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Examining Effects of the COVID-19 Pandemic and Social Distancing on Children and Their Play and Social Development

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EXAMINING THE EFFECTS OF THE COVID-19 PANDEMIC AND SOCIAL DISTANCING ON CHILDREN AND THEIR PLAY AND SOCIAL DEVELOPMENT

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PSYCHOLOGY

ABSTRACT

The COVID-19 pandemic is a global public health crisis that has affected everyone worldwide and drastically changed the social landscape since the first reported case on December 31, 2019 (WHO, 2020). Part of this social landscape includes children's ability to play with their peers. Children with Autism Spectrum Disorder (ASD), a neurodevelopmental disorder characterized by social impairments, have been observed to initiate and reciprocate peer interactions much less frequently than their peers, including language-matched children with other developmental disabilities, without therapeutic intervention (American Psychiatric Association, 2013; Frankel et al., 2011). Therefore, children with ASD could be at an increased risk of missing out on important social interactions during these unprecedented times. The current study set out to determine how the COVID-19 pandemic impacted children's play opportunities, technology use, and quality of life. An anonymous online survey was distributed to parents of children ages 5-12 years, and asked parents to report on their perceptions on play safety during the pandemic, their child's play opportunities before and after the pandemic, their child's technology use before and after the onset of the pandemic, and their child's quality of life within the past month. Findings show that parents are concerned about the safety of in-person peer interactions for their children during the

pandemic, a decrease in play opportunities for children overall since the onset of the pandemic, an increase in technology use since the onset of the pandemic, and significant differences in quality of life between children with ASD and their peers without ASD. Future research into how the availability of vaccines against COVID-19 for this age group impacts parents' perceptions of play safety and affects children's play opportunities and quality of life moving forward is warranted.

Keywords: autism, play, COVID-19, technology, quality of life

DEDICATION

Dedicated to the memory of Dr. Fred Biasini, without whom this project would not have been possible, for his endless support, guidance, wisdom, encouragement, and patience.

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INTRODUCTION

The COVID-19 pandemic is a global public health crisis that has affected everyone worldwide and drastically changed the social landscape since the first reported case on December 31, 2019 (WHO, 2020). The WHO officially characterized the coronavirus outbreak as a pandemic on March 11, 2020 (WHO, 2020). Since then, worldwide, the novel coronavirus has infected over 246 million individuals and caused over 5 million deaths. Of these, over 45.9 million confirmed cases (nearly 19%) and nearly 745,000 deaths (nearly 15%) were in the United States alone (The New York Times, 2021). Public Health officials agreed that, until a vaccine was developed and widely available, the best practice to combat the virus was to remain "socially distant" from others, in addition to other protective behaviors such as wearing a face covering, washing hands with soap and warm water frequently, and regularly disinfecting commonly touched surfaces (CDC, 2020). Moreover, many governments issued "stay-at-home" orders, shut down social venues, and limited the number of people allowed to gather in social settings (CDC, 2020). Additionally, many American schools began operating on a distance learning platform beginning in March 2020 amidst school closures during the pandemic (Education Week, 2020). As a result, children were removed from their daily routines and faced limited social exposure during a critical time in their socioemotional development while also dealing with stress, fear, anxiety, and uncertainty related to the pandemic. Most notably, individuals with an Autism Spectrum

Disorder (ASD) may be at significant risk of experiencing developmental setbacks — especially as it relates to their socioemotional development — dysfunction in their everyday lives, and a decreased quality of life due to the COVID-19 pandemic (Baweja et al., 2021).

Socioemotional development is one of the five major developmental domains, along with gross and fine motor movement, language and speech development, adaptive development, and cognitive development (Bjorklund & Causey, 2018). While each domain is interconnected with all of the other, and development in one area affects development in another, social and emotional development are grouped into one major domain because they are closely related. Socioemotional development is further affected by a wide range of both environmental and genetic factors (Reiss, Leve, & Neiderhiser, 2014). Play is one such environmental factor that influences development during childhood, both functionally and cognitively. Thus, several issues could arise when children are unable to play with peers due to social isolation. These issues are of particular concern for children who are at increased risk of play deprivation and social isolation due to social impairments, such as those with ASD, which are compounded by the social restrictions put in place due to the pandemic.

Autism Spectrum Disorder

ASD is a neurodevelopmental disability that has become the focus of critical research related to its etiology and possible therapeutic interventions over the past few years. The fifth edition of the Diagnostic and Statistical Manual of Mental Disorder

(DSM-V) identifies two major areas of concern for individuals with ASD: “persistent deficits in social communication and social interaction across multiple contexts. . .” and “restricted, repetitive patterns of behavior, interests, or activities. . .” (American Psychiatric Association, 2013). This newest revision of the DSM introduced the term “spectrum disorder” to more accurately encompass the varying spectrum of symptoms that are experienced by individuals who receive the diagnosis.

With an increased understanding of the disorder, there has been an increased ability to properly identify individuals with the disorder leading to steep increases in prevalence rates over the years. According to the Centers for Disease Control and Prevention (CDC, 2020), approximately 1 in 54 school-aged children in the United States, nearly 2 million children, have been diagnosed with ASD. Furthermore, the disorder is identified in boys approximately four times more often than in girls (CDC, 2020). While many people believe that the gender difference in diagnosis is rooted in the gender differences in cognitive processing, making boys more susceptible to impairments in these areas, some scientists hypothesize that this gender difference exists because the female population exhibits symptoms differently (Lai et al., 2012; Rivet & Matson, 2011). A lack of understanding of this symptomology results in an under-identification of many females with the disorder (Beggiato, 2017; John, 2017). Other factors, such as race, ethnicity, and socioeconomic status do not affect the incidence rates of ASD; however, some risk factors do exist that put certain children at higher risk than others, such as being born to older parents (CDC, 2020).

The onset of ASD symptoms is often considered to be between 2 and 3 years of life even though symptoms can appear sooner, and diagnoses can be made as early as 18 months, yet diagnoses are first considered to be reliable, valid, and stable when made at 2 years (Webb & Jones, 2009). Despite this, many children do not receive a diagnosis until after the age of 4 years (CDC, 2020; Webb & Jones, 2009; Zwaigenbaum et al, 2015). Though it is recommended that pediatricians screen all of their patients for developmental delays at 9, 18, and 24 or 30 months, the diagnosis process usually begins when parents notice delays or regressions in their child's development and bring their concerns to a pediatrician around the age of 3 or 4, though sometimes later (CDC, 2015). It has been shown that the earlier identification of the disorder and subsequent intervention takes place, the more effective these interventions are at reducing the severity of impairment (CDC, 2019).

Once a delay has been identified or the pediatrician finds any concerns that warrant further investigation, the second step of the process is a comprehensive diagnostic evaluation. This evaluation is often done by a specialist that the family doctor or pediatrician refers the family to, including a child psychologist or psychiatrist, a child neurologist, or a developmental pediatrician. This evaluation takes a number of factors into consideration: developmental and medical history (e.g., being delayed on early motor and language milestones), caregiver interview (e.g., how the child does with changes in routine), and observable behaviors (e.g., demonstration of eye contact, repetitive behaviors) (CDC, 2015). Additionally, providers often use the following "gold standard companion measures" when determining whether a clinical diagnosis of ASD is

appropriate: Autism Diagnostic Interview (ADI-R) and the Autism Diagnostic Observation Schedule (ADOS). The ADI-R is a "semi structured interview with the caregiver," and the ADOS is "structured interactions for children of different language abilities to allow for observation of symptoms of ASD. . ." (Batshaw et. al, 2013, pp. 354).

Once a child has been identified and diagnosed with ASD, the typical course of action for treating the disorder is implementing an individualized and specialized intervention that targets specific behaviors and symptoms. Most commonly utilized to treat behavioral symptoms of ASD is applied behavioral analysis (ABA) or some treatment program based on the theory behind it. ABA works to encourage and increase good behaviors and decrease problem behaviors through principles behind operant learning and motivation (Batshaw et. al, 2013). Though no medication addresses the core concerns of individuals with ASD, some individuals may be prescribed certain drugs to reduce severe behavior problems, anxiety, and hyperactivity (Mayo Clinic, 2018).

Socioemotional Development

Stages of Attachment

The ability to feel, process, and understand emotions is a core part of sociality by motivating "prosocial and caregiving behaviors, inhibiting aggression, and facilitating cooperation" (Decety et al., 2015). Socioemotional development begins at birth. The first step in socioemotional development is experiencing emotion, which leads to understanding others' emotional states. The ability to share another person's feelings,

also known as empathy, is the foundation of human sociality (Decety et al., 2015). The basic emotions of contentment and distress are apparent from the early months of life. Other emotions do not become apparent in children until several months later, with anger and frustration appearing between four and eight months after birth. By one to two months of age, babies begin to form attachments through four phases. The first phase, indiscriminate social responsiveness, is marked by the baby's ability to reciprocate social interactions with anyone with whom the child comes in close contact. One of the earliest forms of communication, which appears around five weeks, is the social smile when children smile in response to social cues such as being talked to or smiled at by their caregiver.

During the second phase, discriminating sociability, which typically begins between the second month and about six or seven months, attachment begins to form with at least one significant caregiver as babies begin discriminating their sociability. Here, socialization begins to differentiate based on previous social encounters. Thus, children will respond differently to a caregiver than to a stranger. Furthermore, around six months of age is when babies first begin interacting with their peers, though these interactions are parallel and do not coordinate. This phase is closely followed by the emergence of nonverbal decoding — the ability to determine others' emotional states by using their facial and vocal expressions. In addition to using nonverbal cues to understand emotions in others, babies use the expressions of others to learn how to react to new or ambiguous situations. This form of social learning continues

throughout childhood and is very important in framing a child's social development and how they interact with others.

