2022

Occupational Therapy Program Development For Group Threatment For Outpatient Pediatric Clinics: Technology Management

Amy Lynn Fust Shaver

OCCUPATIONAL THERAPY PROGRAM DEVELOPMENT FOR GROUP THREATMENT FOR OUTPATIENT PEDIATRIC CLINICS: TECHNOLOGY MANAGEMENT

by

Amy Lynn Fust Shaver
Occupational Therapy Doctorate, University of North Dakota, 2022

A Scholarly Project
Submitted to the Graduate Faculty

of the

University of North Dakota

in partial fulfillment of the requirements

for the degree of

Occupational Therapy Doctorate

Grand Forks, North Dakota

May
2022

This scholarly project, submitted by Amy Shaver in partial fulfillment of the requirement for the Degree of Occupational Therapy Doctorate from the University of North Dakota, has been read by the Faculty Advisor under whom the work has been done and is hereby approved.

Breann C. Lamborn

Dr. Breann Lamborn, Ed.D, M.P.A.

April 28, 2022

Date

PERMISSION

Title:	Occupational Therapy Program Development for Group Treatment for Outpatient Pediatric Clinics: Technology Management
Department:	Occupational Therapy
Degree:	Occupational Therapy Doctorate

In presenting this scholarly project in partial fulfillment of the requirements for a graduate degree from the University of North Dakota, I agree that the library of this University shall make it freely available for inspection. I further agree that permission for extensive copying for scholarly purposes may be granted by the professor who supervised my project or, in their absence, by the Chairperson of the department or the Dean of the School of Graduate Studies. It is understood that any copying or publication or other use of this scholarly project or part thereof for financial gain shall not be allowed without my written permission. It is also understood that due recognition shall be given to me and the University of North Dakota in any scholarly use which may be made of any material in my scholarly project.

Amy Shaver

Amy Shaver
May 2022

TABLE OF CONTENTS

Abstract

Problem Statement: Children and adolescents are experiencing difficulty managing the technology in their lives as evidenced by excessive technology use leading to negative effects on their occupational performance. The overuse of technology is associated with a variety of problems, especially for growing children and adolescents, including shorter sleep duration, reduced scholastic achievement, musculoskeletal concerns, obesity, and exacerbated symptoms of depression and anxiety (Gerwin, 2017; Glover, 2021; Gwynette, 2017). Description of Product: To address these issues, a group treatment program was developed for outpatient pediatric clinics focused on helping children and their families benefit from the use of technology without experiencing the negative effects of technology overuse. Methodology: A comprehensive literature review was completed regarding pediatric group programming, program development, technology use behaviors, impacts of technology use, and technology management. Description of Results: The intended result of this program is to make positive changes to how children and their families engage with technology to support improved occupational performance. With the ubiquity of advanced technology, it is crucial for occupational therapists to address the impact of technology on developing youth and their families.

Chapter I

Introduction

Problem statement: Children and adolescents are experiencing difficulty managing the technology in their lives as evidenced by excessive technology use leading to negative effects on their occupational performance. Children and adolescents may yearn to over-use their electronic devices, including smartphones, gaming systems, tablets, and computers, to the extent that it becomes problematic up to the point of addiction. The use of electronic devices has grown exponentially, and today, a considerable portion of daily life may be spent engaging with technology. The American Academy of Child and Adolescent Psychiatry (2020) reported that children in the United States (US) between the ages of eight and twelve spend on average four to six hours per day, and teens spend up to nine hours per day, watching screens and/or utilizing screen-based devices (Prout, 2021). With these figures, it is not surprising that 95% of adolescents report being online daily (Giovanelli, Adams, Jane Park, & Ozer, 2021), and 45% report being online "almost constantly" (Moreno, Binger, Zhao, & Eickhoff, 2021). According to Bas and Karatay (2020), children's and adolescents' recreational use of technology puts them at an increased risk for developing technology addiction. The overuse of technology is associated with a variety of problems, especially for growing children and adolescents, including shorter sleep duration, reduced scholastic achievement, musculoskeletal concerns, obesity, and exacerbated symptoms of depression and anxiety (Gerwin, Kaliebe, & Daigle, 2018; Glover, Ariefdjohan, & Fritsch, 2022; Gwynette, Sidhu, & Ceranoglu, 2018; Harris, Straker, Pollock, & Smith, 2015; Lu et al., 2019; Reus & Mosley, 2018). The use of technology is increasing rapidly, and it is necessary to confront the impact overuse may have on developing youth.

