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Screen Exposure and Child Development: A Contextual Analysis of Pandemic

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ABSTRACT

Covid Pandemic impacted people across the globe, especially children who spent the most crucial years in lockdown and had to readjust themselves to the real world after the pandemic. Many children were fixated to screen devices for education, entertainment, and family interaction with limited physical socialization. The research aimed to study the impact of screen duration on language acquisition, behavioral development, social competency, and emotional regulation. The sample comprised 406 children 2-6 years old with no physical and psychological diagnosis and acquired developmental milestones at the appropriate age. Purposive sampling was conducted, and data were collected from various public and private schools and daycares. Albert Language Development Questionnaire, Strengths and Difficulties, and Social Competence (parent versions) were used to assess language development, behavioral problems, social interaction, and emotional regulation. For analysis, correlation, regression, and ANOVA were conducted. Results showed social competence and behavioral difficulties as significant predictors of Language Impairment. Increased screen exposure was found to be related to language impairment, behavioral difficulties, and poor social competence. Each of the factors was found to be significantly related, confirming our hypothesis. The results are beneficial for caregivers, teachers, and psychologists in providing guidelines about the factors. That is impairing child development especially excessive use of screen devices.

1. Introduction

COVID-19 (Zaman et. al. 2021; Mughal & Javed, 2021) has been detrimental to child's development (Viola & Nunes, 2021) especially for underprivileged children with parents who had mental health issues and addiction. (Fredman, 2021). Smith and Pollak (2021) created a topological model to explain pandemic can affect child's development by activating biobehavioral response. These include intensity and duration, the environmental factors, social context containing social support and lastly individual factors as it activates a

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biobehavioral response in the child. The pandemic contributed to stress by causing job insecurity, covid scare, and health issues which made parents less patient towards their children. (Cluver et al., 2020) leading to constant neglect and maltreatment (Lawson et al., 2020) which can disrupt their cognitive, biological, and psychological development (Cicchetti & Toth, 2005).

Early years of childhood act as a critical period for development (Margalit, 2016). Physical disabilities may be easily identified during infancy but delays in language, socio-emotional development or behavioral disorders like hyperactive activity remain undiagnosed till the child starts schooling at age 3 or 4 (First & Palfrey, 1994) and these biological delays surface through interaction with environmental factors (Morin, 2018).

1.1. Screen Exposure

Madigan et al. (2019) reported an association of excessive screen exposure extremely and a low score of a development milestone. There is a 60% increase in screentime in kids during pandemic (Reidhealth, 2021). Screen Exposure caused by pandemic (Hasting et al., 2020) without appropriate coping mechanism (Rao & Fisher, 2021) increased the use of screen time exposure in children age 2-13 (Eales et al., 2021). WHO and American Academy for Pediatrics (2016) laid guide line for screen time exposure for children of different ages (Guan et al., 2020), however, many parents reported inability of follow these guidelines as these devices act as an important tool for socialization, staying connected, and providing an educational program to children who are unable to go to school due to the pandemic (Nagata et al., 2020). Due to pandemic, parents provided digital devices to ensure that children do not interfere with parents' activities, to calm them down child if he is bored or fussy, to persuade and manipulate them by providing it as an incentive (Hardiyanti Pratiwi, 2021).

1.2. Emotional Regulation

Emotional regulation is the ability to perceive our emotions, in order to assist thoughts, understand emotions and develop emotional language, Emotional Regulation depends on the parental response to infants' biological needs (Martins, 2012). Children attain the ability to fully regulate their emotions by the age of 5 (Turner, 2019) through observing people child develops emotional schemas that are stored for future guidance about how to behave and react to different situations (Thompson, 1994). Parents provided infants with a device as a calming tool for it to act as a virtual babysitter which can promote "problematic media use" (Domoff et al., 2020). Moreover, Pandemic has increased the bidirectional relationship between emotional regulation and screen exposure as parents use media to distract the children (Radesky, 2020). The screen time more than 4 hours a day resulted in emotional liabilities among children 2-5 years (Oflu et al., 2021).

1.3. Language

Language development is important in first three years of life (Christakis, 2009). Social interaction activates several brain areas for understanding and corresponding, linguistic abilities during the earliest years of language accusation that help develop a sense of self and others (Simonović & Hinić, 2021; Putri & Delfi, 2021; Franklin et al, 2014), however, the screen device creates unnecessary visual and auditory stimuli which creates an obstacle for the brain's ability to develop internal language and reflective thinking (Radesky, 2020). Excessive use of screen during developmental years can affect the normal development of receptive, expressive language, fluency of speech, difficulty in nonverbal communication,

understanding, and learning the mother tongue as screen applications are often of a different language or dialect (Yulsyofiend et al., 2019). They perform poor on communication development (Martinot et al., 2021) because when a child is exposed to a real-life environment their brain experiences dialogical stimulation which enables the development of reflective thinking (Radesky, 2020). Although the use of the digital device may promote imitation, it is not as helpful as real-life interaction. Screen exposure during early years leads ultimately delay in speech, language comprehension, and expressive language (Zimmerman et al., 2011). Children below 2 years who were exposed to screen for 3 hours and more suffered from language delay and had a short attention span and signs of hyperactivity (Moselhi Mater, 2019; Hermawati et al., 2018; Chonchaiya & Pruksananonda, 2008).