As children begin to decode others' emotional states in their environment, they move into the third phase of developing social attachments, which lasts until their second birthday. Children begin forming enduring emotional bonds around seven months and begin to interact with their peers in more coordinated ways. Children begin to show more complex social behaviors between twelve and eighteen months of age, using social cues to coordinate their interactions. Between eighteen and twenty-four months of age, this evolves into being able to engage in reciprocal interactions and displaying self-awareness in a social context. Once this has been mastered, children move into the fourth stage of attachment: goal-directed partnerships. During this stage, children can use their past social experiences and their knowledge of social rules to construct social expectancies, use their emotionality to encode and interpret social cues, formulate social goals, and enact appropriate responses.

Social Impairment

Social impairment is a phrase used to describe "subnormal performance in emotional processing, theory of mind, empathy, moral judgment, social norms, and self-monitoring," among other aspects (Armijo, 2017, p. 2). In addition to play deprivation, a number of psychological disorders also cause social impairment in people. The social impairment of ASD is one of the most debilitating aspects of the disorder that impacts all facets of an individual's life (NIMH, 2018). The Mayo Clinic has identified areas of life

that are affected by difficulties with appropriate social interactions: “problems in school and with successful learning, employment problems, inability to live independently, social isolation, stress within the family, [and] victimization and being bullied” (2018). Although a number of interventions exist that are effective in helping individuals with ASD overcome their impairments with functional behaviors and cognitive ability, research has shown that the social impairment often remains a significant problem for these individuals post-intervention and persists into adulthood (Kasari and Patterson, 2012; Kretzman, Shih, and Kasari, 2015). One social intervention that has done well to improve social functioning is UCLA’s PEERs program. This 16-week parent-assisted social skills group intervention has been shown to have long-term effects on increasing overall social skills knowledge and increasing frequency of social engagement, while also decreasing socially related symptoms of ASD (Laugeson et al., 2012; Laugeson et al., 2015; Zheng et al., 2021). However, this intervention has only been validated and made widely available for adolescents (ages 12-17) and young adults (ages 18-35) with high functioning ASD. For the individuals who qualify for and have access to PEERS, social functioning improves dramatically, and these improvements can persist into adulthood. Despite promising outcomes from this intervention, it leaves a large gap in coverage for children under the age of 12. One up and coming area of research that could further address this gap in knowledge is the effects of play on the cognitive development of young children and their social functioning. Notably, UCLA has recently begun a PEERS for Preschoolers Program that incorporates play into their social skills training and targets a younger population. While this intervention is not yet readily available outside of UCLA, a preliminary study by Tripathi et al. (2021) found that long-term gains

in social functioning were gained in young children (ages 4-6) who completed the 16-week intervention. Furthermore, this study "highlights the importance of teaching early play and friendship-making skills to establish a foundation for social relationships in young children with ASD" (Tripathi et al., 2021; pp. 15).

Play

Many people believe play simply elicits happiness in children yet playing also prepares children for adult life by socializing them, improving their social competence, and creating an environment for social learning (Pellis et al., 2014). More specifically, children learn about social rules (e.g., cheating is not accepted), exclusion aversion, and inequality aversion, which allows them to function more fluidly in society as adults (Amato et al., 2020). This social learning helps develop our empathy and theory of mind — two critical social functions typically mastered by six years of age. Empathy is "the ability to feel or imagine another person's emotional experience" (McDonald & Messinger, 2010). Theory of mind (ToM) is the understanding that others with whom we interact have various mental states (e.g., knowledge, memories, beliefs, etc.) and that those mental states can differ from our own. Furthermore, we can make inferences about others' intentions based on their behavior (Premack & Woodruff, 1978). For example, we can understand that someone we've engaged in conversation with has somewhere else to be when they begin to check their watch frequently and look over at the door. Theory of mind is considered fully mastered by typically developing children by the age of five, though more recent research suggests that children as young as three years of age could

have a nearly complete understanding of their peers' ability to have different opinions, beliefs, and knowledge about the world from themselves.

Cognitively, playing builds neural connections, which leads to positive brain changes that affect us as adults. The area of the brain most notably involved with play is the prefrontal cortex. This area is responsible for emotions, planning, and problem-solving – all critical components for a well-adjusted adult life. Moreover, these connections result in more social flexibility later in life and an increased ability to handle social stress (Pellis et al., 2014). Overall, "higher levels of social pretend play are related to higher levels of peer-oriented social competence" (Davis et al., 2018, pp. 2790).

Play Types and Stages

There are three different types of play that children engage in: imaginative play, functional play, and constructive play. Imaginative play is when children play pretend, and it is first seen around eighteen months of age (e.g., feeding a doll, having a tea party, using a cardboard box to play space, etc.). Functional play is seen in children between the ages of two and three years and promotes motor functioning. This form of play typically includes repetitive actions such as stacking blocks or pushing a car back and forth. By about three years, this form of play transforms into a more advanced play form, constructive play, when the same toys and actions are used to work towards a larger goal (i.e., the blocks are now being used to build a house) (Smilansky, 1968; Smilansky 1990).

Each of these types of play can range from nonsocial to highly social forms of play, as outlined by Mildred Parten in her 1932 article "Social Play Among Preschool

Children." Nonsocial play includes solitary play behaviors when a child does not interact with peers or adults but participates actively in the play behavior. Another form of nonsocial play is onlooker behavior, commonly seen in infants, where they simply observe other children playing, but can still gain many social benefits as if they were engaged in the play themselves. Parallel play is a more social form of play, though not interactive. This form of play is frequently seen in toddlers before goal-directed partnerships emerge in children's sociality. During this play, the children are often close to each other or an adult, but the parallel actor does not influence their play — they play near each other, but not with each other. Once they hit preschool-age, children will engage in associative play where sociality level increases from that of parallel play. Some interactions occur (e.g., swapping toys), though each play session remains relatively independent of the others around it. The most social form of play is cooperative play when children actively cooperate, interact, and reciprocate to reach a shared goal of a shared game jointly (Parten, 1932).

Play in Children with ASD

As noted above, children who have ASD tend to engage in less frequent and lower quality social play and exhibit deficits in the long-term benefits this type of play elicits in their typically developing peers. Early research conducted on the ASD population showed significant delays and deficits in imaginative play in conjunction with their language difficulties (Wing & Gould, 1979). Rather than engaging in socially important imaginative play, children with ASD display more repetitive play behaviors

(e.g., stacking, lining up, and organizing toys) for longer bouts of time (Honey et al., 2007).

Honey et al. (2007) conducted a study to examine whether the relationship between ASD and repetitive play originated in the restricted and repetitive patterns of behavior seen with the disorder or in the language and social deficits. A parent-report questionnaire on repetitive behaviors and play was given to the caregivers of 117 typically developing children and 79 children with ASD in two age groups: 2-4 years and 6-8 years. The study concluded that "a three-way association between repetitive behavior, imagination and communication might provide the best way of representing these associated impairments" (Honey et al., 2007, pp 1113).

Another study conducted by Memari et al. (2015) examined how ASD impacted patterns of play and physical activity in children ages 6-15 years. This study asked parents of children in this age group who had received a medical diagnosis of ASD to complete a set of questionnaires that asked about physical activity, solitary time, and social play, among other factors. The results of this study showed that children with ASD were significantly less likely to engage in physical activity and in social play and spent more time engaged in solitary play. Notably, this relationship was mediated by ASD severity and that children with greater deficits in the social and communication domains were less likely to engage socially with peers while playing.

Play-Based Interventions for ASD

Current play interventions focus on addressing social impairment in children who have socioemotional delays and disabilities such as those diagnosed with ASD. Children with high functioning ASD are frequently placed into classrooms with their typically developing peers yet have been observed to initiate and reciprocate peer interactions much less frequently than language-matched children with other developmental disabilities. Furthermore, in the absence of additional treatment, placement of these individuals together with typically developing children has not shown to increase social interactions of children with ASD (Frankel et al., 2011). Frankel et al. set out to examine the relationship between frequent parent-mediated play dates and school playground behavior in children with ASD. The frequency of playdates was parent-reported and school playground behavior included both positive peer interactions and the amount of conflict. Thirty-one children who met the criteria for ASD were observed on the playground and correlations of their behavior to the frequency of playdates were analyzed (Frankel et al., 2011). Emphasizing the importance of play on social competence, this study found that for children with high functioning ASD, there is a strong correlation between frequent playdates that were parent-mediated and the child's social ability as measured by behavior on the playground.

In 2015, Kretzman, Shih, and Kasari expanded on the findings of Frankel et al. by examining whether or not staff-mediated intervention on the playground would result in improved peer interactions for children with ASD. Like the children examined by Frankel et al., all twenty-four children who were recruited for the study were fully

included in the general classroom. For this study, staff members of the elementary schools that were included in the study were specifically trained in how to provide social intervention to children with ASD on the playground and instructed to fade out their intervention over time to allow the child more independent play time. The results showed that both brief and sustained immediate intervention leads to an improvement in peer interactions. The waitlist control group that received delayed intervention did not show the same improvements. This study was important in that it brought the intervention out of the clinical setting and implemented it in a real-world setting where the child with ASD was able to practice the intervention with typically developing children (Kretzman et al., 2015).

Holloway, Long, and Biasini (2018) found that "motor skills and social function are related in young boys with autism" (p. 8). This study was a simple correlational study to examine how the two factors (i.e., motor skills and social functioning) were related in individuals with the disorder. Twenty-one children ages four to five years with a diagnosis of ASD from a licensed professional were recruited for the study. Motor impairment and social functioning were measured by physical therapists, and a moderately strong relationship was found between the two factors. This study highlights the importance of incorporating movement into the intervention and suggests that effective play interventions should include activities such as playing an organized sport or a form of imaginative play that requires motor coordination over inactive social activities such as board games.