Sleep

Sleep is a vital occupation for the growth, health, and well-being of children (Shepherd & Ivey, 2020). Lund, Sølvhøj, Danielsen, and Andersen, (2021) completed recent systematic review of 49 qualitative studies on individuals 15 years of age and younger found consistent evidence that children's and adolescent's electronic device use was associated with reduced sleep duration, and these findings were supported by others (Chang, Benjamin, Burkey, Blake, & Chau, 2019; Paulus et al., 2021; Reus & Mosley, 2018). Negative impacts on sleep are especially concerning because a "lack of sleep may compromise a child's occupational performance and their physical growth, health, and ability to learn and behave" (Shepherd & Ivey, 2020, pg. 304).

Education

Education is a fundamental occupation for children and adolescents. Unfortunately, over-use of technology has been repeatedly tied to reduced academic achievement (Baş & Karatay, 2020; Gwynette, Sidhu, & Ceranoglu, 2018; Lu et al., 2019). In a study on students residing in Eastern Turkey, researchers found statistically significant evidence to support an inverse relationship between internet addiction levels and the students' level of academic achievement (Baş & Karatay, 2020).

Mental health

Experiencing mental health challenges at a young age can affect a child's ability to engage in their essential childhood occupations (Ratcliff, Fingerhut, & O'Brien, 2020). The 2016 National Survey of Children's Health surveyed 50,212 parents regarding their children aged zero to seventeen and found that the prevalence of at least one pediatric mental health disorder was 16.5% in the US (Whitney & Peterson, 2019). Several studies have found that overuse of technology is related to the severity of depression and anxiety symptoms (Desouky & Abu-Zaid,

2020; Glover, Ariefdjohan, & Fritsch, 2022; Lu et al., 2019; Salmela-Aro, Upadyaya, Hakkarainen, Lonka, & Alho, 2016). Twenge and Campbell (2018) studied screen time as it relates to psychological well-being with a national US sample of individuals aged two to seventeen. The authors found that children and adolescents who were considered to be high users of screen-based technology (seven or more hours per day compared to low users of one hour per day) had a significantly greater likelihood of being diagnosed with depression or anxiety and were twice as likely to need mental health treatment (Twenge & Campbell, 2018).

Physical health

According to the Center for Disease Control and Prevention (CDC), childhood and adolescent obesity rates have more than tripled in the last 40 years (Fryar, Carroll, & Afful, 2021). The CDC National Center for Health Statistics (NCHS) reported that from 2017 to 2018, the percentage of youth ages two to nineteen experiencing obesity was 19.3%, affecting nearly one in five children (Fryar, Carroll, & Afful, 2021). This significant childhood obesity epidemic may be further fueled by children's and adolescent's increase in technology use (Beauchamp, 2019; Jamruk, 2017; Pauluset al., 2021; Reus & Mosley, 2018; Tripathi & Mishra, 2019; Western Governors University, 2020). A systematic review of empirical research studies centered on youth ages five to nineteen found that excessive screen time had significant ramifications on weight-related outcomes, such as a higher body mass index, waist circumference, and percentage of body fat (Tripathi & Mishra, 2019). Excessive electronic technology use is also associated with negative musculoskeletal outcomes (Beauchamp, 2019; Gerwin, Kaliebe, & Daigle, 2018; Harris, Straker, Pollock, & Smith, 2015).