1.4. Social Competency

Social competency consists of adaptive behavior, social skills, peer acceptance (Thorndike, 1979) including prosocial behavior, emotional regulation, communication skills and self-control in any social settings (Gresham & Reschly, 1987). Screen time is directly correlated to less in-person social interaction (Twenge & Campbell, 2018). This drastically affects the development of social competency (Griffiths, 2010; Lemmens et al., 2011; Andreassen et al., 2016) and emotional understanding (Skalická et al., 2019). As it inhibits the child's understanding of human emotions and comprehension of facial expressions that they would normally develop by interacting with others or by parents' and further decreased imagination games with other playmates. Margalit (2016) explains that early screen exposure can lead to immediate gratification as excess of dopamine is released due to rapid change in screen stimulus. Lack of social interaction between parent and the child, lack of interaction of the child with peer-mates, child poor sleep schedule, and screen exposure in children predicted 65% lower social competency (Mcdonald et al., 2018).

1.5. Behavior

Excessive screen exposure also increases behavioral problems including attention seeking behaviors (Kildare & Middlemiss, 2017) leading to screen dependency disorder (Sigman, 2017) and emotional reactivity and aggression (Mistry et al., 2007). As pandemic has led to greater screen time exposure, children are found to be more anxious uneasy, restless, and nervous. They are also found to have poorer concentration along with increased behavioral issues (Orgilés et al., 2020). Quarantine, closure of schools, and social life has led to children feeling lonely (Loades, 2020 as sited in Larsen et al., 2021). Although children were protected from bullying in school, they are exposed to constant domestic abuse during lockdown (Baron, 2020). Children who are in their developing stage will have a long-term effect on their mental health (Singh et al., 2020) associated with obesity, sleep problems, aggressive behavior, and attention deficits in preschool children (Christakis, et al., 2004 as cited in McBee et al., 2021) with 88% chance of maladaptive behavior (McDonald et al., 2018) and behavioral and emotional problems (Orgilés et al., 2020), restlessness and attention difficulty (Waite et al., 2021).

1.6. Pandemic

During a pandemic, an infant was prohibited from touching objects and experimenting with the world, they had to quarantine. Moreover, as a mask was made compulsory, infants could not observe people especially their facial expressions which acted as a barrier to emotional and linguistic development (Pelekasis, 2021). Liu et al. (2020) explained that children under 7 who are growing up in a pandemic have a "magical thinking" due to transductive and

egocentric approach, they believe that they have a control on the environment and might assume that their bad behavior caused their parents to get sick or suffer instead of the diseases causing it. During a pandemic, parents were mostly preoccupied with work or psychological issues caused by the pandemic (Compernolle & Leontjev, 2020). Parents provide the children with the device to calm them down (Setiawan & Zubaedah, 2020). In Pakistan as well unsupervised screentime was increased due to reduced family engagement (Hussain et al., 2021). This drastically impacted children's mental health (Imran, et al., 2020).

Bronfenbrenner (1995) ecological theory explains how child's cognitions, language behavior, emotions, and social interaction all are taught directly and indirectly by these environments. During the pandemic children were forced to grow up in isolation with minimum opportunities to learn, this led to increased stress especially in boys, children of single parents, or parents with a psychiatric problem (Tso et al., 2020).

The review of above mentioned litreture did mention the importance of how early screen exposure may interfere with the development of these factors. However, the variables have minimum to no research on the effect of pandemic. Early screen exposure and limited socialization may cause eye fixation, socioemotional and behavioral problems, and language delays. Therefore, the current study intended to explore excessive screentime exposure and child development during a pandemic, the study focused on emotional regulation, social competency, behavioral issues, and language development of children under 7 years old with the help of parent version questionnaires.

2. Methodology

2.1. Objectives

- To evaluate the emotional regulation in children with prolonged screen exposure
- To examine the delay in receptive and expressive language
- To evaluate social competency in children after the lockdown
- To analyze the behavioral problem in children, especially in social settings

2.2. Hypotheses

1. More screen exposure causes higher behavioral difficulties and delays in language acquisition.
2. Social competence in children with excessive usage of screen devices will be lower thanin children with less screen exposure.
3. Boys will score more in conduct behavior and hyperactivity as compared to girls.
4. Children with poor language development will also have higher behavioral issues.

