



Disrupted and Disconnected: Child Activities, Social Skills, and Race/Ethnicity During the Pandemic

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Early in the COVID-19 pandemic, parents reported that their children spent the majority of their time at home, which can dramatically change their activities and negatively impact their social skills. However, research has yet to uncover the relationships between changes in activities during the pandemic and children's social skills, nor the degree to which these relationships might differ across race and ethnicity. To fill this gap in knowledge, we leverage a nationally representative survey with 948 parents conducted in May 2021 and use Likert scaled questions to explore the relationships between increases or decreases across a range of child activities (e.g., outdoor activities, schoolwork activities, friend activities, extracurricular activities, and screen activities) and better or worse child social skills during COVID-19. By exploring the relationship between changes in children's activities and changes in children's social skills during the first 15 months of the pandemic, we provide new evidence for the long-term effects of COVID-19's disruptions on children's social development, while highlighting opportunities to improve children's social skills through targeted activities. First, we used a multivariate linear regression strategy to capture associations between changes in child activities and changes in child social skills, while accounting for a robust set of student, school, and parent covariates. Then, we used interaction terms to examine the moderating role of race and ethnicity on the associations between changes in child activities and changes in child social skills. We found that an increase in outdoor activities, schoolwork activities, friend activities, and extracurricular activities were significantly associated with an increase in social skills. We also found evidence that for Hispanic households an increase in schoolwork activities was especially important for the development of social skills, and that for Black and Hispanic households, an increase in screen time was associated with an increase in social skills.

Keywords: child activities, social skills, race/ethnicity, COVID-19, education

INTRODUCTION

Through initial school closures, the transition to distance and hybrid learning, and the transformation of the physical learning environment (e.g., masks, partitions, and other forms of isolation) for schools that did offer in-person instruction, the COVID-19 pandemic disrupted the social lives of children (Sakiz, 2021). In fact, over a third (34.6%) of parents have reported that

their child's activities have changed since the start of the pandemic (Lee et al., 2021). For example, in a study conducted in March of 2020, parents reported that their children spent the majority of their initial pandemic days at home, with the most frequent activities including eating, watching TV/streaming, and working/studying (Lades et al., 2020). In another study conducted in March of 2020, parents of children ages 5–13 reported over 8 h of leisure-related sitting a day (Dunton et al., 2020). In addition, scholars have found that while time outdoors has decreased during the pandemic (Mitra et al., 2021), screen time has increased (Xiang et al., 2020). Schoolwork activities have also changed during the pandemic, as most extracurricular activities were canceled (Al-Balushi and Essa, 2020). While parent–child interactions increased during the pandemic (Uzun et al., 2021), the overall changes in child activities—especially in relation to activities with peers and other adults—has led to varying degrees of social isolation for children (Rauschenberg et al., 2021).

Ultimately, the changes in child activities—and the social isolation experienced by many children—can have a significant impact on children's social skills. For example, previous research by Hinkley et al. (2018), found that spending time playing outside facilitates peer interactions, which leads to the development of social skills in children. Hinkley et al. (2018) also found that higher levels of screen time were associated with worse social skills. However, this effect was not uniform across technology uses; rather, only television and video viewing had a negative association with social skills, while computers and e-games had no association with social skills (Hinkley et al., 2018). Furthermore, research by Laursen and Mooney (2005) has demonstrated the importance of peers in the development of social skills. Moreover, Maleki et al. (2019) have demonstrated the importance of schools and curricular activities in the development of social skills, while Durlak and Weissberg (2007) have demonstrated the importance of extracurricular activities.

Although research has yet to comprehensively explore the relationships among child activities and social skills during the pandemic, some scholars, such as Cameron and Tenenbaum (2021), suggest that by restricting children's physical interactions with peers, the pandemic will lead to potential declines in children's social skills and development. However, as physical interactions with peers have decreased during the pandemic, technological interactions—often referred to as “screen time”—have increased. Through a systematic review of screen time, social connectedness, and mental health during the pandemic, Pandya and Lodha (2021) found that excessive screen time was negatively associated with a variety of social problems; nevertheless, the review found mixed conceptualizations of what constitutes healthy and unhealthy screen time use. While some research has explored social development and screen time with other child activities, such as “green time” (i.e. outdoor activities) (Oswald et al., 2020), research has yet to explore the relationship between a comprehensive set of child activities during the pandemic and changes in social skills. The consideration of multiple child activities simultaneously is especially important in the context of COVID-19, as many of the activities that children engaged *in prior* to the pandemic were replaced by new activities *during* the pandemic.

Moreover, while much of the research on the impact of COVID-19 on children's social skills focuses on the short-term effects of the pandemic, the disruptions spurred by the pandemic can have long-term effects as well. Stemming from the Life Course theory (Elder, 1998), historical forces like the COVID-19 pandemic can act as “turning points” in the lives of children, resulting in altered trajectories over the life course. Given the rapid transformation of children's social environment during the pandemic, as well as changes in activities that can shape children's development, such as school closures, the closure of recreational centers and parks, and the cancelation of sports activities, the COVID-19 pandemic can be considered a turning point in the lives of many children (see Benner and Mistry, 2020). In addition, while the COVID-19 pandemic has impacted people of all ages, given the social and developmental processes occurring within youth (Asbury et al., 2021), there is reason to believe that the impact of COVID-19 may be especially salient for children. In this study, we specifically explore how spending time outdoors, on electronic devices, on school/homework, with friends, and on extracurricular activities has changed during the COVID-19 pandemic and how these changes are associated with children's social development—particularly their social skills. While life course theory has been applied to other natural disasters (Elder, 1998), it has yet to be applied to the COVID-19 pandemic in the context of child activities and social skills. Thus, by exploring the relationships between changes in children's activities and changes in children's social skills during the first 15 months of the pandemic, we provide new evidence for the potential long-term effects of COVID-19's disruptions on children's social development.