Positive Technology Management

Excessive technology use can be very impactful on youth, and even more pronounced for individuals with developmental disabilities (Waldman & Perlman, 2018). This is significant because the prevalence of children diagnosed with at least one developmental disability has risen to 17.76% in the US according to the National Health Interview Survey (Zablotsky et al., 2019). Parents and caregivers also struggle to help their children use technology productively. Parents and caregivers need to monitor their own technology use in order to role-model a healthy relationship with technology for their children (Ceranoglu, 2018). With the ubiquity of advanced technology, children and adolescents need to be able to manage the technology in their lives in a positive way, and their parents/caregivers need to know how to guide them effectively.

The purpose of this project is to develop an occupational therapy group treatment program for pediatric clients and their families that provides occupational therapy focused education to help them benefit from the use of technology without experiencing the negative effects of technology overuse. The goal of this program is to change how children and their families engage with technology to support improved occupational performance. The long-term objective of the program is for the child to demonstrate improved mental and physical health management with assistance from their caregiver as a result of regulated technology use. The short-term objective of the program is for the family to positively adjust their technology habits with the implementation of a personalized technology use plan which allows families to create goals, in collaboration with a licensed occupational therapist for when, where, and how they will engage with technology.

The theoretical framework that was used to guide this program is the person-environment-occupation (PEO) model (Baptiste, 2017) and the developmental frame of reference

(O'Brien & Kuhaneck, 2020). The PEO model views the person as a unique combination of physical, cognitive, sensory, affective, and spiritual components (Baptiste, 2017, pg.142); the spiritual component of the person was not a primary focus in the development of the program, although it is still considered an important aspect of the person. Children and adolescents are more susceptible to the negative effects of technology overuse because they are still in the midst of developing physically, cognitively, and emotionally, and their youthful sensory systems are more sensitive and reactive to the continuous stimulation of electronic devices. The program offers education to children and their families on the benefits of providing structure around technology use to minimize the negative effects associated with sleep, academic achievement, and mental and physical health. The PEO model considers the environment to be everything that surrounds the person, including physical, social, cultural, institutional, and virtual components (Baptiste, 2017, pg.142). In this day and age, electronic technology is everywhere, and youth spend more time engaged in the virtual environment than ever before in order to communicate with others and easily access information and entertainment. The program is intended to help children navigate the virtual environment responsibly by facilitating media literacy, cybersecurity, and caregiver involvement in their technology use. Spending an abundance of time engaged with technology can displace time spent participating in valuable childhood occupations. The program aims to improve occupational balance for children in order to enhance their occupational performance, particularly in areas of sleep, education, and mental and physical health management. It is within occupational therapists' scope of practice to address the problems that individuals, groups, and populations may face in these areas, such as poor sleep hygiene, emotional regulation difficulty, and inactive or sedentary lifestyles. Pediatric occupational therapists have the specific knowledge and practical skills needed to optimize the

fit between children, their unique environments, and the occupations they choose to engage in. Occupational therapists can play a significant role in helping children and their families manage the technology in their lives effectively.

Chapter II

Literature Review

Pediatric Development

During childhood, children need to gain skills and knowledge that will enable them to effectively participate in and make sense of the world around them. Thompson (2016) summarized what researchers have learned about early childhood development since the release of the seminal report, *From Neurons to Neighborhoods: The Science of Early Childhood Development* by the National Research Council and the Institute of Medicine in 2000. In his report, Thompson highlights "several basic conclusions" that have become foundational information to the public regarding the significance of early childhood development (Thompson, 2016, p. 18). From the time children are born, they begin learning, and early learning happens rapidly. Infants and children depend on nurturing relationships with others to facilitate their healthy development as "most early learning is social in nature" (Thompson, 2016, pg. 21). The basic cognitive skills that need to be developed by children are "attention, memory, cognitive self-regulation, executive function, reasoning, [and] problem solving" (Thompson, 2016, pg. 20). The advancement of self-regulation skills is considered foundational to early development because the child's ability to regulate themselves influences other areas of development. Beyond these cognitive skills, children's socioemotional and physical development, as well as their health, influence their early learning capacity. As children reach school age, their socioemotional abilities become crucial for their success in the classroom and their engagement with other students. A child's ability to be competent socially and maintain their emotional well-being is considered to be as vital to school readiness as their skills with math and language (Thompson, 2016).