2.3. Sample

The sample consists of 406 children of age group 2-6.The purposive sampling technique was used to collect information. The inclusion criteria were children who have acquired appropriate milestone and are not diagnosed with any illness. Parent's proficiency in English language. Additionally, children must not have any impairment or diagnosis.

2.4. Instrument

Social Competence Scale. A 12-items parent version originally developed by Bierman (1997) to evaluate the inter and intrapersonal competencies of children preschoolers in social

settings, originally for 0-4 years old but later extended up to children of age 8 (RAND, 2018). It contains two subsets 'pro-social behavior/ communication skills' (4,7,9,10, 11, and 12) and emotional regulation (1,2,3,5,6 and 8). Total mean is calculated by dividing the total score with 12 and interpreted as socially competent or incompetent using the cutscores. Items are assessed using fivepoint Likert scale with 0 = not at all, 1 = a little, 2 = moderately well, 3 = well and 4= very well. The instrument has a high reliability of 0.87 (Corrigan, 2002).

Strength and Difficulty Questionnaire (SDQ). Parent version 2-4 year old scale and 4-10 years old scale (Goodsman, 2002) consisted of 25 items with five subscale; emotional symptoms (3,8, 13, 16 and 24), conduct problems (5,7,12,18, and 22), hyperactivity/ inattention (item 2,10, 15 21 and 25), peer relationship problems (6,11,14,19 and 23) evaluates behavioral difficulties whereas prosocial behavior (item 1, 4, 9, 17 and 20) measures strength for which reverse scoring is done. 3 points Likert scale is used with 0: not true, 1: somewhat true, and 2: certainly true. Item 7, 11, 14, 21 and 25 has inverse scoring. Impact scores are calculated parents agree to child having difficulties from 0 to 10 by cumulating areas of difficulty (0) only a little, (1) moderate and (2) a great deal and difficulties distress the child at home, learning, friendship and leisure. The cutoff total for difficulty score ranges from 0-13 for normal, 14-16 borderline, and 17-40 abnormal; for prosocial behavior, normal ranges from 6-10, borderline 5, and abnormal 14. Externalizing factors are calculated by adding conduct and hyperactivity score and internalizing score is calculated by cumulating emotional problems and peer relationship problems. The Alpha reliability ranges from .82 for difficulty and .65 for prosocial behavior (Goodman et al., 1998).

Alberta Language and Development Questionnaire (ALDeQ) is a parent version for children aged 17 months to 70 months. It uses 19 items four subscales; early milestones (item 1-4), Current Abilities in the First Language (5 -10b). Behavior Patterns and Activity Preferences (11-16) and Family History (17a-19). Items scored from 0 to 3, mean 0= very different and 3= not at all other. However, items 2, 3, and 19 have scored 0 to 6. The scoring is done by dividing section A to C scores separately and dividing them by 18, whereas section D scores are divided by 9. Each segment calculated cores range from 0 to 1.0 and reported in sd. Mean score of .69-.93 and above is considered normal and reported as 1 sd, .66 to .64 is considered as -1.25 sd, .63-.58 -1.5 sd, .57 to .52 -2 sd, .51 to .44 -2.5 sd and below that is considered -3 sd. Children who scores below -1.25 sd, that is mean score of .66 to .54 are reported to have language impairment due to first language development profile, rather than typical language impairment. The test has a high reliability of .82 and .78 validity with participant who spoke hindi or urdu as their first language (Bonnifaci, nd).

2.5. Procedure

The questionnaires were carefully selected based upon child's age group, norms, reliability, and validity. Demographic questions included child's age, gender, birth order and any illness or diagnosis were asked, additionally questions about child's lifestyle during pandemic was also included. Parents were contacted indirectly through online survey (shared through WhatsApp and social media), daycares, and public and private preschools. In order to evaluate whether each person had achieved the milestones, questions were asked with options of age set where each milestone was acquired. A verbal and written informed consent were taken which included to ensure the confidentiality of the institution, parents and children and details about the nature and purpose of the research, how the data will be used and who will have the access of it. For parents who were contacted using personal contacts, informed consent and permission was taken from the parents but in term of institutions, permissions

were also taken from the head of the institution using supervisors permission letter, they were provided with the incentive of separate data analysis and personalized hardcopy of the questionnaires to show the parents that the institutions values their children's mental health, To ensure the confidentiality of the children, their names were not asked, institutions were also promised that the research will not mention institution's name. After collecting sufficient data, these questionnaires were evaluated through screening questions including presence of illness and acquired milestones. 406 questionnaires were finalized from a pool of 500.