Furthermore, as the effects of the pandemic are not equally distributed across racial/ethnic groups (White et al., 2021), the relationship between child activities and social skills may differ across race and ethnicity, and thus further exacerbate inequalities. For example, Nguyen et al. (2021) found that compared to White individuals, Black individuals are more likely to experience decreased digital communication during the pandemic. Indeed, the digital divide for racial and ethnic minorities, especially in terms of access to high-speed Internet, technology, and computers, has been widely cited during the pandemic (Wright and Merritt, 2020), which can have an isolating effect on racial/ethnic minorities. Additionally, compared to White, non-Hispanic students, racial and ethnic minority students were more likely to be attending school online with fewer supports for students during COVID-19 (White et al., 2021), which can have a negative impact on their social skills as well (Cameron and Tenenbaum, 2021). Finally, Gavin (2021) found that racial and ethnic minority groups tend to have less access to outdoor spaces, which can limit opportunities for their children to spend time outdoors, and ultimately have a negative impact on their social skills.

Altogether, it is unsurprising that parents have reported noticing their children being withdrawn during the pandemic (Wolfman-Arent, 2021), which can have negative implications for the development social skills. As poor social skills have been associated with aggression, delinquency, crime (Beelmann and Lösel, 2021), lower academic performance, and higher alcohol

usage (Scheier et al., 1999), as well as psychological wellbeing (Segrin and Taylor, 2007) and mental health (Spirito et al., 1990), it is essential to understand the types of activities associated with social skill development and intervene accordingly.

Nevertheless, research has yet to uncover the relationships between changes in a wide range of child activities during the pandemic and children's social skills, nor the degree to which these relationships might differ across race/ethnicity. To fill this gap in knowledge, we leverage a nationally representative survey to explore how changes in social skills are associated with changes across a variety of child activities, including (a) time spent outdoors, (b) time spent on computers, smartphones, or other electronic devices, (c) time spent on school/homework, (d) time spent with friends, and (e) time spent on extracurricular activities, such as sports and music. We ask the following research questions:

RQ1: Are changes in child social skills during the pandemic significantly associated with changes in the following child activities: (a) time spent outdoors, (b) time spent on computers, smartphones, or other electronic devices, (c) time spent on school/homework, (d) time spent with friends, and (e) time spent on extracurricular activities, such as sports and music?

RQ2: Do the associations between changes in child social skills and changes in child activities differ across race and ethnicity?

We proceed with an overview of our section "Materials and Methods." Then we provide the results of our study. Finally, we discuss our results in light of previous research, while providing implications for policy and practice.

MATERIALS AND METHODS

Data and Sample

Data for this study come from the Socio-Economic Impacts of COVID-19 Survey, which was administered in May 2021. The survey includes questions that capture households' social and economic experiences during COVID-19 and questions that capture their children's activities, as well as children's social/emotional skills. As parents respond to child survey items, these items capture parents' perceptions of their children's activities, as well as children's social/emotional skills. Parents with multiple children were randomly assigned to respond for a specific child. Our survey sample was drawn from a large, online panel provider. Respondents were recruited into the survey using a quota sampling methodology that ensured national representativeness in terms of race/ethnicity, age, income, and gender. In addition to the quota sampling methodology, there was both an explicit and implicit inclusion criteria: explicitly, respondents needed to be age 18 or older; implicitly, respondents needed to have access to the Internet, as the survey was to be completed online. After keeping those who completed the survey, 5,045 respondents remained in the sample. Of these respondents, 1,503 had children. We excluded respondents in this panel sample who were both too young and too old for school ($n = 406$). After listwise deletion for missing observations ($n = 149$), we were left with a final analytic sample of 948.

Procedure

In our first model, we use a multivariate regression strategy to capture associations between changes in child social skills and changes in child activities during the pandemic. In our second model, we add student, school, and parent covariates to the model in order to account for the variation explained by these variables. In models three through seven, we use interaction terms to examine the moderating role of race and ethnicity on the associations between changes in child social skills and changes in child activities during the pandemic.

As previous research has demonstrated that ordered outcome measures can be treated as continuous variables with relatively large samples (Robitzsch, 2020), linear regression models were used in our study, as they allow for easily interpretable interactions (as opposed to ordered logit models). We therefore use a series of linear regression models with interaction terms to demonstrate our results. In robustness checks (not shown), we verify that linear regression models have nearly identical results to ordered logit models. As seen below, Y represents our outcome (changes in social skills), β_1 represents our main predictors (change in child activities), β_2 represents race/ethnicity, β_3 represents the interaction between change in child activities and race/ethnicity, and β_4 represents our school, child, and parent covariates.

$$Y = \beta_0 + \beta_1 \text{activity} + \beta_2 \text{race/ethnicity} + \beta_3 \text{activity} * \text{race} + \beta_4 \text{covariates} + \varepsilon$$

Measures

This study investigates the relationship between the change in activities of children during the COVID-19 pandemic and the effect of these changes on their social skills. These changes were measured using the following survey questions:

- Since the start of the COVID-19 pandemic, how would you say your child has changed in *social skills*? (1 = Much worse – 5 = Much better)
- How has the way your child spends their time on each of the following activities changed since the start of the COVID-19 pandemic? (1 = Large decrease – 5 = Large increase)
 - Spending time outdoors
 - Spending time on computers, smart phones, or other electronic devices
 - Spending time on school/homework
 - Spending time with friends
 - Spending time on extracurricular activities (e.g., sports, music).