If a child's early learning becomes impeded, the child is more likely to struggle with academic and occupational pursuits in the long term (Thompson, 2016). Today, there are an increasing number of children experiencing "intellectual, behavioral, and/or mental health challenges that interfere with their ability to participate in the occupations of childhood" (Ratcliff, Fingerhut, & O'Brien, 2020, p. 728). This is evidenced by the increased incidence of developmental disabilities among youth (Zablotsky et al., 2019). A developmental disability is a broad term used to describe a group of neurodevelopmental disorders that may impair a child's physical, social, or cognitive development (Ratcliff, Fingerhut, & O'Brien, 2020, p. 729). The term *developmental disability* includes diagnoses such as intellectual disability, learning disability, Attentions Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorder (ASD), and Cerebral Palsy (CP), among others (Zablotsky et al., 2019).

In a study by Zablotsky et al. (2019), researchers examined data pertaining to the prevalence of developmental disabilities among children ages three to seventeen living in the US. The data was gathered from the National Health Interview Survey, and the survey was conducted by the National Center for Health Statistics (NCHS). Survey data was obtained from a large sample size of 88,530 parents between 2009 and 2017, building on previous data collected from 1997 to 2008. Survey data revealed that among this population, the prevalence of children diagnosed with a developmental disability has been trending upwards. The frequency of a developmental disability was 12.84% from 1997-1999, 15.04% from 2006-2008, and 17.76% from 2015-2017 (Zablotsky et al., 2019). This translates to about one in every six children having at least one developmental disability. These frequencies are striking, especially when considering that individuals with developmental disabilities commonly need services to address the challenges they face (Zablotsky et al., 2019).

Similarly, the 2016 National Survey of Children's Health received 50,212 completed surveys regarding US children ages zero to seventeen (Whitney & Peterson, 2019). As mentioned previously, the survey data indicated that the prevalence of pediatric mental health disorders in the US was 16.5%; additionally, half of these children did not receive necessary treatment from a professional (Whitney & Peterson, 2019). Mental health disorders experienced during childhood have the potential to hinder engagement in meaningful childhood occupations (Ratcliff, Fingerhut, & O'Brien, 2020). They may also restrict the child from being able to participate in activities that develop their self-efficacy (Ratcliff, Fingerhut, & O'Brien, 2020).

Technology

Currently, pediatric development is being impacted by the ubiquity of electronic technology. In its most basic sense, technology is simply the application of scientific knowledge (Merriam-Webster, 2022). Technology's influence has changed the way humans live their lives throughout history, from the advent of the classic wheel, to the complex computers, smartphones, and internet that we use today. In this day and age, when we think of technology, we typically think of portable electronic devices. Individuals born in the 1990's and after are considered to be digital natives, as they have been exposed to advanced technologies, such as cellphones, since the time of their birth (Arias-de la Torre et al., 2020). The pervasiveness of electronic devices has both positive and negative impacts for developing youth.

Positive Effects of Technology

The electronic technology that is available today offers a cornucopia of advantages. Technology provides quick access to information and needed resources (Arias-de la Torre et al., 2020). This includes fundamental resources for physical and mental health care, among others. Another huge benefit of modern technology is the increased access to social support. Technology

facilitates endless opportunities for social connection regardless of physical location, potentially lessening feelings of loneliness for those who are experiencing isolation (Arias-de la Torre et al., 2020). This is especially vital for individuals in marginalized groups; technology provides them with a platform to promote inclusion, advocate against injustice, and find networks of support (Glover, Ariefdjohan, & Fritsch, 2022; Hester, 2020). Additionally, technology provides access to a copious amount of educational content that can assist individuals of any age with learning new information and gaining skills. Various applications (apps) have been designed to make life easier, offering help with maintaining healthy behavior, habits, and routines (Arias-de la Torre et al., 2020; Reynolds & Andelin, 2021). Technology, access to the internet, and apps can give individuals a space to express themselves, simulate their creativity, and develop a sense of personal identity (Glover, Ariefdjohan, & Fritsch, 2022). Lastly, for better or worse, technology provides virtually limitless options for entertainment.