2.6. Analysis Schemes

In order to evaluate the the relationship between children's lifestyle during pandemic and screen exposure with language development, social competence and behavioral factors including conduct behavior, emotional regulation, hyperactivity, peer relationship and prosocial behavior, IBM Statistical Package for Social Sciences (SPSS), version 20 was used. First these items were scored, revise scoring was done, then they were cumulated into subcategories. Skewness and kurtosis was calculated to identify whether the data is parametric or non-parametric, reliability was identified. After that different analysis were used; for sample characteristics mean was taken for age and frequency was found. Correlation and regression was calculated, for language development and behavioral strength and difficulties one way ANOVA was applied.

3. Results

The overall correlations between scales is weak but highly significant except for social competence and language development for which it the relationship is strong. Total difficulty is inversely related to prosocial behavior, language development and social competence. Prosocial has a direct relation to language and social competence. Language is directly related to social competence and prosocial behavior but inversely to total difficulties.

Table 1.
Pearson Correlation of Strengths and Difficulties Questionnaire, Albert Language Development Questionnaire and Social Competence Scale (N=406)

	1	**2**	**3**	**4**
Total Difficulty (SDQ)	1			
Prosocial (SDQ)	-.36***	1		
ALDeQ	-.53***	.28**	1	
Social Competence	-.47**	.27**	.83**	1

*. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).

Multiple regression was done on social competence scale and strength and difficulties (total difficulties and prosocial behavior) to evaluate their predictive role in language development. Social competence and total difficulties were statistically significant predictor explaining 48% variance with R2: .48.

Table 2.
Liner Regression of ALDeQ with social competence and strength and difficulties questionnaire (N = 406)

Source	***B***	***SE B***	**β**	***p***	***t***
Constant	.583	.041		.000	14.385
Total Difficulties SDQ	-.009	.001	-.321	.000	-7.805
Prosocial SDQ	.04	.003	.059	.125	1.538
Social Competence	.008	.001	.477	.000	12.110

Note: B= unstandardized coefficient, SE B: standard error of unstandardized coefficient, β: standardized coefficient

Table 3.
Mean Comparison of Child's Screen Time and Albert Language Development

	Always in background (*n*=94)	**5- 8 hours (*n*=65)**	**2-4 hours (*n*=121)**	**1 hour (*n*=99)**	**Less than an hour (n= 27)**			
	M(SD)	***M(SD)***	***M(SD)***	***M(SD)***	***M(SD)***	***f***	***sig***	***n 2***
Total	.47 (.10)	.62(.14)	.60 (.10)	.69 (.71)	.71(.12)	61.20***	.000	.034
Milestone	.31 (.15)	.51 (.17)	.602 (.140)	62 (.14)	.63(.15)	71.94***	.000	.042
First Language	.31(.17)	52 (.24)	.68 (.198)	.59(.21)	.65 (.237)	40.40***	.000	.29
Behavior	.26 (.15)	.46 (.24).	.51 (.19)	.58 (.26)	.59 (.255)	31.77***	.000	.24
Family History	1.00	1.00	1.00 (.00)	1.00		1.00	.	.000

n 2: eta square

Table 3 of mean compares shows screen hours with language development, it shows that children who use screen for less than an hour scored significantly highest on language development as compared to children who had screen device always played in the background. The effect size is small. Additionally, these children also scored significantly higher in behavior and task performance and first language development. The effect size was large.

Table 4.
Mean comparison of child's screen time and Social Competence (N= 406)

	Always in background (*n*=94)	**5- 8 hours (*n*=65)**	**2-4 hours (*n*=121)**	**1 hour (*n*=99)**	**Less than an hour (n= 27)**			
	M(SD)	***M(SD)***	***M(SD)***	***M(SD)***	***M(SD)***	***f***	***p***	***n 2***
SCS Total	.32 (.17)	.54 (.24)	.67 (.21)	.604(.21)	.669 (.714)	41.28	.000***	.029
Prosocial	.55 (.25)	8.76 (4.29)	12.48(3.49)	13.71(4.20)	14.31(4.50)	27.93	.000***	.042
Emotional Regulation	8.66 (3.82)	11.66 (3.38)	12.92 (3.48)	13.41 (3.98)	14.52 (4.64)	27.05	.000***	.217

n 2: eta square

Mean comparison of the duration of screen and social competence shows that children with least screen exposure scored significantly highest in social competence with overall moderate effect size, except for emotional regulation for which the effect size was large.