Child's *grade level* consisted of the following options: kindergarten, 1st through 2nd grade, 3rd through 5th grade, 6th through 8th grade, and 9th through 12th grade. For *learning amount*, we asked if parents believed their children were learning more or less than they would have if the pandemic had not occurred. Five options were given ranging from "learning a lot less" = 1 to "learning a lot more" = 5. For children's *school plan*, we asked parent's what type of education was offered in the spring of 2021 with the following options: (1) in-person only (2),

TABLE 1 | Descriptive statistics.

Variables	Mean/Percent	Std. Dev.	Min	Max	Median
Change in Social Skills	3.06	1	1 (Much worse)	5 (Much better)	3
Change in activities					
Outdoors	3.04	1.12	1 (Large decrease)	5 (Large increase)	3
School	3.16	1	1 (Large decrease)	5 (Large increase)	3
Friends	2.67	1.16	1 (Large decrease)	5 (Large increase)	3
Extracurriculars	2.86	1.13	1 (Large decrease)	5 (Large increase)	3
Screen	3.54	1.02	1 (Large decrease)	5 (Large increase)	4
Grade Level					
Kindergarten	9.74%		1	5	
1st Grade – 2nd Grade	11.94%		1	5	
3rd Grade – 5th Grade	21.97%		1	5	
6th Grade – 8th Grade	21.30%		1	5	
9th Grade – 12th Grade	35.05%		1	5	
Learning amount	3.13	1.15	1 (A lot less)	5 (A lot more)	3
School Plan					
In-person only	22.59%		1	4	
Online only	30.86%		1	4	
Mix of in-person and online	36.40%		1	4	
Choice of in-person or online	10.14%		1	4	
School Type					
Public school	63.31%		1	4	
Public charter school	9.55%		1	4	
Private or parochial school	18.51%		1	4	
Home-schooled	8.62%		1	4	
School Quality: Pre-Covid	3.81	.98	1 (Very Poor)	5 (Excellent)	4
School Quality: Covid	3.68	.99	1 (Very Poor)	5 (Excellent)	4
Respondent Race/Ethnicity					
White	55.47%		1	5	
Black	12.27%		1	5	
Asian	6.60%		1	5	
Hispanic	23.94%		1	5	
Other	1.72%		1	5	
Gender					
Male	54.35%		0	1	
Female	45.65%		0	1	
Income Range					
AMI = [0,50)	30.15%		1	4	
AMI = [50,80)	18.84%		1	4	
AMI = [80, 120)	22.27%		1	4	
AMI = [120+)	28.73%		1	4	
Language Spoken at Home					
English	95.56%		0	1	
Spanish	4.44%		0	1	
Married/Has Partner					
Yes	79.45%		0	1	
No	20.55%		0	1	
Number of Children					
1	47.92%		1	3	
2	37.69%		1	3	
3 or more	14.39%		1	3	
Bachelor's Degree					
Yes	75.99%		0	1	
No	24.01%		0	1	
Current Employment					
Working Full-Time	67%		1	3	
Working Part-Time	12.69%		1	3	
Not Working	20.32%		1	3	

online-only (3), a mix of in-person and online, and (4) a choice between in-person OR online (a small number of individuals did not know and were dropped from the sample). For the *type of school* attended, four choices were used: public school, public charter school, private or parochial school, and homeschooled. In terms of *school quality*, we asked parents to rate the quality of the school's instruction from 1 (Very Poor) to 5 (Excellent). Parents answered this twice, once to demonstrate their school's quality before COVID-19 and once to demonstrate their school's quality in the spring of 2021.

In order to identify respondents' *race and ethnicity*, respondents were asked to select one of the following choices: White/Caucasian, Black/African American, Asian, Native American/Pacific Islander, or some other race. Multiple options could be selected. Respondents were then asked if they were of Hispanic or Latino/a/x origin. For those who did identify themselves as Hispanic or Latino/a/x, they were coded as such, regardless of the racial identity they selected. Native American/Pacific Islander was grouped with the category Other. For income, respondents were asked to report their total pre-tax household income in 2020, inclusive of all sources. Because the cost of living differs across regions as well as family size, income groups were constructed as a function of households' total income in 2020, household size, and the US Department of Housing and Urban Development (HUD)'s measure of area median income (AMI) at the county level (US Department of Housing and Urban Development, 2020). When recoding, the levels of income were split into four ranges: 0–50% of AMI, 50–80% of AMI, 80–120% of AMI, and 120%+ of AMI.

We also included respondents' *gender* (Male = 0; Female = 1), *language spoken at home* (English = 0; Other = 1), *marital/partner status* (married/has partner = 0; not married/no partner = 1), *number of children* (one = 1; two = 2; three or more = 3), highest education level of parent or their partner (less than a bachelor's degree = 0; bachelor's degree or higher = 1). Lastly, we considered respondents' current *employment status* (working full time = 1; working part-time = 2; not working = 3).