Negative Effects of Technology

Musculoskeletal.

As stated previously, excessive electronic technology use is associated with negative musculoskeletal outcomes (Beauchamp, 2019; Gerwin, Kaliebe, & Daigle, 2018; Harris, Straker, Pollock, & Smith, 2015). Looking down at devices causes the head to be too far forward, putting increased strain on the cervical spine. This has been referred to as “text-neck” (Beauchamp, 2019, pg. 32), “tech-neck” (Gerwin, Kaliebe, & Daigle, 2018, pg. 347), and “anterior head syndrome” (Beauchamp, 2019, pg. 32); and causes individuals to experience symptoms such as headaches and pain in their neck, jaw, and shoulders (Beauchamp, 2019). Long term effects of increased stress on the cervical spine can lead to pressure on the nerves exiting the spine, effecting the nerve impulses and potentially resulting in numbness and/or a tingling sensation in

the upper extremities (Beauchamp, 2019). Nerve input can also be affected, leading to reduced sensory input to the central nervous system (Beauchamp, 2019). Furthermore, anterior head syndrome can lead to flattening of the cervical spine curvature, disc degeneration, and muscle strains (Beauchamp, 2019). Anterior head syndrome has been observed in youth with increased prevalence (Beauchamp, 2019; Harris, Straker, Pollock, & Smith, 2015). As youth are still physically developing, these abnormal spinal stressors can negatively impact their skeletal structure as they age (Beauchamp, 2019), potentially leading to long-term pain that follows them into adulthood (Harris, Straker, Pollock, & Smith, 2015).

Inactivity and Obesity.

In the US, childhood obesity is a serious problem; and for children, an inactive or sedentary lifestyle has been linked to obesity (Bernard et al., 2017). As mentioned in Chapter One, the prevalence of childhood obesity was found to be 19.3% in the US (CDC, 2021), and children's and adolescents' increased use of technological devices may be contributing to this significant problem (Beauchamp, 2019, Jamruk, 2017; Paulus, Potenza, & Bagot, 2021; Reus & Mosley, 2018; Tripathi & Mishra, 2020; Western Governors University, 2020). Screen-time is typically a time of low physical exertion and potentially high caloric intake (Tripathi & Mishra, 2020). Indeed, research has found that kids who spend more of their time with screen-based technology tend to be less physically active (Tripathi & Mishra, 2020) and consume more calories (Paulus, Potenza, & Bagot, 2021) than the children and adolescents who spend less of their time on screens. A literature review focused on children ages zero to five found that exposure to screen-based devices was associated with reduced outdoor physical activity (Reus & Mosley, 2018). The same review found several studies that reported excessive exposure to screens was linked to a higher body mass index (Reus & Mosley, 2018).

Electromagnetic Field (EMF) Exposure.

It is important to note that the consequences of EMF exposure are under debate, however, emerging evidence regarding the negative side effects of EMF exposure are of concern, particularly for our youth who are developing in an environment saturated with wireless emissions (Beauchamp, 2019; Sage & Burgio, 2018). Chronic EMF exposure has been associated with negative effects on mental and physical health, including symptoms such as headaches, fatigue, attention and concentration problems, and reduced sleep quality, among others (Sage & Burgio, 2018). The risk of children developing these symptoms is higher than adults due to children having increased fluid in their brains, a smaller circumference of their heads, and thinner skulls, enabling them to absorb an increased amount of radiation compared to adults (Beauchamp, 2019).