Table 5.
Mean comparison of child's screen time and Behavioral strengths and difficulties (N=406)

	Always in background (*n*=94)	**5- 8 hours (*n*=65)**	**2-4 hours (*n*=121)**	**1 hour (*n*=99)**	**Less than an hour (n= 27)**			
f	***M(SD)***	***M(SD)***	***M(SD)***	***M(SD)***	***M(SD)***	***f***	***p***	***n 2***
Total Difficulties	26.94 (3.99)	21.32 (4.56)	20.04(5.15)	19.53(4.41)	17.70 (4.60)	45.29***	.000	.31
Prosocial	.544 (.229)	6.00 (1.75)	6.52(.2.17)	6.68(1.85)	6.85(1.59)	7.36***	.000	.060
Emotional Problem	7.34 (1.65)	5.23 (1.53)	5.03(1.57)	4.76 (1.33)	4.81(1.77)	71.94***	.000	.301
Conduct Behavior	6.09 (1.80)	4.34(2.02)	4.21(2.029)	4.09 (1.94)	3.22(1.805)	43.20***	.000	.169
Hyperactivity	8.19 (1.35)	6,54 (1.74)	6.62 (1.77)	6.32(1.54)	5.81 (1.47)	20.40***	.000	.188
Peer Problem	5.32 (2.00)	5.22 (1.80)	4.18(2.012)	4.35 (2.00)	3.85 (2.05)	6.35	.000***	.067
Impact Behavior	2.89 (3.32)	3.90 (3.64)	2.98(3.68)	2.75 (3.05)	2.75 (2.96)	.837	.502	.011

n 2: eta square

Mean results shows that children who had screen device constantly played in the background scored significantly highest in total difficulties, followed by children who use the devices for 5-8 hours. The effect size was large. Additionally, these children scored significantly lowest whereas children who scored screen device for less than an hour scored the significantly highest with large effect size.

4. Discussion

Current research studied the child's lifestyle during pandemics especially screen exposure and and its relationship with child's mental and emotional development. Screen device was the most important source of a child's education, leisure, and way of connecting with other family members, especially from 2019 to 2021.

WHO screen guideline has clearly stated that children of 2-5 years age must only use screen device for an hour under adult supervision, Unfortunately out of 406 children, 280 of them were exposed to screen for 2 hours or more. The results revealed a significantly weakened language development as manifesting in difficulties with social competence. It was found through regression analysis that the aggregate of language difficulties, which includes both reception and expression of the given language was impaired in the children going through their early developmental stages during the covid-19 pandemic.

The predictors for language difficulties or consequences of language development were social competence and behavioral difficulties. The results validated previous findings that children who are unable to comprehend, express themselves or understand the verbal cues are likely to be agitated and prone to physical aggression (Richard et al., 2014). These children are unable to apply the learned language to their environment (Radesky, 2020).

Current research results showed that children who had screen devices played in the background scored significantly lower than other children This was previously identified by a number of researches; children who watch television for more than 2.85 hours a day have poorer language development (Chonchaiya & Pruksananonda, 2008) and score lower in Communicative Development Inventory (Martinot et al., 2021).

Further research finding shows that children who had screen device constantly playing in the background scored the least on social competence scale followed by children who used screen for 5-8 hours. According to previous literature children who used devices for 17 hours per week at the age of 2 and 10.85 hours per week at the age of 3 scored low in age and stage questionnaire. (Madigan et al., 2019). Excessive screen exposure causes children to perform 65% low in social competence (McDonald et al., 2018).

Our research highlights that child who have constant exposure to screen device have greater behavioral difficulties and lower prosocial behavior as early excessive screen exposure causes several behavioral problems including emotional reactivity and aggressive behavior. (Mistry et al., 2007). Children may have faced difficulty adjusting to the slower pace of real world after approximately two years of lockdown. Orgilés et al., 2020), also found that during pandemic as children had prolonged exposure of screen device they developed irritability, aggression, and frustration when they even were expected to interact with their parents.

One main concern of our research was its reliability. This maybe due to difference in age-appropriate milestones including ability to formulate sentence and write in ALDeQ. Parents are often unable to recall the early details of their children. (Paradis, 2010). Previous research on validity and reliability of SDQ in China had similar reliability of.46 reliability for conduct disorder and hyperactivity and .22 for emotional problems. (Du, & Coghill. 2008). Arabic

version of SDQ also had low reliability due to different interpretation of behavioral symptoms and stricter moral dilemma for questions like stealing (Thabet et al., 2000).

Future research can study the relationship of screentime and child development with parents' occupation during pandemic as it was observed to an important factor.

The research findings are beneficial for parents, teachers, and child psychologist. Parents are advised to reduce the screen timings, have supervised screen exposure and to encourage one-to-one interaction. School must have a psychologist in their panel or as a visitor who can advise teachers on behavioral interventions including reinforcement strategies to overcome over gratification caused by the devices.