RESULTS

As described in **Table 1**, the average change in social skills of children in our survey was 3.06 on a scale from 1 (much worse) to 5 (much better), suggesting little change in social skills during the pandemic. For the change in activities, the average score for outdoors was 3.04 on a scale from 1 (large decrease) to 5 (large increase), also suggesting little change during the pandemic. The average score for change in schoolwork activities was 3.16, suggesting a slight increase; the average score for change in activities with friends was 2.67, suggesting a moderate decrease; the average score for change in extracurricular activities was 2.86, suggesting a slight decrease; and average score for change in activities involving a screen was 3.54, suggesting a moderate increase.

When considering child and school characteristics, 13.59% of students were too young for school, 7.99% attended pre-school, 7.53% were in kindergarten, 8.46% were in 1st through

2nd grade, 16.06% attended 3rd through 5th grade, 15.06% were in 6th through 8th grade, 25.85% of the students were in 9th through 12th grade, and 5.46% were no longer in school. The average amount learned during the past year was 3.13 from 1 (learning a lot more) to 5 (learning a lot less), suggesting a slight decrease in learning. For school plan, 22.59% of respondents' children were offered in-person only instruction, 30.86% were offered online only instruction, 36.40% were offered a mix of in-person and online instruction, and 10.14% were given a choice between in-person or online instruction. For school type, 63.31% of all students were enrolled in public schools, 9.55% were in public charter schools, 18.51% attended private or parochial schools, and 8.62% were homeschooled. On average, parents rated the school quality pre-COVID-19 as 3.81 from 1 (very poor) to 5 (excellent), suggesting good school quality. During COVID-19, the average was 3.68, suggesting an overall decrease in school quality.

In terms of demographic characteristics of respondents, 54.35% of respondents were male and 45.65% were female. 30.15% of respondents were in the [0–50) area median income bracket (low income), 18.84% were in the [50–80) income bracket (moderate income), 22.27% were in the [80–120) income bracket (middle income), and 28.73% were in the [120+) income bracket (upper income). 55.47% of respondents were White, 12.27% were Black, 6.60% were Asian, 23.94% were Hispanic, and 1.72% were categorized as “Other” racial/ethnic group. The majority of our respondents spoke English as their primary language at home (95.56%). The majority of our sample were married or had a partner (79.45%), and 47.92% had one child, 37.69% had two children, and 14.39% had three or more children. The majority of parents had a bachelor's degree or higher level of education (75.99%). 67% of respondents were working full-time, 12.69% were working part-time, and 20.32% were not working at all.

Table 2 displays models the main predictors, as well as covariates. In Model 1, we examine the relationship between changes in child activities and change in social skills. Here, we find that a one-unit increase in outdoor activity was associated with a significant increase ($b = 0.139^{***}$) in social skills. The same was true for increases in schoolwork activities ($b = 0.16^{***}$), friend activities ($b = 0.189^{***}$), and extracurricular activities ($b = 0.169^{***}$) in social skills. There was no significant association between changes in screen activities and changes in social skills.

When covariates were added in Model 2, the significance of these activities did not change. Considering the influence of covariates, when compared to attending a public school, being home-schooled was associated with a significant decrease ($b = -0.229^*$) in social skills. A one-unit increase in learning amount was associated with a significant increase ($b = 0.211^{***}$) in social skills. Living with a partner or being married, when compared to respondents who were not married or who did not live with a partner was associated with a significant increase ($b = 0.163^*$) in social skills. Finally, respondents' having a bachelor's degree was associated with a significant increase ($b = 0.144^*$) in social skills.

Additionally, there were significant interactions across race/ethnicity and changes in activities, which are displayed in **Table 3**. Specifically, for changes in schoolwork activities

TABLE 2 | Child activities and social skills (outcome: increase in social skills)

	(Model 1) Main predictors	(Model 2) With covariates
Child information		
Change in activities		
Increased time outdoors	0.139*** (0.028)	0.123*** (0.027)
Increased time on schoolwork	0.16*** (0.03)	0.1*** (0.03)
Increased time with friends	0.189*** (0.03)	0.161*** (0.03)
Increased extracurricular time	0.169*** (0.03)	0.122*** (0.029)
Increased screen time	0 (0.029)	0.029 (0.029)
Grade level (reference = kindergarten)		
1st through 2nd grade		0.083 (0.114)
3rd through 5th grade		0.034 (0.101)
6th through 8th grade		0.159 (0.103)
9th through 12th grade		0.015 (0.098)
Learning amount		0.211*** (0.028)
School information		
School plan (reference = in-person only)		
Online only		0.001 (0.077)
Mix of in-person and online		-0.104 (0.071)
Choice of in-person or online		-0.059 (0.101)
School type (reference = public school)		
Public charter school		-0.044 (0.093)
Private or parochial school		0.116 (0.078)
Home-schooled		-0.229* (0.105)
School quality: pre-COVID		-0.004 (0.036)
School quality: COVID		0.071 (0.037)
Parent information		
Respondent race/ethnicity (reference = White)		
Black		0.035 (0.087)
Asian		0.045 (0.101)
Hispanic		-0.011 (0.068)
Other		-0.093 (0.208)
Gender (reference = male)		
Female		0.053 (0.052)

(Continued)

TABLE 2 | (Continued)

	(Model 1) Main predictors	(Model 2) With covariates
Household income [reference = AMI [0–50]]		
AMI = [50–80]		0.015 (0.079)
AMI = [80–120]		0.008 (0.077)
AMI = [120+]		-0.044 (0.077)
Language spoken at home (reference = English)		
Not English		0.146 (0.131)
Married/has partner		0.163* (0.078)
Number of children (reference = 1)		
2		-0.075 (0.057)
3 or more		-0.125 (0.078)
Bachelor's degree		0.144* (0.072)
Current employment (reference = full-time)		
Working part-time		-0.028 (0.085)
Not working		0.103 (0.074)
_cons	1.153*** (0.138)	0.699* (0.302)
Observations	948	948
R-squared	0.309	0.409

Standard errors are in parentheses.