Blue Light Exposure.

Blue light that is emitted from the screens of electronic devices can impact our eyes and, when exposed to blue light at night, can affect our sleep as well. (Beauchamp, 2019; Hale et al., 2018) Over-use of electronic devices can lead to vision blurring, eye irritation, headaches, and reduced ability to focus (Beauchamp, 2019). This has been referred to as "digital eye strain" and "computer vision syndrome" (Beauchamp, 2019, pg. 33). Exposure to blue light at night suppresses levels of melatonin, a sleep-inducing hormone, in the blood levels leading to reduced sleepiness (Hale et al., 2018). This impacts the body's natural circadian rhythm, delaying sleep-onset and reducing sleep quality (Beauchamp, 2019; Hale et al., 2018). Children are more susceptible to the negative impacts of blue light exposure at night. Children had significantly more melatonin suppression when compared to adolescents, and twice as much when compared

to adults (Hale et al., 2018). A contributing factor may be the pupil size of children, as their pupils have a greater diameter than the pupil size of adults (Hale et al., 2018).

Sleep Problems.

As mentioned previously, sleep is an essential occupation for the health, growth, and well-being of children and adolescents (Lund, Sølvhøj, Danielsen, & Andersen, 2021; Shepherd & Ivey, 2020). Unfortunately, a large portion of adolescents are not obtaining the recommended quantity of sleep that is required for optimum functioning, and technology has been noted as a main contributor (Chang, Benjamin, Burkey, Blake, & Chau, 2019). As stated in Chapter One, there is consistent evidence to support that children's and adolescents' use of electronic devices is associated with reduced sleep duration (Chang, Benjamin, Burkey, Blake, & Chau, 2019; Lund, Sølvhøj, Danielsen, & Andersen, 2021; Paulus, Potenza, & Bagot, 2021; Reus & Mosley, 2018).

Technology's negative impact on sleep is especially evident when it is used close to bedtime. A meta-analysis of 20 studies (including randomized control trials, cohort, and cross-sectional designs) covering more than 125,000 youth found reliable evidence to support the association between technology use at bedtime and inadequate sleep duration, as well as poor quality of sleep (Hale et al., 2018). Evidence obtained from the meta-analysis suggested that simply having a mobile, screen-based device in the bedroom is associated with poor quality of sleep. This is valuable information to be aware of considering that, in America, 75% of children and adolescents reported having at least one screen-based technological device in their bedrooms (Hale et al., 2018). Further, approximately 60% use their technology regularly in the hour before bedtime (Hale et al., 2018). According to Ceranoglu (2018), access to screen-based technology

in the bedroom has been repeatedly correlated with spending more time on devices and reduced supervision from parents/caregivers.

In regard to smartphones specifically, a study with 49 young adult subjects found that individuals with a higher dependence on their devices obtained significantly less sleep on average, and they reported having a lower quality of sleep (Hu, Long, Lyu, Zhou, & Chen, 2017). Subjects in the control group, who were not dependent on their devices, received an average of 7.43 hours of sleep per night, whereas individuals with smartphone dependence received an average of only 5.18 hours per night (Hu, Long, Lyu, Zhou, & Chen, 2017). Another study by Tymofiyeva et al. (2020) detected a significant, positive correlation between adolescent individuals who were dependent on their smartphones and sleep problems.

Sleep problems early in life have been found to be a risk factor for developing emotional and behavioral problems, as well as potential psychopathology, during childhood and adolescence (Hale et al., 2018). When the occupation of sleep is disrupted chronically, negative consequences are inevitable. Due to these lasting, adverse effects, it is crucial to address technology's contribution to sleep disturbances and implement practical solutions.

Caregiver Technology Use; Reduced Quality of Interactions.