5. Conclusion

Pandemic was a different chronosystem that the world had to adapt to. Unfortunately, since parents had to themselves adjust to the new normal, they were unable to understand the best way to help their children especially when they were forced to adhere to government policy of home confinement. Since the world is getting back to normal, it felt necessary to study the impact of the pandemic. The research highlighted how children who acquired developmental milestones show socio-emotional dysregulations, behavioral difficulties, and language impairment. The research intends to create awareness with the hope that these children will be facilitated appropriately to reverse the negative impact of pandemic.

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Reference

Anderson, D. R., & Kirkorian, H. L. (2015). Media and Cognitive Development. In *Handbook of Child Psychology and Developmental Science*. https://doi.org/10.1002/9781118963418.childpsy222

Andreassen, C. S., Billieux, J., Griffiths, M. D., Kuss, D. J., Demetrovics, Z., Mazzoni, E., & Pallesen, S. (2016). The relationship between addictive use of social media and video games and symptoms of psychiatric disorders: A large-scale cross-sectional study. *Psychology of Addictive Behaviors*, *30*(2). https://doi.org/10.1037/adb0000160

Chonchaiya, W., & Pruksananonda, C. (2008). Television viewing associates with delayed language development. *Acta Paediatrica, International Journal of Paediatrics*, *97*(7). https://doi.org/10.1111/j.1651-2227.2008.00831.x

Compernolle, R. A. V., & Leontjev, D. (2020). It's Beyond Our Group ZPD: A Sociocultural Approach to the Unsuccessful Self-treatment of Writer's Block in Times of COVID-19. *Language and Sociocultural Theory*, *7*(2). https://doi.org/10.1558/lst.19302

Domoff, S. E., Borgen, A. L., & Radesky, J. S. (2020). Interactional theory of childhood problematic media use. *Human Behavior and Emerging Technologies*, *2*(4). https://doi.org/10.1002/hbe2.217

Du, Y., Kou, J. & Coghill, D. (2008) The validity, reliability and normative scores of the parent, teacher and self report versions of the Strengths and Difficulties Questionnaire in China. Child Adolesc Psychiatry Ment Health 2, 8. https://doi.org/10.1186/1753-2000-2-8

First, L. R., & Palfrey, J. S. (1994). The Infant or Young Child with Developmental Delay. *New England Journal of Medicine*, *330*(7). https://doi.org/10.1056/nejm199402173300708

Franklin, B., Warlaumont, A. S., Messinger, D., Bene, E., Nathani Iyer, S., Lee, C. C., Lambert, B., & Oller, D. K. (2014). Effects of Parental Interaction on Infant Vocalization Rate, Variability and Vocal Type. *Language Learning and Development*, *10*(3). https://doi.org/10.1080/15475441.2013.849176

Gresham, F. M., & Reschly, D. J. (1987). Dimensions of social competence: Method factors in the assessment of adaptive behavior, social skills, and peer acceptance. *Journal of School Psychology*, *25*(4). https://doi.org/10.1016/0022-4405(87)90038-0

Guan, H., Zhang, Z., Wang, B., Okely, A. D., Tong, M., Wu, J., & Zhang, T. (2020). Proportion of kindergarten children meeting the WHO guidelines on physical activity, sedentary behaviour and sleep and associations with adiposity in urban Beijing. *BMC Pediatrics*, *20*(1). https://doi.org/10.1186/s12887-020-1969-6

Hermawati, D., Rahmadi, F. A., Sumekar, T. A., & Winarni, T. I. (2018). Early electronic screen exposure and autistic-like symptoms. *Intractable and Rare Diseases Research*, *7*(1). https://doi.org/10.5582/irdr.2018.01007

Hussain, M., Rahim, K. A., Shafiq, F., Allana, A., & Bhamani, S. (2021). Family engagement amidst COVID-19 pandemic: a cross-sectional study from Pakistan. *International Journal Of Community Medicine And Public Health*, *8*(8), 3805. https://doi.org/10.18203/2394-6040.ijcmph20213006

Imran, N., Zeshan, M., & Pervaiz, Z. (2020). Mental health considerations for children & adolescents in covid-19 pandemic. In *Pakistan Journal of Medical Sciences* (Vol. 36, Issues COVID19-S4). https://doi.org/10.12669/pjms.36.COVID19-S4.2759

Jiao, W. Y., Wang, L. N., Liu, J., Fang, S. F., Jiao, F. Y., Pettoello-Mantovani, M., & Somekh, E. (2020). Behavioral and Emotional Disorders in Children during the COVID-19 Epidemic. In *Journal of Pediatrics* (Vol. 221). https://doi.org/10.1016/j.jpeds.2020.03.013