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

(Model 4) there was a significant interaction for Hispanic respondents ($b = 0.15^*$) when compared to White respondents. As seen in **Figure 1**, as schoolwork activities increase, children of Hispanic respondents experience a larger increase in social skills when compared to children of White respondents. Similarly, for changes in friend activities (Model 5), there was a significant interaction for Other respondents ($b = -0.599^*$) when compared to White respondents. As seen in **Figure 2**, as friend activities increase, children of Other racial/ethnic respondents experience a decrease in social skills when compared to children of White respondents. Finally, for changes in screen activities (Model 7), there was a significant interaction for Black ($b = 0.22^{**}$) and Hispanic and respondents ($b = 0.25^{***}$) when compared to White respondents. As seen in **Figure 3**, as screen activities increase, children of Hispanic and Black respondents experience an increase in social skills when compared to children of White respondents. There were no significant interactions with race/ethnicity for outdoor activities (Model 3) or extracurricular activities (Model 6).

TABLE 3 | Child activities and social skills with race interactions skills (outcome: increase in social skills).

	(Model 3) Outdoor activity	(Model 4) School activity	(Model 5) Friend activity	(Model 6) Extracurricular activity	(Model 7) Screen activity
Child information					
Change in activities					
Increased time outdoors	0.134*** (0.034)	0.125*** (0.027)	0.116*** (0.027)	0.124*** (0.027)	0.132*** (0.027)
Increased time on schoolwork	0.092** (0.03)	0.074 (0.038)	0.099** (0.03)	0.1*** (0.03)	0.094** (0.03)
Increased time with friends	0.161*** (0.03)	0.161*** (0.03)	0.182*** (0.036)	0.16*** (0.03)	0.165*** (0.029)
Increased extracurricular time	0.12*** (0.029)	0.122*** (0.029)	0.122*** (0.029)	0.127*** (0.035)	0.121*** (0.029)
Increased screen time	0.026 (0.029)	0.029 (0.029)	0.033 (0.029)	0.027 (0.029)	-0.066 (0.037)
Grade level (reference = kindergarten)					
1st through 2nd grade	0.073 (0.114)	0.06 (0.114)	0.087 (0.114)	0.084 (0.115)	0.103 (0.113)
3rd through 5th grade	0.019 (0.101)	0.02 (0.101)	0.044 (0.101)	0.035 (0.101)	0.029 (0.1)
6th through 8th grade	0.151 (0.103)	0.151 (0.102)	0.163 (0.103)	0.162 (0.103)	0.168 (0.102)
9th through 12th grade	0.004 (0.098)	0.005 (0.098)	0.022 (0.098)	0.017 (0.098)	0.009 (0.097)
Learning amount	0.214*** (0.028)	0.212*** (0.028)	0.206*** (0.028)	0.211*** (0.028)	0.21*** (0.028)
School information					
School plan (reference = in-person only)					
Online only	0.006 (0.077)	0.009 (0.076)	-0.001 (0.076)	0.001 (0.077)	0.008 (0.076)
Mix of in-person and online	-0.096 (0.071)	-0.107 (0.071)	-0.098 (0.071)	-0.103 (0.072)	-0.094 (0.071)
Choice of in-person or online	-0.041 (0.101)	-0.052 (0.101)	-0.065 (0.1)	-0.059 (0.101)	-0.031 (0.1)
School type (reference = public school)					
Public charter school	-0.056 (0.093)	-0.038 (0.093)	-0.028 (0.093)	-0.038 (0.094)	-0.025 (0.092)
Private or parochial school	0.116 (0.078)	0.112 (0.078)	0.123 (0.078)	0.116 (0.078)	0.137 (0.077)
Home-schooled	-0.238* (0.105)	-0.234* (0.105)	-0.229* (0.105)	-0.225* (0.106)	-0.21* (0.105)
School quality: pre-COVID	-0.003 (0.036)	-0.005 (0.036)	-0.002 (0.036)	-0.006 (0.036)	-0.004 (0.036)
School quality: COVID	0.07 (0.037)	0.072 (0.037)	0.071 (0.037)	0.073* (0.037)	0.073* (0.036)
Parent information					
Respondent race/ethnicity (reference = White)					
Black	0.337 (0.231)	0.172 (0.312)	0.185 (0.196)	-0.015 (0.236)	-0.777* (0.319)
Asian	0.184 (0.262)	0.38 (0.363)	-0.191 (0.232)	0.157 (0.26)	-0.368 (0.389)
Hispanic	-0.183 (0.189)	-0.497* (0.218)	0.115 (0.154)	0.032 (0.172)	-0.925*** (0.236)
Other	0.802 (0.58)	-0.182 (0.668)	10.036* (0.483)	-0.01 (0.465)	-0.09 (0.655)