Moreover, in a case study published in 2017, Holloway and Biasini reported improvements in social functioning in children with ASD following participation in a Motor Intervention Program. This study only recruited eight children, four with a diagnosis of ASD and four typically developing children, and took pre- and post-intervention measures of acceptance, rejection, and reciprocated playmates. The results of this study show that most of the children, regardless of diagnosis, improved in social status following the intervention. Additionally, it should be noted that these motor interventions were often based in play but did focus on the social aspect of play in children. It was concluded that the increased motor skills likely better allowed the child to participate in group activities, which in turn could have led to more social association and a greater level of peer acceptance (Holloway & Biasini, 2017).

Play During COVID

Recent research on how play has been impacted by the onset of the COVID-19 pandemic has shown that restrictions put in place for public health and safety during the outbreak have negatively impacted children's social opportunities and play behaviors (Moore et al., 2020; Ammar et al., 2020; Kourti et al., 2021). Within a month of the WHO declaring the coronavirus a global pandemic, Moore et al. (2020) distributed an online survey to Canadian parents of children ages 5-17 years aimed at assessing the immediate changes in children's physical activity and play during the outbreak as compared to before. They found a sharp decrease in outdoor play with little change to indoor play to make up for the difference resulting in a net decline in play opportunities directly related to pandemic-related restrictions (Moore et al., 2020). Additionally,

Ammar et al. (2020) distributed an international survey shortly after the coronavirus outbreak was characterized as a pandemic that examined the impact of home confinement on social participation and life satisfaction in adults ages 18 years and older. These researchers also found a sharp decrease in participation in social activities and a correlated decrease in overall mental wellbeing and life satisfaction. While this study did not focus specifically on play behaviors, it speaks to the general trend of decreased social activities across the lifespan in the wake of the COVID-19 outbreak.

Furthermore, Kourti et al. (2021) conducted a meta-analysis of play frequency and quality during the pandemic. Seventeen studies were included in the analysis with samples from both North American and European populations. Overall, this study found a significant decrease in outdoor play activities — particularly ones that included a social aspect (e.g., playgrounds and outdoor sports)— while indoor play activities increased — particularly ones that included technology (e.g., video games). In addition to the reduced play opportunities, the study reports on the importance of play on a child's psychosocial well-being and found that many children were able to adapt to the drastic changes by increasing their play with family members and relying on other factors (e.g., remote team sport activities) to help them cope. The study also highlighted large variability in outcomes based on geographical region due in part to the number of cases of COVID-19 reported, local restrictions put into place, and cultural differences (Kourti et al., 2021).

Technology

Additionally, research done on the impact of the COVID-19 pandemic on technology use has also shown an increase in screen time as well as an increase in problematic outcomes that were associated with it (Eales et al., 2021; Kotrla Topic et al., 2020; Limone & Toto, 2021; Menear & Ernest, 2020). A study conducted by Eales et al. (2021) found a significant increase in non-school related screen media use (SMU) as well as problematic media use (PMU) (i.e., media use that disrupts a child's daily functioning) from before the pandemic to after the onset. Qualitative data from this study suggested that pandemic-related challenges led to the increase in reliance on technology for both parents and their children. In particular, reduced access to childcare and increased workload from home meant parents were less able to monitor screen usage and relied more heavily on technology to babysit their children. Additionally, the study found that families reported an increase in problematic behaviors and an over reliance on screen time in their children after the onset of the pandemic (Eales et al., 2021).

A Croatian study of technology use changes after the start of the pandemic also reported significant increases in screen time for children for non-school related activities, though age and grade level impacted their digital leisure time with preschool aged children spending less time using technology for non-school related activities than children in lower and upper elementary school (Kotrla Topic et al., 2020). Moreover, the study found a significant negative correlation between leisurely use of screens and sleep quality, indicating that increased use of technology during the pandemic is negatively impacting children's sleep (Kotrla Topic et al., 2020).

A systematic literature review of technology use in children during the pandemic also found a significant increase in time spent using technology for leisurely activities as well as a number of negative effects that were associated with this increase in screen time (Limone & Toto, 2021). Thirty studies that examined digital technology and the resulting psychosocial and emotional effects both before and after the onset of the pandemic were included in the analysis. Overall, the studies found an average of a 15% increase in prevalence rate in technology use during the pandemic in conjunction with a decrease in outdoor activities. A number of negative health impacts were noted across studies including sleep disturbances, poorer health, and an increase in mental health disorders such as anxiety, depression, and internet and technology addictions. However, some positive effects from technology use were also reported in association with video games specifically, including increased creativity and cognition and decreased stress and loneliness. Moreover, despite the stark increase in mental health issues among children during the pandemic, many children in these studies were also shown to be quite resilient through quarantine (Limone & Toto, 2021).

Finally, a study by Menear and Ernest (2020) compared technology use in children with ASD to that of their typically developing peers prior to the onset of the pandemic. Over 70,000 questionnaires were completed on physical activity and technology usage in children under the age of 18 split into three age categories: 0-5 years, 6-11 years, and 12-17 years. Of these, over 1700 came from households of children with ASD. The study found that overall children with ASD spent significantly more time engaged in technology use (e.g., watching TV, playing video games, etc.) than children

without ASD. Specifically for children between the ages of 6 and 11, nearly twice the percentage of children with ASD spent more than 4 hours a day engaging with technology (i.e., ASD=9.7%; TD=5.0%) (Menear & Ernest, 2020).

Quality of Life

Health Related Quality of Life (HRQoL) refers to an individual's "physical and mental health perceptions (e.g., energy level, mood) and their correlates—including health risks and conditions, functional status, social support, and socioeconomic status (CDC, 2016). Play is a vital part of a child's life that impacts both their physical and mental development and wellbeing. In fact, "stimulating play behaviour enhances the adaptability of a child. . . and promotes cognitive, social, emotional and psychomotor functioning, thereby strengthening the basis for their future health" (Nijhof et al., 2018). Moreover, children with a chronic illness or physical disability who are able to engage in play, through therapy for example, have better health outcomes and a higher quality of life (Nijhof et al., 2018).

A study conducted by Kuhlthau et al. (2010) found that the HRQoL in children with ASD was significantly worse than both the healthy population overall and compared to children with chronic disorders in overall quality of life, psychosocial, and emotional and social functioning, but did not significantly differ for physical and school functioning. These findings suggest that social impairment can have a greater impact on a child's HRQoL than a chronic illness or physical disability. In addition to having a lower quality of life than their typically developing peers, some research has shown that

families of children with ASD are at an increased risk of various factors that could further negatively affect their quality of life including the following: decreased access to services and therapies, disproportionate issues with educational and vocational challenges, and an increase in psychiatric problems (Baweja et al., 2021; Vasa et al., 2021).

The Current Study

This study aimed to examine how the COVID-19 pandemic has impacted children, especially those with an Autism Spectrum Disorder, and their play opportunities, technology use, and quality of life. Researchers dispersed an online survey for parents to complete about their children's play habits, as well as their own perceptions on play during the COVID-19 pandemic and health recommendations of social distancing.

Specific Aims and Hypotheses

Aim 1: *Determine children's play opportunities during the COVID-19 pandemic compared to retrospective parental accounts of before the COVID-19 pandemic.* We hypothesized that children will have fewer play opportunities during the COVID-19 pandemic compared to before the pandemic **(Hypothesis 1a)**. Furthermore, it was hypothesized that children with ASD will have fewer play opportunities before and during the COVID-19 pandemic compared to children without ASD **(Hypothesis 1b)**.

Aim 2: *Determine parent's perceived safety of play during the COVID-19 pandemic.* We hypothesized that parents will report greater perceived safety in small, outdoor, private settings compared to large, indoor, public settings **(Hypothesis 2)**.

Aim 3: *Determine the frequency of technology used by children before and during the COVID-19 pandemic.* We hypothesized that children will have greater technology usage during the COVID-19 pandemic compared to retrospective parental accounts of before the COVID-19 pandemic **(Hypothesis 3)**.

Aim 4: *Determine whether higher amounts of play is related to greater quality of life in children.* We hypothesized that children with more play opportunities have a greater quality of life than children with fewer opportunities for play (Hypothesis 4a). Furthermore, it was hypothesized that children with ASD have a lower quality of life compared to their peers without ASD (Hypothesis 4b).

METHODS

Participants

A convenience sample of caregivers of children with ASD (n = 14) and children without ASD (n = 27) completed the online survey via an anonymous Qualtrics link or QR code. Participants were recruited through a variety of networks (e.g., Regional Autism Network, Autism Society of America, The University of Alabama at Birmingham Civitan-Sparks Clinics), as well as social media platforms and word of mouth. Our target population for this study was parents of young children ages 5-12 that live in Alabama. However, the survey was dispersed online, and 3 responses were received from outside of Alabama. These responses were included in the analysis as there were no significant differences between their responses and those from Alabama. Only one of these respondents had a child with ASD. Parent and child characteristics are reported in Table 1 and Table 2. Children in the whole sample ranged in age from 5 to 12 years, with the mean of 8.3 years. There were 44% boys. 85.4% participants were White, 7.3% were Black, and 7.3% reported being Other. Only 4.9% of participants were Hispanic. Parent education and household income were reported and can be seen in Table 1.