Kildare, C. A., & Middlemiss, W. (2017). Impact of parents mobile device use on parent-child interaction: A literature review. In *Computers in Human Behavior* (Vol. 75). https://doi.org/10.1016/j.chb.2017.06.003

Larsen, L., Helland, M. S., & Holt, T. (2021). The impact of school closure and social isolation on children in vulnerable families during COVID-19: a focus on children's reactions. *European Child and Adolescent Psychiatry*. https://doi.org/10.1007/s00787-021-01758-x

Lawson, M., Piel, M. H., & Simon, M. (2020). Child Maltreatment during the COVID-19 Pandemic: Consequences of Parental Job Loss on Psychological and Physical Abuse Towards Children. *Child Abuse and Neglect*, *110*. https://doi.org/10.1016/j.chiabu.2020.104709

Liu, J. J., Bao, Y., Huang, X., Shi, J., & Lu, L. (2020). Mental health considerations for children quarantined because of COVID-19. In *The Lancet Child and Adolescent Health* (Vol. 4, Issue 5). https://doi.org/10.1016/S2352-4642(20)30096-1

Madigan, S., Browne, D., Racine, N., Mori, C., & Tough, S. (2019). Association between Screen Time and Children's Performance on a Developmental Screening Test. *JAMA Pediatrics*, *173*(3). https://doi.org/10.1001/jamapediatrics.2018.5056

Margalit, L. (2016). What Screen Time Can Really Do to Kids' Brains. *Psychology Today*.

Martinot, P., Bernard, J. Y., Peyre, H., de Agostini, M., Forhan, A., Charles, M. A., ... & Heude, B. (2021). Exposure to screens and children's language development in the EDEN mother–child cohort. *Scientific reports*, *11*(1), 11863. https://doi.org/10.1038/s41598-021-90867-3

Martins, N. (2013). Media and emotional development. In *The Routledge International Handbook of Children, Adolescents and Media*. https://doi.org/10.4324/9780203366981-39

McBee, M. T., Brand, R. J., & Dixon, W. E. (2021). Challenging the Link Between Early Childhood Television Exposure and Later Attention Problems: A Multiverse Approach. *Psychological Science*, *32*(4). https://doi.org/10.1177/0956797620971650

McDonald, S. W., Kehler, H. L., & Tough, S. C. (2018). Risk factors for delayed social-emotional development and behavior problems at age two: Results from the All Our Babies/Families (AOB/F) cohort. *Health Science Reports*, *1*(10). https://doi.org/10.1002/hsr2.82

Mistry, K. B., Minkovitz, C. S., Strobino, D. M., & Borzekowski, D. L. G. (2007). Children's television exposure and behavioral and social outcomes at 5.5 years: Does timing of exposure matter? *Pediatrics*, *120*(4). https://doi.org/10.1542/peds.2006-3573

Morin, A. (2018). What you need to know about Developmental Delays. *Understood*, *516*, 10013. https://www.understood.org/en/learning-attention-issues/treatments-approaches/early-intervention/what-you-need-to-know-about-developmental-delays

Moselhi Mater, E. A. (2019). Exposure to Electronic Media: Children Diagnosed With Speech Delay. *International Journal of Nursing Didactics*, *09*(02). https://doi.org/10.15520/ijnd.v9i02.2457

Mughal, M., & Javed, R. (2021). Perturbed nuptiality, delayed fertility: childbirth effects of Covid19. *Journal of Population Research*. https://doi.org/10.1007/s12546-021-0920-4

Nagata, J. M., Abdel Magid, H. S., & Pettee Gabriel, K. (2020). Screen Time for Children and Adolescents During the Coronavirus Disease 2019 Pandemic. *Obesity*, *28*(9). https://doi.org/10.1002/oby.22917

Orgilés, M., Morales, A., Delvecchio, E., Mazzeschi, C., & Espada, J. P. (2020). Immediate Psychological Effects of the COVID-19 Quarantine in Youth From Italy and Spain. *Frontiers in Psychology*, *11*. https://doi.org/10.3389/fpsyg.2020.579038

Paradis, J., Emmerzael, K., & Duncan, T. (2010). Alberta Language and Development Questionnaire (ALDeQ)©. *Journal of Communication Disorders*, *43*. https://doi.org/10.1037/t85853-000

Pelekasis, P. (2021). Forecasting the Long-Term Effects of the Pandemic on Children: Towards a COVID-Generation. In *Anxiety, Uncertainty, and Resilience During the Pandemic Period - Anthropological and Psychological Perspectives*. https://doi.org/10.5772/intechopen.97931