(Continued)

TABLE 3 | (Continued)

	(Model 3) Outdoor activity	(Model 4) School activity	(Model 5) Friend activity	(Model 6) Extracurricular activity	(Model 7) Screen activity
Gender (reference = male)					
Female	0.044 (0.053)	0.052 (0.052)	0.05 (0.052)	0.053 (0.053)	0.054 (0.052)
Household income [reference = AMI [0–50]]					
AMI = [50–80)	0.015 (0.079)	0.002 (0.079)	0.005 (0.079)	0.016 (0.079)	0.017 (0.078)
AMI = [80–120)	0.015 (0.077)	0.008 (0.077)	–0.006 (0.077)	0.008 (0.078)	0.004 (0.077)
AMI = [120+)	–0.042 (0.077)	–0.045 (0.077)	–0.054 (0.077)	–0.046 (0.078)	–0.05 (0.077)
Language spoken at home (reference = English)					
Not English	0.156 (0.131)	0.164 (0.131)	0.152 (0.13)	0.14 (0.131)	0.163 (0.13)
Married/has partner	0.162* (0.079)	0.166* (0.078)	0.148 (0.078)	0.161* (0.079)	0.167* (0.078)
Number of children (reference = 1)					
2	–0.083 (0.057)	–0.073 (0.057)	–0.08 (0.057)	–0.074 (0.058)	–0.077 (0.057)
3 or more	–0.125 (0.078)	–0.127 (0.078)	–0.12 (0.078)	–0.123 (0.078)	–0.134 (0.077)
Bachelor's degree	0.134 (0.072)	0.149* (0.072)	0.135 (0.072)	0.143* (0.072)	0.144* (0.072)
Current employment (reference = full-time)					
Working part-time	–0.022 (0.085)	–0.037 (0.086)	–0.042 (0.085)	–0.027 (0.086)	–0.024 (0.085)
Not working	0.096 (0.074)	0.104 (0.074)	0.09 (0.074)	0.1 (0.074)	0.087 (0.074)
Race/ethnicity interactions					
Black × change in activity	–0.108 (0.076)	–0.04 (0.09)	–0.063 (0.07)	0.017 (0.078)	0.22** (0.083)
Asian × change in activity	–0.051 (0.09)	–0.102 (0.107)	0.096 (0.083)	–0.042 (0.091)	0.113 (0.099)
Hispanic × change in activity	0.058 (0.058)	0.15* (0.064)	–0.051 (0.055)	–0.015 (0.056)	0.25*** (0.062)
Other × change in activity	–0.297 (0.18)	0.027 (0.203)	–0.599* (0.233)	–0.037 (0.189)	–0.001 (0.173)
_cons	0.355 (0.229)	0.423 (0.235)	0.331 (0.228)	0.335 (0.227)	0.66** (0.235)
Observations	948	948	948	948	948
R-squared	0.406	0.407	0.408	0.402	0.414

Standard errors are in parentheses.

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

DISCUSSION

Previous research has demonstrated the negative impact of COVID-19 disruptions on children's achievement (Dorn et al., 2020) and mental health (Jackson et al., 2021). However, research has yet to comprehensively explore the relationship between child activities during COVID-19 and social skills over an extended period of time. To fill this gap, we used a nationally representative survey administered in May of 2021, we explored how changes in child activities were associated with changes in social skills during the pandemic and how these associations were moderated by race and ethnicity. Although our cross-sectional data does not

allow us to leverage pre-pandemic child activities and social skills, our measures are able to capture changes since the beginning of the pandemic. Thus, while previous studies examine the initial disruptions spurred by COVID-19, our study captured changes throughout the first 15 months of the pandemic—including the 2020–2021 academic year.

Our results demonstrate that an increase in outdoor activities, schoolwork activities, friend activities, and extracurricular activities were significantly associated with an increase in social skills. The only activity that did not have a significant association with social skills was screen time. The associated increase in social skills resulting from outdoor activities

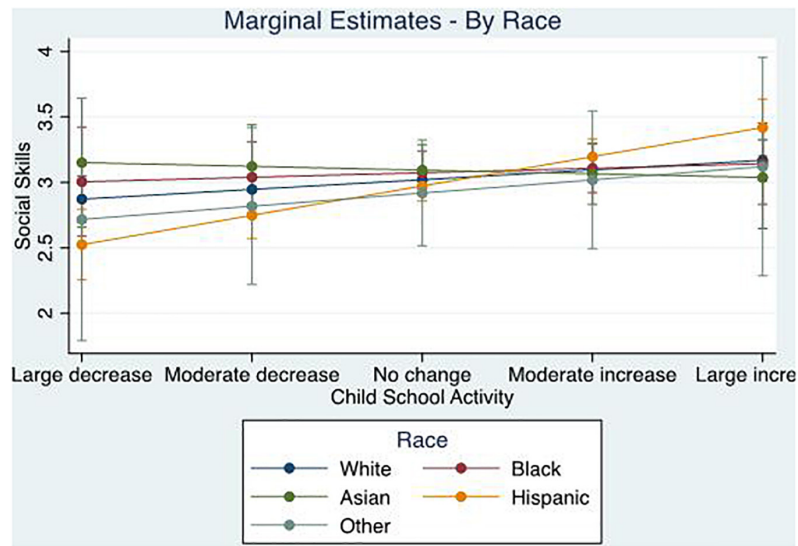


FIGURE 1 | Marginal estimates for change in social skills by race/ethnicity: change in schoolwork/homework.