Table 1

Parent Characteristics

	ASD (n = 14)	TD (n = 27)	Overall (N = 41)	Group Differences
	Freq. (%)	Freq. (%)	Freq. (%)	p
Gender				n.s.
Male	1 (7.1)	2 (7.4)	3 (7.0)	
Female	13 (92.9)	24 (88.9)	37 (86)	
Not specified	0 (0.0)	1 (3.7)	1 (2.4)	
Race				n.s.
White	10 (71.4)	25 (92.6)	35 (85.4)	
Black	3 (21.4)	0 (0.0)	3 (7.3)	
Other	1 (7.1)	2 (7.4)	3 (7.3)	
Ethnicity				n.s.
Hispanic/Latino	1 (7.1)	1 (3.7)	2 (4.9)	
Not Hispanic/Latino	13 (92.9)	26 (96.3)	39 (95.1)	
Region				n.s.
Alabama	13 (92.9)	25 (92.6)	38 (88.4)	
Not Alabama	1 (7.1)	2 (7.4)	3 (7.0)	
Education				.001
High School	2 (14.3)	0 (0.0)	2 (4.9)	
Some college	4 (28.6)	0 (0.0)	4 (9.8)	
2-year degree	0 (0.0)	1 (3.7)	1 (2.4)	
4-year degree	5 (35.7)	8 (29.6)	13 (31.7)	
Professional degree	2 (14.3)	9 (33.3)	11 (26.8)	
Doctorate degree	1 (7.1)	9 (33.3)	10 (24.4)	
Household Income				.05
<$20,000	1 (7.1)	0 (0.0)	1 (2.5)	
$20,000-39,999	1 (7.1)	0 (0.0)	1 (2.5)	
$40,000-59,999	1 (7.1)	4 (14.8)	5 (12.5)	
$60,000-79,999	2 (14.3)	0 (0.0)	2 (5.0)	
$80,000-99,999	2 (14.3)	3 (11.1)	5 (12.5)	
>$100,000	7 (50.0)	19 (70.4)	26 (65.0)	

Table 2

Child Characteristics

	ASD (n = 14)	TD (n = 27)	Overall (N = 41)	Group Differences
	Freq. (%)	Freq. (%)	Freq. (%)	*p.*
Gender				n.s.
Male	11 (78.6)	7 (25.9)	18 (43.9)	
Female	3 (21.4)	19 (70.4)	22 (53.7)	
Other	0 (0.0)	1 (3.7)	1 (2.4)	
Age				n.s.
5	0 (0.0)	5 (18.5)	5 (12.5)	
6	1 (7.1)	1 (3.7)	2 (5.0)	
7	1 (7.1)	4 (14.8)	5 (12.5)	
8	2 (14.3)	6 (22.2)	8 (20.0)	
9	3 (21.4)	7 (25.9)	10 (25.0)	
10	3 (21.4)	3 (11.1)	6 (15.0)	
11	2 (14.3)	0 (0.0)	2 (5.0)	
12	1 (7.1)	1 (3.7)	2 (5.0)	
Mean	9.23	7.85	8.30	

Measures

In order to identify play in children during the COVID-19 pandemic, a survey was created to evoke the perspectives of parents of children with and without ASD. The survey questions are structured to solicit parents' perspectives regarding play safety, children's play opportunities, and technology use (See Appendix A). The survey includes questions from ActiveWhere (Durant, 2009) and Pediatric Quality of Life Inventory 4.0. Parents of children without ASD were directed to respond with only one child in mind: the child closest to his/her birthday. Parents with a child who has ASD were asked to report on their child with ASD.

Demographics

Parents completed a brief questionnaire about child and family characteristics. Parents reported on their child's gender and age (See Table 1). They also reported on the number of children in the home, their own race/ethnicity, parental education, household income, parental employment status, and geographical location.

Parent Perceptions of Play Safety

A scale was developed to measure parental perceptions of play safety. The scale included 10 items, each with 5-point Likert scale response options anchored with "very unsafe" to "very safe." This scale asks parents to rate the perceived safety of large group outdoor activities (e.g., "organized outdoor activities such as soccer and baseball"); small group outdoor activities (e.g., "small group play-dates in an outdoor public space such as the park or playground"); large group indoor activities (e.g., "organized indoor activities such as ballet and karate"); small group indoor activities (e.g., small group play-dates in an indoor private space such as in the home"). The scale includes questions about perceived safety for both public and private spaces.

Play Opportunities

The second scale asked parents to indicate opportunities for their children to engage in play in outdoor, indoor, public, and private settings. Parents were asked to report on their children's play opportunities before and during the COVID-19 pandemic. The scale includes 10 items, each with 5-point Likert scale response options anchored

with “never” to “regularly.” This scale asks parents to rate their child’s opportunity to engage in large group outdoor activities (e.g., “Organized outdoor activities such as soccer and baseball”); small group outdoor activities (e.g. “Small group play dates in an outdoor public space such as the park or playground”); large group indoor activities (e.g., “Organized indoor activities such as ballet and karate”); small group indoor activities (e.g. “Small group play dates in an indoor private space such as in the home”). The scale includes questions about opportunities for play in both public and private spaces.

Technology

Children’s technology usage was measured using the Home Environment scale from the ActiveWhere survey (Durant, 2009). Parents were asked to report the number of various types of electronic entertainment or information devices available in the home and in the child’s bedroom using an open-ended format. Parents were also asked to report the amount of time their child spends on the electronic device before and during the COID-19 pandemic.

Quality of Life

Quality of Life was measured using the Pediatric Quality of Life Inventory 4.0 (PedsQL), which is a standardized measure used to assess the health-related quality of life in children and adolescent populations. The PedsQL is a 23-item measure that asks about functioning in the past 1 month and divides health quality into four scales: Physical Functioning, Emotional Functioning, Social Functioning, and School Functioning. These scales combine to yield a Total Scale Score, a Physical Health Summary Score (8 items),

and a Psychosocial Health Summary Score (15 items). Additionally, the PedsQL has been normed and standardized for use in many different populations including ASD. The PedsQL has identical Child Self-Report Measures and a Parent Proxy Report Measure (Varni, Seid, & Kurtin, 2001). This survey utilized the Parent Report Form of the measure. Psychometrics for this measure are high, with an internal consistency reliability coefficient alpha of .93 (Varni, Limbers, & Burwinkle, 2007).

Procedure

The protocol for this study was approved by the Institutional Review Board at UAB (See Appendix B). Participants completed all surveys via a Qualtrics link that was distributed through numerous outlets, including the Regional Autism Network, Autism Society of America, The UAB Civitan-Sparks Clinics, and social media platforms (e.g., Facebook, Instagram) and word of mouth. The Qualtrics link remained active from June 23, 2021 to October 22, 2021. Qualtrics is an online tool designed to build and disseminate surveys, which participants were able to access using a hyperlink or scanning a QR code. The hyperlink brought participants to the initial page of the survey that included an informational handout. This informational handout provided a detailed explanation of the study's purpose and goals as well as the contact information of the principal investigator for questions and/or concerns. If participants elected to consent, they were brought to the first page of the survey questions. It took participants approximately 20 minutes to complete the survey.

Data Analysis

All statistical analyses were completed using SPSS (Version 27, IBM Corp, 2020). Tables and graphs were created in Excel (Version 16.54, Microsoft, 2021). Descriptive statistics were calculated to provide a description of the children as a total group and by their diagnostic grouping (ASD or TD). Composite scores were created for play opportunities, parent perception of play safety, technology use, and quality of life.

For play opportunities, we created three composite scores: play before the pandemic, play since the pandemic hit, and overall play. For play before the pandemic, we computed the average score for the 10 sub-questions from the question "How often did your child have the opportunity to engage in these activities BEFORE the COVID-19 pandemic?" For play since the pandemic hit, we computed the average score for the 10 sub-questions from the question "How often has your child had the opportunity to engage in these activities DURING the COVID-19 pandemic?" For overall play we combined all 20 of these items for a general composite score. Higher values indicate greater play opportunities.

For parent perception of play safety, we created the following six composite scores: indoor setting, outdoor setting, large group setting, small group setting, public setting, and private setting. For each of these composite scores we averaged the sub-questions from the question "How safe would you rate these activities for your child DURING the COVID-19 pandemic?" that related to the grouping we wanted to capture (e.g., "large group play dates in an outdoor public space," "large group play dates in an

indoor public space," "large group play dates in an outdoor private space," and "large group play dates in an indoor private space" for the large group composite score, etc.) (See Appendix A). Higher values indicate greater perception of play safety.

For technology usage, we created the following six composite scores: overall technology use before the pandemic, overall technology use since the pandemic, technology use on weekdays before the pandemic, technology use on weekdays since the pandemic, technology use on weekends before the pandemic, and technology use on weekends since the pandemic. Each of these composite scores, technology usage was re-coded into hourly increments (e.g., a score of 1 for "Never" was recoded into a 0, a score of 2 for "15 minutes" was recoded into 0.25, etc.) for more meaningful data interpretation. Similar to the parent perception of play safety composite, these scores were calculated using the average score for the 5 sub-questions, excluding the sub-question about virtual school, that related to frequency of technology use before and during the pandemic either on weekdays, weekends, or both for the overall composite (See Appendix A). Higher values indicate a greater frequency of technology usage.

For quality of life, composite scores provided by PedsQL scoring manual were used. Each entry was reverse scored (i.e., 0 = 100, 1 = 75, 2 = 50, 3 = 25, 4 = 0) so that a higher score indicated a greater quality of life. Then three composite scores were calculated: overall quality of life, psychosocial quality of life, and physical quality of life. Overall quality of life averaged all of the responses together for a general composite score. Psychosocial averaged the responses to the sub-questions relating to emotional

functioning, social functioning, and school functioning. Physical quality of life averaged the responses to the sub-questions relating to physical functioning.

Hypothesis 1a.

We hypothesized that children will have fewer play opportunities during the COVID-19 pandemic compared to before the pandemic. Hypothesis 1a was tested using a paired samples t-test, where the dependent variables were a composite score of play opportunities before the pandemic and a composite score of play opportunities since the pandemic hit.

Hypothesis 1b.

We hypothesized that children with ASD will have fewer play opportunities before and during the COVID-19 pandemic compared to children without ASD. Hypothesis 1b was tested using an independent samples t-test, where the dependent variable was a composite score of overall play opportunities and the independent variable was child diagnosis, which had two groups: ASD and TD.

