Durlak, J. A., & Weissberg, R. P. (2017). Promoting positive youth development through school-based social and emotional learning interventions: A meta-analysis of follow-up effects. *Child Development*, *88*(4), 1156–1171. <https://doi.org/10.1111/cdev.12864>
- U.S. Department of Health and Human Services. (2018). *Physical activity guidelines for Americans* (2nd ed.). U.S. Department of Health and Human Services.
- Whooten, R. C., Perkins, M. E., Gerber, M. W., & Taveras, E. M. (2018). Effects of before-school physical activity on obesity prevention and wellness. *American Journal of Preventive Medicine*, *54*(4), 510–518. <https://doi.org/10.1016/j.amepre.2018.01.017>
- World Health Organization. (1948). *Constitution of the World Health Organization*. World Health Organization.
- Zhu, X., Haegele, J. A., & Healy, S. (2019). Movement and mental health: Behavioral correlates of anxiety and depression among children of 6–17 years old in the U.S. *Mental Health and Physical Activity*, *16*, 60–65.