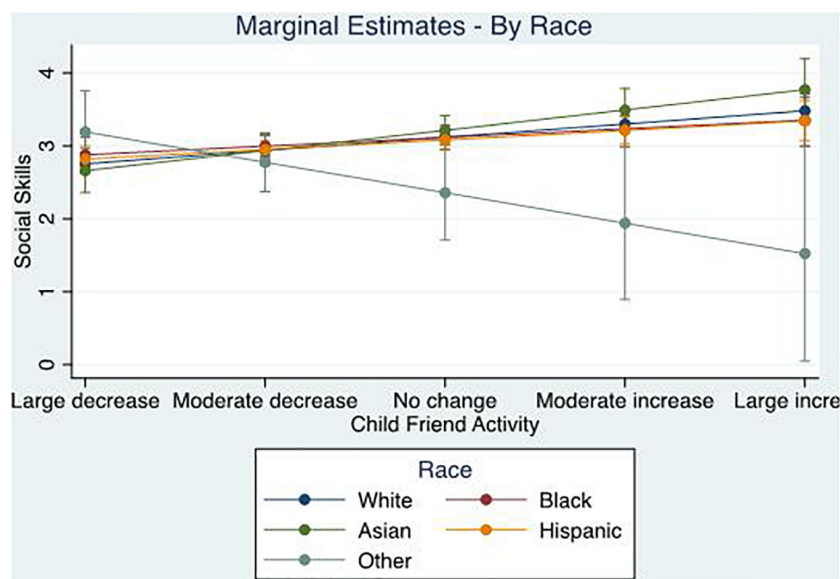


FIGURE 2 | Marginal estimates for change in social skills by race/ethnicity: change in friend activities.

aligns with previous research, as Hinkley et al. (2018) found that spending time outdoors eases social interactions, which in turn can increase social skills. The associated increase in social skills resulting from schoolwork activities also aligns with previous literature, as Maleki et al. (2019) found that learning activities and peer interactions were positively related to social skill development. The same is true for extracurricular activities (see Durlak and Weissberg, 2007) and—unsurprisingly—spending time with friends (Gottman et al., 1975). While previous literature has found that an increase in screen time can have a negative association with social skills, this was not the case in our study. In our

study, screen time could signal peer interactions during the pandemic, as many of the child activities were moved to virtual environments.

Additionally, being married or having a partner had a positive association with child social skills, which might suggest that two-parent households can dedicate more time to interacting with their children. Having a bachelor’s degree was also found to have a positive association with child social skills as well, which might suggest that higher educated households are adopting parenting styles that incorporate designated social activities (Lareau, 2011). Both of these relationships may signal broader protections from the disruptions of COVID-19. For

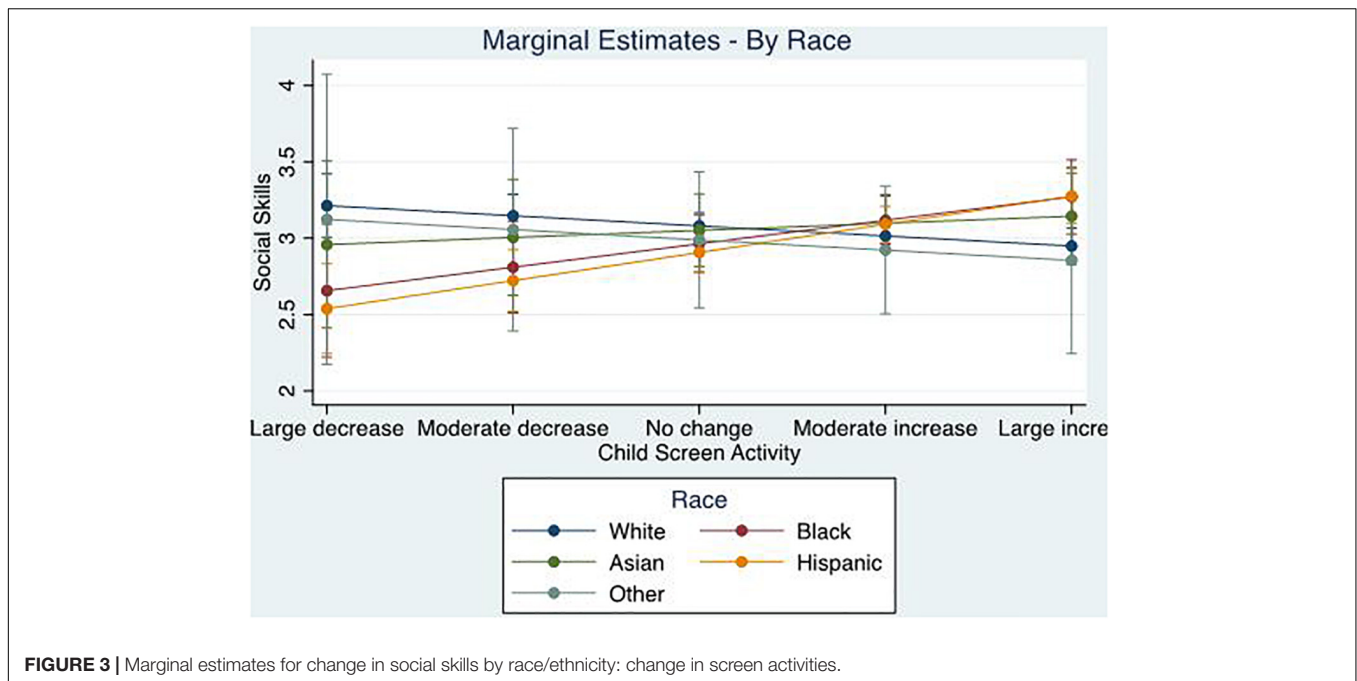


FIGURE 3 | Marginal estimates for change in social skills by race/ethnicity: change in screen activities.