Hypothesis 2.

We hypothesized that parents will report greater perceived safety in small, outdoor, private settings compared to large, indoor, public settings. Hypothesis 2 was tested using paired samples t-tests, where the dependent variables were a composite score of parent perception of play safety in an indoor setting versus an outdoor setting, a composite score of parent perception of play safety in a large versus small group setting, and a composite score of parent perception of play safety in a private versus public play setting all measured during the COVID-19 pandemic.

Hypothesis 3.

We hypothesized that children will have greater technology usage during the COVID-19 pandemic compared to retrospective parental accounts of before the COVID-19 pandemic. Hypothesis 3 was tested using a paired samples t-test, where the dependent variables were a composite score of overall technology usage before the pandemic versus since the pandemic hit, a composite score of technology use on weekdays before the pandemic versus since the pandemic, and technology use on weekends before the pandemic versus since the pandemic.

Hypothesis 4a.

We hypothesized that children with more play opportunities have a greater quality of life than children with fewer opportunities for play. Hypothesis 4a was tested using a linear regression, where the dependent variable was quality of life and the independent variable was a composite score of play opportunities since the pandemic hit.

Hypothesis 4b.

We hypothesized that children with ASD have a lower quality of life compared to their peers without ASD. Hypothesis 4b was tested using an independent samples t-test, where the dependent variable was quality of life and the independent variable was child diagnosis, which had two groups: ASD and TD.

RESULTS

Play Opportunities

Our first aim was to determine children's play opportunities during the COVID-19 pandemic compared to before the COVID-19 pandemic. A paired samples t-test was conducted to compare children's play opportunities before the COVID-19 pandemic and since the pandemic. There was a significant difference in score for before the pandemic *(M*=3.05, *SD*=0.72*)* and since the pandemic *(M*=2.03, *SD*=0.77*); t(40*)=7.36*, p*<.001. These results suggest that children have had fewer opportunities to socially engage with their peers since the COVID-19 pandemic hit and support our hypothesis 1a. Furthermore, an independent samples t-test was conducted to compare overall play opportunities in children without ASD and children with ASD. There was a significant difference in the scores for children without ASD *(M*=2.75, *SD*=0.54*)* and children with ASD *(M*=2.15, *SD*=0.48*); t(39)*= -3.52*, p*=.001 (See Table 3). These results indicate that children with ASD have less play opportunities with their peers than children without ASD and support hypothesis 1b.

Table 3

Play Opportunities

	ASD (n = 14)	TD (n = 27)	Overall (N = 41)	Group Differences
	M (SD)	M (SD)	M (SD)	p
Total Play	2.146 (0.48)	2.753 (0.54)	2.546 (0.59)	.001
Before COVID-19	2.693 (0.83)	3.242 (0.58)	3.054 (0.72)	.018
During COVID-19	1.583 (0.66)	2.265 (0.72)	2.032 (0.77)	.005

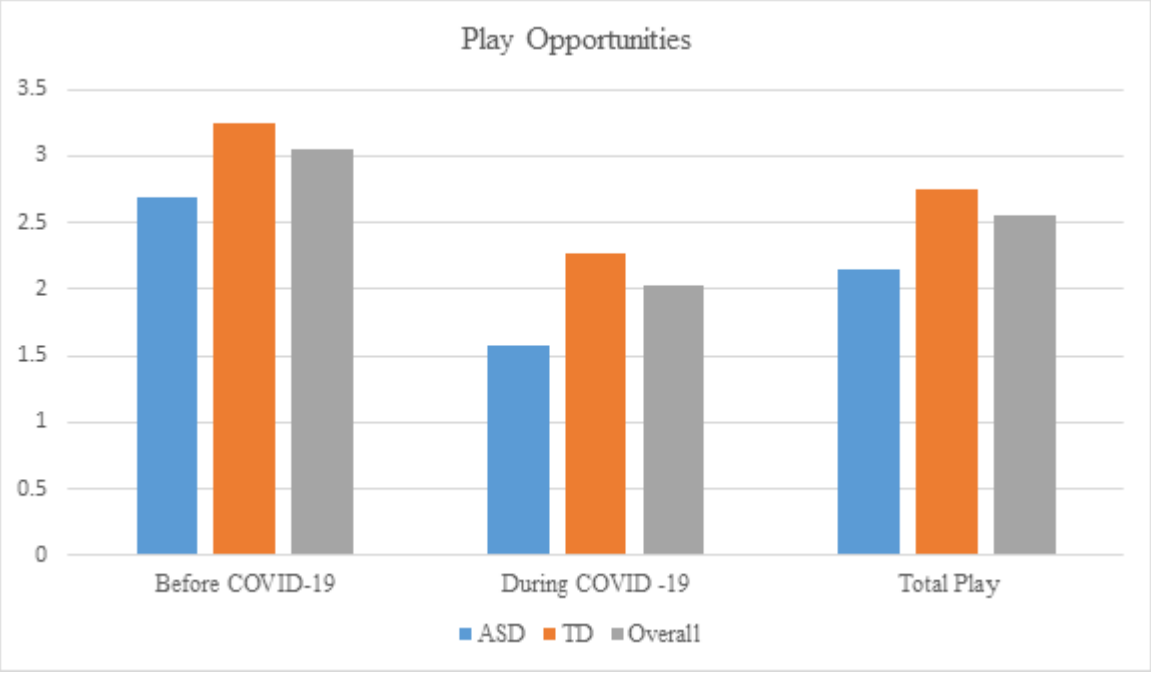

Figure 1. Play Opportunities by diagnosis and for the sample overall

Parents' Perception of Play Safety

Our second aim was to determine parent's perceived safety of play during the COVID-19 pandemic. A paired samples t-test was conducted to compare parents' perception of play safety in an indoor versus outdoor setting, large group versus small group setting, and public versus private setting. There was a significant difference in the score for indoor *(M*=2.34, *SD*=0.9*)* and outdoor *(M*=3.45, *SD*=0.92*)* settings; *t(40)*= -9.32; *p*<.001. There was also a significant difference in the score for large *(M*=2.46*, SD*=1.00*)* and small *(M*=3.39, *SD*=0.76*)* group settings; *t(40*)= -9.06, *p*<.001. Finally, there was a significant difference in the score for public *(M*=2.78, *SD*=0.88*)* and private *(M*=3.08, *SD*=0.83*)* group setting; *t(40)*= -3.99; *p*<.001. These results indicate that parents perceive greater safety in small, outdoor, private settings compared to large, indoor, public settings and support hypothesis 2.

Technology Use

Our third aim was to determine the frequency of technology used by children before and during the COVID-19 pandemic. A paired samples t-test was conducted to compare children's technology use before the COVID-19 pandemic and since the pandemic overall as well as specifically on weekdays and weekend days. There was a significant difference in the score for overall technology use before *(M*=4.01, *SD*=3.82*)* and since *(M*=5.97*, SD*=4.34*)* the pandemic; *t(40)*= 6.61, *p*<.001. There was also a significant difference in the score for weekday use before *(M*=3.59, *SD*=3.64*)* and since *(M*=6.13*, SD*=4.75*)* the pandemic; *t(40)*= 6.07, *p*<.001. Finally, there was a significant

difference in the scores for weekend use before *(M*=4.43, *SD*=4.26*)* and since *(M*=5.81, *SD*=4.54*)* the pandemic; *t(40)*= 4.28 *, p*<.001 (See Table 4). These results indicate that children are using more technology since the onset of the pandemic both during the week and on weekends and supports hypothesis 3. Moreover, a follow-up analysis comparing children with ASD to their peers without ASD showed significant group differences in overall technology use during the pandemic.

Table 4

Technology Usage

	ASD (n = 14)	TD (n = 27)	Overall (N = 41)	Group Differences
	M (SD)	M (SD)	M (SD)	*p*
Overall Usage				
Before COVID-19	5.660 (5.05)	3.153 (2.73)	4.009 (3.82)	.045
During COVID-19	8.089 (5.10)	4.875 (3.51)	5.973 (4.34)	.023
Weekday				
Before COVID-19	5.268 (4.71)	2.722 (2.64)	3.591 (3.64)	.032
During COVID-19	7.857 (5.50)	5.241 (4.15)	6.134 (4.75)	n.s.
Weekend				
Before COVID-19	6.054 (5.46)	3.583 (3.29)	4.427 (4.26)	n.s.
During COVID-19	8.321 (5.01)	4.509 (3.74)	5.811 (4.54)	.009