Putri, V. M., & Delfi, E. (2021). The Impact of Negative Gadgets on Children's Language Development during the Covid-19 Pandemic. *International Journal of Emerging Issues in Early Childhood Education (IJEIECE)*, *3*(1), 1–7. https://doi.org/10.31098/ijeiece.v3i1.414

Radesky, J. S. (2020). Smartphones and Children: Relationships, Regulation, and Reasoning. In *Cyberpsychology, behavior and social networking* (Vol. 23, Issue 6). https://doi.org/10.1089/cyber.2020.29186.jsr

Rao, N., & Fisher, P. A. (2021). The impact of the COVID-19 pandemic on child and adolescent development around the world. In *Child Development* (Vol. 92, Issue 5). https://doi.org/10.1111/cdev.13653

Reidhealth.org. (2021). Retrieved 29 November 2021, from https://www.reidhealth.org/blog/how-much-screen-time-should-kids-get-during-the-pandemic

Scharf, R. J., Scharf, G. J., & Stroustrup, A. (2016). Developmental milestones. *Pediatrics in Review*, *37*(1), 25–38. https://doi.org/10.1542/pir.2014-0103

Setiawan, A. S., & Zubaedah, C. (2020). Application of Health Belief Model on Child's Dental Visit Postponement during the COVID-19 Pandemic. *European Journal of Dentistry*, *14*. https://doi.org/10.1055/s-0040-1715784

Sigman, A. (2017). Screen Dependency Disorders. *Journal of the International Child Neurology Association*. https://doi.org/10.17724/jicna.2017.119

Simonović, S., & Hinić, D. (2021). Excessive Screen Media Exposure and Language Delay in the Development of Infants and Toddlers – Three Case Reports. *Serbian Journal of Experimental and Clinical Research*, *0*(0). https://doi.org/10.2478/sjecr-2021-0028

Singh, S., Roy, D., Sinha, K., Parveen, S., Sharma, G., & Joshi, G. (2020). Impact of COVID-19 and lockdown on mental health of children and adolescents: A narrative review with recommendations. In *Psychiatry Research* (Vol. 293). https://doi.org/10.1016/j.psychres.2020.113429

Skalická, V., Wold Hygen, B., Stenseng, F., Kårstad, S. B., & Wichstrøm, L. (2019). Screen time and the development of emotion understanding from age 4 to age 8: A community study. *British Journal of Developmental Psychology*, *37*(3). https://doi.org/10.1111/bjdp.12283

Smith, K. E., & Pollak, S. D. (2021). Early life stress and neural development: Implications for understanding the developmental effects of COVID-19. *Cognitive, Affective and Behavioral Neuroscience*. https://doi.org/10.3758/s13415-021-00901-0

Thompson, R. A. (1994). Emotion Regulation: A Theme in Search of Definition. *Monographs of the Society for Research in Child Development*, *59*(2/3). https://doi.org/10.2307/1166137

Tierney, A. L., & Nelson, C. A. (2009). Brain Development and the Role of Experience in the Early Years. *Zero to Three*, *30*(2).

Tso, W. W. Y., Wong, R. S., Tung, K. T. S., Rao, N., Fu, K. W., Yam, J. C. S., Chua, G. T., Chen, E. Y. H., Lee, T. M. C., Chan, S. K. W., Wong, W. H. S., Xiong, X., Chui, C. S., Li, X., Wong, K., Leung, C., Tsang, S. K. M., Chan, G. C. F., Tam, P. K. H., … lp, P. (2020). Vulnerability and resilience in children during the COVID-19 pandemic. *European Child and Adolescent Psychiatry*. https://doi.org/10.1007/s00787-020-01680-8

Thabet, A. A., Stretch, D., & Vostanis, P. (2000). Child mental health problems in Arab children: application of the strengths and difficulties questionnaire. International journal of social psychiatry, 46(4), 266-280. https://doi.org/10.1177/002076400004600404

Turner, R. (2019). *Play-Based Bereavement Centers for Children and Families*. https://doi.org/10.4018/978-1-5225-8226-7.ch010

Twenge, J. M., & Campbell, W. K. (2018). Associations between screen time and lower psychological well-being among children and adolescents: Evidence from a population-based study. *Preventive Medicine Reports*, *12*. https://doi.org/10.1016/j.pmedr.2018.10.003

Viola, T. W., & Nunes, M. L. (2021). Social and environmental effects of the COVID-19 pandemic on children. In *Jornal de Pediatria*. https://doi.org/10.1016/j.jped.2021.08.003

Waite, P., Pearcey, S., Shum, A., Raw, J. A. L., Patalay, P., & Creswell, C. (2021). How did the mental health symptoms of children and adolescents change over early lockdown during the COVID-19 pandemic in the UK? *JCPP Advances*, *1*(1). https://doi.org/10.1111/jcv2.12009