example, two-parent households may be more likely to stay home with children during the pandemic, while higher educated households may be more likely to work from home—both of which could signal more time dedicated to their children’s social development. As many students and parents have been dissatisfied with multiple aspects of distance learning during the pandemic, including interactions with peers and teachers and learning methods and materials (Maqableh and Alia, 2021), it is unsurprising that learning amount and school quality had a positive association with children’s social skills, while being homeschooled had a negative association. Here, learning amount and school quality may signal more positive interactions with teachers and peers, while homeschooling may signal fewer peer interactions altogether. While it was somewhat surprising to find that learning format (e.g., in-person, virtual, and hybrid) were not significantly associated with social skills, it is possible that learning amount and school quality may be concealing these effects—especially when considering that learning format has been significantly associated with both learning amount and school quality (see Jabbari et al., 2022).

Finally, when we interacted the relationships between child activities and social skills with race/ethnicity, we noticed significant interactions for school, friend, and screen activities. For example, as schoolwork activities increase, children of Hispanic respondents experience an increase in social skills when compared to children of White respondents, which could indicate the importance of schoolwork activities in developing social skills for students whose first language may not be English. This aligns with recent research by Sugarman and Lazarín (2020) on the importance of in-person schoolwork activities in supporting English language learners. Moreover, as screen time increased, children of Black and Hispanic respondents experienced an increase in social skills relative to White students. Here, Black and

Hispanic students, who may have been more likely to lack access to digital tools prior to the pandemic, may have experienced a boost in social skill development, as COVID-19 provided them more time and more tools to communicate with peers and other adults in their social networks (Wright and Merritt, 2020). This aligns with recent research by Mareta and Susanto (2021) who found that students use screen time to engage in social media platforms, which can improve social skills.

Implications

As demonstrated in the relationship between learning and social skills, schools should take active steps to provide high quality instruction to all students—regardless of the format. Schools should also consider how to close the digital divide. As our research indicated, Black and Hispanic children—who are more likely to lack digital resources (Ong, 2020; Anakwe et al., 2021)—demonstrate improved social skills with screen time. Given the various types of activities associated with screen time, future research should further explore the types of screen time activities that are associated with improved social skills. Finally, given the relationship between some of the family characteristics and social skills (e.g., married/partner status, having a bachelor’s degree, etc.), schools should take additional steps to ensure students’ social development—especially for students in vulnerable circumstances. One of these steps could be to create and implement effective social-emotional-learning (SEL) interventions, which have been associated with improved social and emotional skills, attitudes, behavior, and academic achievement (DuPaul and Eckert, 1994; Durlak et al., 2011). While some states have already started to implement SEL standards (e.g., Illinois, New York, etc.), COVID-19 should act as a wake-up call for more states to follow suit.

Limitations

This study is not without its limitations. First, the data used in this study is cross-sectional. While our questions involved change over time, we were not able to survey parents across multiple time points. Second, we were not able to observe children directly; rather parents report on the characteristics that they observe of their children. Third, while we were able to control for a range of child, school, and parent characteristics, additional characteristics may relate to both changes in child activities and changes social skills during the pandemic. For example, recent research has examined how disruptions spurred by the pandemic can have had unique consequences for students with special needs (Asbury et al., 2021; Sakiz, 2021). Additionally, due to sample size limitations, we are not able to speak to some of the nuances within the “Other” racial-ethnic groups. Another limitation in our study is that our survey questions have not yet undergone reliability assessments; future studies should explore the psychometric properties of these measures. Finally, as there may be some unobservable characteristics that are also associated with child activities and social skills, our results cannot establish causality.

CONCLUSION

In addition to the deadly disease, the disruptions and isolations caused by COVID-19 have severely impacted individuals’ social wellbeing. Nevertheless, despite increased levels of isolation among children and youth, a limited number of studies have explored the impact that COVID-19 has had on children’s social skills. Leveraging a novel, nationally representative survey, we demonstrate that certain activities, such as spending time outdoors, with friends, doing schoolwork, and extracurricular activities have increased children’s social skills. Moreover, we demonstrate that these relationships are moderated by race/ethnicity, suggesting further disparities and opportunities to reduce the inequalities stemming from the pandemic. Apart from needing social skills to build healthy relationships with other children and adults, social skills are also important predictors of psychological wellbeing. Given the prolonged disruptions

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and isolations from COVID-19, immediate action is needed to prevent the pandemic from operating as a turning point and placing students on isolated trajectories over the life course.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors upon request, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Washington University in St. Louis IRB. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

RH conceptualized the study, cleaned the data, ran the analyses, created the tables and figures, conducted the literature review, and drafted the results. JJ collected the data and advised on the analysis, and helped write the methods and discussion sections. Both authors contributed to the article and approved the submitted version.

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