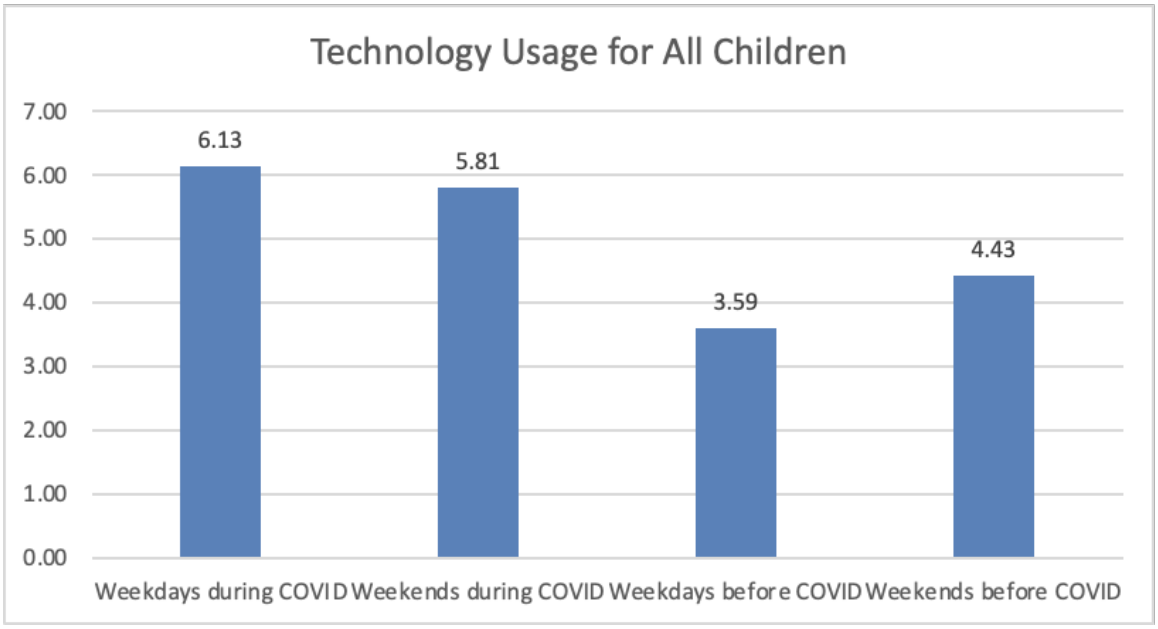

Figure 2. Technology Usage for All Children

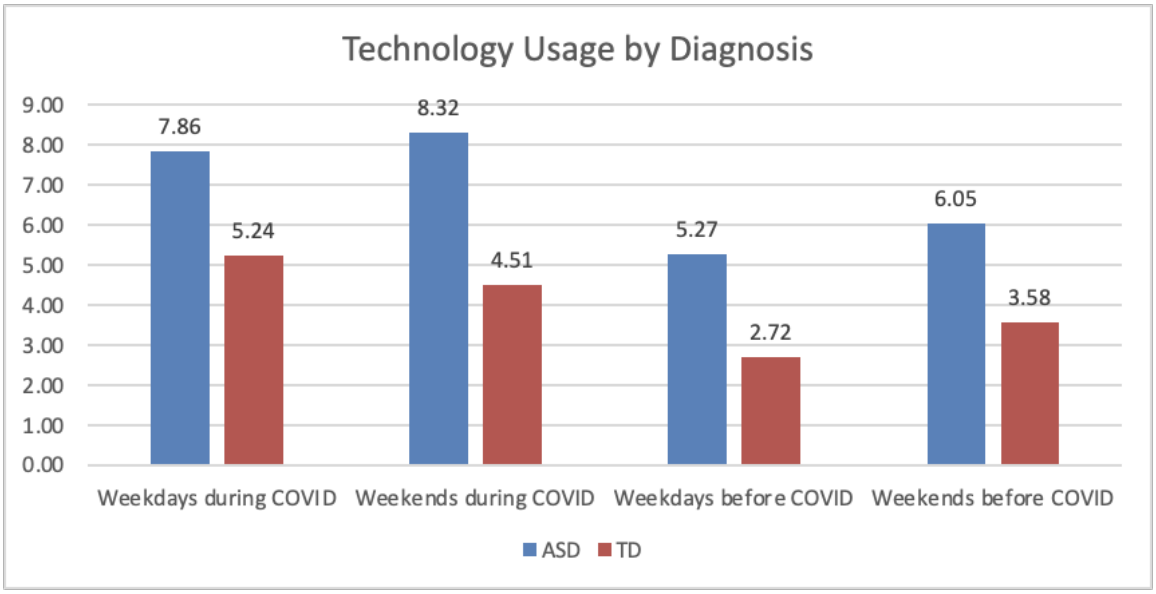

Figure 3. Technology Usage by Diagnosis

Quality of Life

Our final aim was to determine whether increased frequency of play opportunities is related to greater quality of life in children. A simple linear regression was calculated to predict a child's overall quality of life based on play opportunities since the onset of the COVID-19 pandemic. Significance was not found in the association between play opportunities since the pandemic and overall quality of life *(β*=3.26, *SE*=0.17*, p= n.s.)*. This result suggests that having more opportunities to play does not predict a higher quality of life and does not support our hypothesis 4a. An independent samples t-test was conducted to compare the overall quality of life in children without ASD and children with ASD. There was a significant difference in the scores for children without ASD *(M*=56.63, *SD*=13.42*)* and children with ASD *(M*=39.52*, SD*=10.77*); t(38)*= -4.01, *p*<.001. These results suggest that children with ASD have a lower overall quality of life scores compared to their peers without ASD and supports our hypothesis 4b.

DISCUSSION

The purpose of the current study was to examine how the COVID-19 pandemic has impacted children, especially those with an Autism Spectrum Disorder, and their play opportunities, technology use, and quality of life. The current study explored how safe parents perceived in-person social play gatherings for their children. Results of this study support, in part, existing research on technology use during the pandemic in children and quality of life in children with ASD when compared to their peers without ASD, as well as some novel findings regarding social play opportunities and parents' perceptions on the safety of social play in the era of COVID-19.

We hypothesized that children will have had fewer play opportunities overall since the onset of the pandemic as compared to their normal routine before COVID-19. We also expected to see that children with ASD would have fewer play opportunities overall than their peers without ASD. As hypothesized, children in the study had a significant decrease in social play opportunities during the pandemic from approximately every other week on average to once a month or less. When analyzing how a diagnosis of ASD impacted children's play opportunities overall, the study found a significant difference between both groups. Children without ASD still had an average of play opportunities about every other week even during COVID, while children with ASD averaged about once a month or less. This study extends on previous research that has

shown discrepancies in play opportunities in children with ASD when compared to their peers without ASD before the pandemic began and highlights how disproportionally affected these children have been by the restrictions set into place after the onset of the COVID-19 pandemic (Memari et al., 2015).

We also hypothesized that parents would report greater perceived safety in small, outdoor, private play settings as compared to a large, indoor, public play setting. As predicted, the outdoor, small group, and private settings were all reported as being perceived as significantly safer than their indoor, large group, and public counterparts. None of the scenarios were reported as being perceived as "safe" or "very safe." Rather, outdoor, small, and private were all ranked on average as being "neutral," while indoor, large, and public were all ranked on average as being "unsafe." The largest difference in perceived safety that parents reported was between outdoor versus indoor, followed closely by small versus large groups. These results are in accordance with public health reports that transmission of the disease is lower in outdoor settings and recommendations to keep gatherings to a small group (Schive, 2021).

We further hypothesized that the frequency of a child's technology use would increase with the onset of the pandemic. This hypothesis was also supported by the data. Parents reported that their children spent significantly more time using technological devices after the onset of the pandemic; however, the general trend of children using more technology on the weekends as compared to the weekdays did not remain the same. A follow-up analysis that compared children without ASD to those with ASD, found that while children with ASD did follow the same pre-pandemic trend,

children without ASD spent less time using technology during the weekends (approximately 4.5 hours) than they did on the weekdays (approximately 5.2 hours) (See Table 4). For the purpose of this study, time spent doing virtual school was disregarded from the analysis and does not account for the difference in screen time during the week. These findings are in line with existing literature that was published after the onset of the pandemic that indicated that non-school related technology use had increased in children in the wake of lock downs and social distancing orders in many geographical locations, including throughout the United States (Eales et al., 2021; Kotrla Topic et al., 2020; Limone & Toto, 2021; Menear & Ernest, 2020).

Finally, we hypothesized that children with more social play opportunities would have a greater quality of life. However, the results of this study did not support this hypothesis. While we did see that children with ASD had significantly lower quality of life than their peers without ASD, the study does not provide evidence to suggest that social play opportunities are a protective factor against issues that reduce a child's overall quality of life. Existing literature released during the pandemic has suggested that perhaps children have been more resilient to the drastic changes that came along with the sudden shut-downs than their adult counterparts, scoring more highly on measures of mental health and general wellbeing (Limone & Toto, 2021; Kourti et al., 2021). Increased use of technology for virtual play and social activities, as well as the availability of family members in the home could influence the resilience seen in children.

Implications

These findings suggest that the COVID-19 pandemic had a profound impact on children's ability to engage in socially important play opportunities. Moreover, while all children saw a significant decrease in their play opportunities since the pandemic hit, children with ASD were disproportionately impacted. Previous research has shown how important play is for children's social learning and cognitive development, as well as how important access to mediated social encounters and structured play sessions are to the effective treatment of social impairment in children with ASD. It is possible that these months of restricted access to play could have long-term effects on the current generation's social development. Additionally, reduced access to play in conjunction with difficulty receiving services could put children with ASD even further behind their peers without ASD, widening the gap in social functioning and decreasing the long-term benefits to appropriate social experiences (i.e., dating, job hunting, etc.).

Moreover, the data shows a significant increase in technology usage for all children and indicates that children with ASD used even more technology than their peers without ASD. Interestingly, the pandemic brought on a shift of decreased use on the weekends than on weekdays during the pandemic, but only for children without ASD. It is possible that these children have access to opportunities (e.g., family hikes, play dates, etc.) that children with ASD do not have access to either due to their disorder (i.e., no one to organize play dates with) or another confounding variable (i.e., socioeconomic status). In any case, all children, especially those with ASD, are at increased risk of experiencing the negative side-effects of using more technology throughout the

day. While social experiences can be brought to a virtual platform, oftentimes the physical nature of play does not translate well to a digital setting. Existing literature has shown that an increase in technology usage is accompanied by a decrease in physical activity and a more sedentary lifestyle. Both of these in turn are linked to higher levels of obesity and greater health risks in children.

Finally, the study shows that quality of life in children is not predicted solely by their social play opportunities. There are a number of reasons why our study was not able to support our hypothesis that social play opportunities are linked to quality of life in children during the pandemic. First, the quality of play is likely as important as the frequency. As mentioned above, almost all play-based interventions for children with ASD that have been shown to be effective against social impairment are mediated by an adult that helps to connect the social bridge between peers. Simply having the opportunity to play on a public playgroup is not enough of a positive social experience for a child with ASD, and the pandemic likely reduced the amount and quality of interactions parents could have to facilitate their child's play experience. Second, previous research has suggested that children have been fairly resilient in the wake of the pandemic. This could be, in part, due to other social experiences (e.g., video chatting with friends, virtual ballet class, interacting with family members, etc.). Therefore, it is possible that social play is still an important factor in overall quality of life, but this play does not need to be physical, outdoor, or in-person in nature in order to provide the benefits we expect to see.

Limitations

While these findings are promising for understanding how the COVID-19 pandemic impacted children's play opportunities, technology use, and quality of life, this study has a number of limitations. First, the sample size of the study is quite small, especially for the ASD population, thus limiting the generalizability of these findings to the larger population without further research. This may be due, in part, to a lack of incentive or immediate benefit for participation in the study as well as the timing of survey distribution, which was during the summer months. In addition to the effects of the pandemic on access to childcare, parents tend to be busier during summer months when their children are out of school. This may be particularly true of parents caring for children with special needs. Moreover, the study relied on an non-randomized convenience sample. Certain qualities within the sample, such as a child's overall quality of life, could have been artificially selected for by the nature of the survey. For example, perhaps only parents of children who are handling the pandemic relatively well had the time to complete the survey, or only children with less severe autism symptoms were captured in the sample. Furthermore, because we relied heavily on word of mouth for distributing the survey, there is likely a skew in the sample being very similar in terms of SES and racial make-up among other relevant factors, rather than representative of the population.

Next, the data relied entirely on parent report data. Thus, these responses could be impacted by social desirability bias, under or overestimates on various items, or memory bias. Moreover, studies have shown that parent-proxy of quality of life is not

equivalent to self-reported measures of quality of life on the PedsQL 4.0, so the reported numbers could also possibly not be reflective of how well the children in the study are actually doing. Finally, as mentioned above there are likely a number of confounding variables that could impact the results of this study including, but not limited to, the following: resilience, sleep quality, socioeconomic status, siblings/family members available for play, activity level, and autism severity. Since this study did not control for any of these factors nor did the analysis take them into consideration as possible mediators or moderators, the results should be interpreted with caution.

Future Research

As mentioned above, additional research should be conducted on how factors such as resilience, sleep quality, and activity level impact how well children have coped with the sudden social changes brought on by the pandemic and their quality of life. Furthermore, the use of technology for virtual social interactions and possibly play in this age group should be explored further. Notably, future research should focus on the difference between virtual play in a private, interactive setting (e.g., video-chatting while playing dolls, online game forums with close in-person friends, etc.) and social media use on children's social development and mental wellbeing. While some research has been conducted on these individual factors since the pandemic began, a deeper understanding of how these factors interplay could give social scientists an important clue on how children develop socially in a modern era.

It would also be beneficial to see how the availability of the vaccine against COVID-19 for this age group (ages 5-11), which was approved by the FDA on October 29, 2021, will impact children moving forward in terms of social play opportunities, technology use, physical activity, and quality of life, among others. Vaccine availability will likely also impact how both parents and children perceive the safety of social play opportunities. It is expected that with the availability of the vaccine, children will be able to continue engaging in social opportunities at similar rates to what they were seeing prior to the pandemic and that perceptions of play safety would increase. Understanding how these pandemic benchmarks have impacted children in the short-term could also provide some insight on possible long-term impacts to explore in the future.

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APPENDIX A

QUALTRICS SURVEY

Introduction

You are being invited to take part in this research study. This study aims to examine how the COVID-19 pandemic has impacted children, especially those with an Autism Spectrum Disorder, and their play behaviors, as well as the effects of isolation on their socioemotional development across childhood. The Principal Investigator of this study is Jenni Koehler of the University of Alabama at Birmingham. We plan to enroll around 100 participants.

If you agree to participate in this study, you will be asked to complete the online questionnaire. If you agree to participate in the study, you will be redirected to the online questionnaire about your child's play opportunities during the COVID-19 pandemic. This questionnaire includes both closed-ended and open-ended questions and takes about 20 minutes to complete.

Whether or not you take part in this study is your choice. There will be no penalty if you decide not to be in it. If you decide not to be in the study, you will not lose any benefits you are otherwise owed. To the best of our knowledge, the things you will be doing have no more risk of harm than you would experience in everyday life. You will receive a $25 gift card for taking part in this study. Your willingness to take part, however, may, in the future, help society as a whole better understand this research topic.

If you are a UAB student or employee, taking part in this research is not a part of your UAB class work or duties. You can refuse to enroll or withdraw after enrolling at any time before the study is over, with no effect on your class standing, grades, or job at UAB. You will not be offered or receive any special consideration if you take part in this research.

If you have any questions, concerns, or complaints about the research, please contact the Principal Investigator. You may contact the Investigator, Jenni Koehler at jweikard@uab.edu or the faculty advisor Maria Hopkins at mhopkins@uab.edu. If you have questions about your rights as a research participant, or

concerns or complaints about the research, you may contact the UAB Office of the IRB (OIRB) at (205) 934-3789 or toll free at 1-855-860-3789. Regular hours for the OIRB are 8:00 a.m. to 5:00 p.m. CT, Monday through Friday.

Do you consent to participate in this study?

- ○ Yes
- ○ No

Demographics

Do you live in Alabama?

- ○ Yes
- ○ No

In what **county** do you live?

In what **county** and **state** do you live?

What is your gender?

- ○ Male
- ○ Female
- ○ Other
- ○ Prefer not to say

What is your race/ethnicity?

- ○ White
- ○ Black or African American
- ○ American Indian or Alaska Native
- ○ Asian
- ○ Native Hawaiian or Pacific Islander
- ○ Other

Are you of Hispanic or Latino origin?

- ○ Yes
- ○ No

What is the highest level of education you have completed?

- ○ Less than high school
- ○ High school graduate
- ○ Some college
- ○ 2 year degree
- ○ 4 year degree
- ○ Professional degree
- ○ Doctorate

What is your current employment status?

- ○ Employed full time
- ○ Employed part time
- ○ Unemployed looking for work

- ○ Unemployed not looking for work
- ○ Retired
- ○ Student
- ○ Disabled

Do you work from home?

- ○ Yes, work from home full time (standard)
- ○ Yes, work from home part time (standard)
- ○ Yes, work from home full time (COVID)
- ○ Yes, work from home part time (COVID)
- ○ No, work from the office

What is your annual household income?

- ○ Less than $20,000
- ○ $20,000 - $39,999
- ○ $40,000 - $59,999
- ○ $60,000 - $79,999
- ○ $80,000 - $99,999
- ○ More than $100,000

How many children do you have living in your home?

The following questions are about your child. Please answer these questions for your child with the most recent birthday who is between the ages of 5 and 12 years OR with an ASD diagnosis AND who lives in this house most of the time.

What is your relationship to the child?

- ○ Mother/Step-mother/Legal guardian
- ○ Father/Step-father/Legal guardian
- ○ Grandmother
- ○ Grandfather
- ○ Other (Please Specify)

Does your child have a diagnosis of Autism Spectrum Disorder (ASD)?

- ○ Yes
- ○ No

How old is your child?

What gender is your child?

- ○ Male
- ○ Female
- ○ Other
- ○ Prefer not to say

Parent Perception of Play Safety

How safe would you rate these activities for your child **DURING** the COVID-19 pandemic:

	Very Unsafe	Unsafe	Neutral	Safe	Very Safe
Organized indoor activity (karate, ballet, etc.)	O	O	O	O	O
Organized outdoor activity (soccer, baseball, etc.)	O	O	O	O	O
Large group play dates in an outdoor public space (park, playground, etc.)	O	O	O	O	O
Large group play dates in an indoor public space (movie theatre, trampoline park, etc.)	O	O	O	O	O
Large group play dates in an outdoor private space (backyard, pool, etc.)	O	O	O	O	O
Large group play dates in an indoor private space (your home, friend's/neighbor's home, etc.)	O	O	O	O	O
Small group play dates in an outdoor public space (park, playground etc.)	O	O	O	O	O
Small group play dates in an indoor public space (movie theatre, trampoline park, etc.)	O	O	O	O	O

	Very Unsafe	Unsafe	Neutral	Safe	Very Safe
Small group play dates in an outdoor private space (backyard, pool, etc.)	○	○	○	○	○
Small group play dates in an indoor private space (your home, friend's/neighbor's home, etc.)	○	○	○	○	○

How many people gathering together do you consider a large group?

	0	10	20	30	40	50	60	70	80	90	100
Please select the number of people											

What safety measures do you think about when you are scheduling an activity for your child **DURING** the pandemic? Please select **ALL** that apply

- ☐ Hand washing/sanitation stations
- ☐ Mask requirements
- ☐ Number of people allowed in space
- ☐ If its an indoor/outdoor facility
- ☐ Other (please specify) _____

Play Opportunity

How often has your child had the opportunity to engage in these activities **DURING** the COVID-19 pandemic:

	Never	Once a month or less	Every other week	Once a week or more	Daily
Organized indoor activity (karate, ballet, etc.)	○	○	○	○	○
Organized outdoor activity (soccer, baseball, etc.)	○	○	○	○	○
Large group play dates in an outdoor public space (park, playground, etc.)	○	○	○	○	○
Large group play dates in an indoor public space (movie theatre, trampoline park, etc.)	○	○	○	○	○
Large group play dates in an outdoor private space (backyard, pool, etc.)	○	○	○	○	○
Large group play dates in an indoor private space (your home, friend's/neighbor's home, etc.)	○	○	○	○	○
Small group play dates in an outdoor public space (park, playground etc.)	○	○	○	○	○
Small group play dates in an indoor public space (movie theatre, trampoline park, etc.)	○	○	○	○	○

	Never	Once a month or less	Every other week	Once a week or more	Daily
Small group play dates in an outdoor private space (backyard, pool, etc.)	○	○	○	○	○
Small group play dates in an indoor private space (your home, friend's/neighbor's home, etc.)	○	○	○	○	○

How often did your child have the opportunity to engage in these activities **BEFORE** the COVID-19 pandemic:

	Never	Once a month or less	Every other week	Once a week or more	Daily
Organized indoor activity (karate, ballet, etc.)	○	○	○	○	○
Organized outdoor activity (soccer, baseball, etc.)	○	○	○	○	○
Large group play dates in an outdoor public space (park, playground, etc.)	○	○	○	○	○
Large group play dates in an indoor public space (movie theatre, trampoline park, etc.)	○	○	○	○	○

	Never	Once a month or less	Every other week	Once a week or more	Daily
Large group play dates in an outdoor private space (backyard, pool, etc.)	○	○	○	○	○
Large group play dates in an indoor private space (your home, friend's/neighbor's home, etc.)	○	○	○	○	○
Small group play dates in an outdoor public space (park, playground etc.)	○	○	○	○	○
Small group play dates in an indoor public space (movie theatre, trampoline park, etc.)	○	○	○	○	○
Small group play dates in an outdoor private space (backyard, pool, etc.)	○	○	○	○	○
Small group play dates in an indoor private space (your home, friend's/neighbor's home, etc.)	○	○	○	○	○

If you feel that play activities are safe during the pandemic, but have not engaged in any of the above activities, please explain why.

Activity

Please indicate if you have the following items in your home, yard, or apartment complex, and if you have them, how often your child uses each item. Please select the answer that best applies to your child.

	Not Available	Available but never used	Used once a month or less	Used once every other week	Used once a week or more	Used daily
Bike	○	○	○	○	○	○
Basketball hoop	○	○	○	○	○	○
Sport equipment (ball, bats, racquets, etc.)	○	○	○	○	○	○
Swimming pool	○	○	○	○	○	○
Roller skates, skateboard, scooter	○	○	○	○	○	○
Fixed play equipment (swing set, playhouse, jungle gym)	○	○	○	○	○	○
Trampoline	○	○	○	○	○	○
Exercise/Play/Rec room	○	○	○	○	○	○
Board games	○	○	○	○	○	○
Puzzles	○	○	○	○	○	○
Crafting supplies, coloring books and supplies, paints	○	○	○	○	○	○
Imaginative play toys (doll house, play kitchen)	○	○	○	○	○	○
Construction toys (blocks, train set)	○	○	○	○	○	○

Does your child typically use these items independently or with a friend or family member?

- ○ Independently
- ○ With a family member in the home
- ○ With a family member from outside of the home
- ○ With a friend

Technology

For the following non-portable electronic devices, please count the total number in your home that works, whether or not you use them. Please then tell us how many of these are in your child's bedroom, if any.

	Total number in home	Number in child's bedroom
TVs		
DVD/Bluray player		
Smart streaming device (Amazon fire stick, Apple TV, Chromecast, Roku, etc.)		
Video game player that hooks up to TV (Xbox, Playstation, etc.)		
Desktop computer with internet access		
Desktop computer without internet access		
Music player (radio, CD player, stereo system, etc.)		

Please tell us how many of the following portable electronic devices your child has access to, if any

	Total number
Laptop computer with internet access	
Laptop computer without internet access	
Tablet (iPad, etc.)	
Handheld video game player (Switch, etc.)	
Music player (MP3, IPod, etc.)	
Cellphone	

Please indicate how many times on a typical **WEEKDAY (Monday-Friday)** **DURING** COVID-19 your child does the following activities. Please think about the time from when your child wakes up until he/she goes to bed.

	None	15 minutes	30 minutes	1 hour	2 hours	3 hours	4+ hours
Watching TV/Videos/DVDs	○	○	○	○	○	○	○
Playing computer or video games (Xbox, Playstation)	○	○	○	○	○	○	○
Play handheld video games (Switch, etc.)	○	○	○	○	○	○	○
Using internet/electronic media for leisure (tablet, smart phone, web browsing, etc.)	○	○	○	○	○	○	○

	None	15 minutes	30 minutes	1 hour	2 hours	3 hours	4+ hours
Listening to music	O	O	O	O	O	O	O
Virtual School	O	O	O	O	O	O	O

Please indicate how many times on a typical **WEEKEND DAY (Saturday-Sunday) SINCE** COVID-19 your child does the following activities. Please think about the time from when your child wakes up until he/she goes to bed.

	None	15 minutes	30 minutes	1 hour	2 hours	3 hours	4+ hours
Watching TV/Videos/DVDs	O	O	O	O	O	O	O
Playing computer or video games (Xbox, Playstation)	O	O	O	O	O	O	O
Play handheld video games (Switch, etc.)	O	O	O	O	O	O	O
Using internet/electronic media for leisure (tablet, smart phone, web browsing, etc.)	O	O	O	O	O	O	O
Listening to music	O	O	O	O	O	O	O
Virtual School	O	O	O	O	O	O	O

Please indicate how many times on a typical **WEEKDAY (Monday-Friday) BEFORE** COVID-19 your child does the following activities. Please think about the time from when your child wakes up until he/she goes to bed.

	None	15 minutes	30 minutes	1 hour	2 hours	3 hours	4+ hours
Watching TV/Videos/DVDs	O	O	O	O	O	O	O

	None	15 minutes	30 minutes	1 hour	2 hours	3 hours	4+ hours
Playing computer or video games (Xbox, Playstation)	○	○	○	○	○	○	○
Play handheld video games (Switch, etc.)	○	○	○	○	○	○	○
Using internet/electronic media for leisure (tablet, smart phone, web browsing, etc.)	○	○	○	○	○	○	○
Listening to music	○	○	○	○	○	○	○
Virtual School	○	○	○	○	○	○	○

Please indicate how many times on a typical **WEEKEND DAY (Saturday-Sunday) BEFORE** COVID-19 your child does the following activities. Please think about the time from when your child wakes up until he/she goes to bed.

	None	15 minutes	30 minutes	1 hour	2 hours	3 hours	4+ hours
Watching TV/Videos/DVDs	○	○	○	○	○	○	○
Playing computer or video games (Xbox, Playstation)	○	○	○	○	○	○	○
Play handheld video games (Switch, etc.)	○	○	○	○	○	○	○
Using internet/electronic media for leisure (tablet, smart phone, web browsing, etc.)	○	○	○	○	○	○	○
Listening to music	○	○	○	○	○	○	○

	None	15 minutes	30 minutes	1 hour	2 hours	3 hours	4+ hours
Virtual School	○	○	○	○	○	○	○

If you have noticed a change in your child's technological use, why do you think this changed has occured.

Parent Perception of Child Social Skills

Do you feel that your child's social skills have changed since the COVID-19 pandemic began?

- ○ Yes
- ○ No

Explain how your child's social skills have changed since the COVID-19 pandemic

Why do you think your child's social skills have not changed since the COVID-19 pandemic?

Quality of Life

In the past **one month**, how much of a problem has your child had with. . .

Physical Functioning (problems with. . .)

	Never	Almost Never	Sometimes	Often	Almost Always
Walking more than one block	O	O	O	O	O
Running	O	O	O	O	O
Participating in sports activities or exercise	O	O	O	O	O
Lifting something heavy	O	O	O	O	O
Taking a bath or shower by him or herself	O	O	O	O	O
Doing chores around the house	O	O	O	O	O
Having hurts or aches	O	O	O	O	O
Low energy level	O	O	O	O	O

Emotional Functioning (problems with. . .)

	Never	Almost Never	Sometimes	Often	Almost Always
Feeling afraid or scared	O	O	O	O	O
Feeling sad or blue	O	O	O	O	O
Feeling angry	O	O	O	O	O
Trouble sleeping	O	O	O	O	O
Worrying about what will happen to him or her	O	O	O	O	O

Social Functioning (problems with. . .)

	Never	Almost Never	Sometimes	Often	Almost Always
Getting along with other children	○	○	○	○	○
Other kids not wanting to be his or her friend	○	○	○	○	○
Getting teased by other children	○	○	○	○	○
Not able to do things that other children his or her age can do	○	○	○	○	○
Keeping up when playing with other children	○	○	○	○	○

School Functioning (problems with. . .)

	Never	Almost Never	Sometimes	Often	Almost Always
Paying attention in class	○	○	○	○	○
Forgetting things	○	○	○	○	○
Keeping up with school work	○	○	○	○	○
Missing school because of not feeling well	○	○	○	○	○
Missing school to go to the doctor or hospital	○	○	○	○	○

APPENDIX B

IRB APPROVAL

THE UNIVERSITY OF ALABAMA AT BIRMINGHAM
Office of the Institutional Review Board for Human Use

470 Administration Building
701 20th Street South
Birmingham, AL 35294-0104
205.934.3789 | Fax 205.934.1301 |
irb@uab.edu

APPROVAL LETTER

TO: Weikard, Jennifer

FROM: University of Alabama at Birmingham Institutional Review Board
Federalwide Assurance # FWA00005960
IORG Registration # IRB00000196 (IRB 01)
IORG Registration # IRB00000726 (IRB 02)
IORG Registration # IRB00012550 (IRB 03)

DATE: 21-May-2021

RE: IRB-300006751
IRB-300006751-003
Examining the Effects of the COVID-19 Pandemic and Social Distancing on Children and Their Play and Social Development

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The IRB reviewed and approved the Initial Application submitted on 21-May-2021 for the above referenced project. The review was conducted in accordance with UAB's Assurance of Compliance approved by the Department of Health and Human Services.

Type of Review: Exempt
Exempt Categories: 2
Determination: Exempt
Approval Date: 21-May-2021
Approval Period: No Continuing Review

Documents Included in Review:

- IRB EPORTFOLIO