It is well-known that caregivers have a large effect on the healthy development of children. Caregivers play a vital role in fostering interactions with young children that are of high-quality (Ochoa, Reich, & Farkas, 2021). These interactions, including the caregiver's ability to be responsive to the child, are important for the child's healthy cognitive, social, and emotional development (Carson & Kuzik, 2021). As electronic devices become more and more ubiquitous, there are potential implications for caregiver responsiveness, as well as for caregiver-child relationships (Carson & Kuzik, 2021). Even the seemingly innocuous act of leaving the

television on in the background has been found to be associated with caregiver's speaking to, and playing with, their children less frequently (Zimmerle, 2019). When using electronic devices, caregivers have a higher likelihood of being distracted and lowering their level of engagement with their child, reducing the quality of their interactions (Ochoa, Reich, & Farkas, 2021), and limiting their ability to form strong attachments (Zimmerle, 2019). Technological distractions that interfere with relationships have been coined as "technoference" by social scientists; technoference has been found to have a negative impact on the development of infants and young children (Carson & Kuzik, 2021; Zimmerle, 2019).

An observational study by Ochoa, Reich, and Farkas (2021) found that when caregivers were using a mobile, electronic device, they were less likely to initiate interactions, show positive emotions, and participate in joint attention with their young child (ages zero to four). Further, when young children observed their caregivers looking at screens, they were significantly less likely to talk (Ochoa, Reich, & Farkas, 2021). Maternal sensitivity has been found to be negatively correlated with maternal smartphone use (Hood, Zabatiero, Zubrick, Silva, & Straker, 2021). In the same vein, when caregivers are using an electronic device, research has shown that they have reduced recognition of their child's cues (Alvarez Gutierrez & Ventura, 2021), and they tend to be more hostile when their children vie for their attention (Alvarez Gutierrez & Ventura, 2021; Zimmerle, 2019).

Caregivers who used technology more frequently than others while interacting with their infants reported that their infants were more difficult, meaning that they demonstrated a higher propensity for internalizing behaviors, such as withdrawing, and externalizing behaviors, such as throwing tantrums (Alvarez Gutierrez & Ventura, 2021). These findings are far-reaching because a mother's perception of her infant's temperament as difficult early in infancy predicted reduced

bonding between the mother and infant (Alvarez Gutierrez & Ventura, 2021). A new mother's use of electronic devices was found to have a small, statistically significant positive association with perceived infant negative affectivity, and a small, statistically significant negative relationship with mother-infant attachment quality (Alvarez Gutierrez & Ventura, 2021). A possible interpretation of these findings is that "maternal technology use displaces time spent engaging with the infant", or it may impair the quality of mother-to-infant interactions through "impacts on maternal sensitivity and reciprocity" (Alvarez Gutierrez & Ventura, 2021, pg. 7).

Similarly, caregivers who used technology more frequently than others while interacting with their children under the age of five reported that their children displayed more negative behaviors, such as whining and throwing tantrums (Zimmerle, 2019). A tense caregiver-child relationship may cause caregivers to use technology even more in order to mitigate their difficult feelings (Alvarez Gutierrez & Ventura, 2021). This was supported by caregiver's statements that when their children act out, they tend to withdraw from them, leading caregivers to increase their screen use (Zimmerle, 2019). This can cause a negative cycle to develop that caregiver-child dyads may fall victim to, where caregiver's excessive technology use leads to negative child behavior, resulting in the caregiver using technology more frequently (Zimmerle, 2019). Further, difficult family relationships might lead the child to use technology more readily as a way to bypass conflict and/or obtain socio-emotional support from others outside the home (Hood, Zabatiero, Zubrick, Silva, & Straker, 2021).

Technology Addiction and Mental Health Impact

Excessive use of the internet, digital games, and mobile phones can be considered an addiction when the user experiences a loss of control (Baş & Karatay, 2020; Lee & Kim, 2017; Desouky & Abu-Zaid, 2020). Unfortunately, the apps and programs that are utilized by youth are

frequently “designed to be addictive” (Salmela-Aro, Upadyaya, Hakkarainen, Lonka, & Alho, 2016, p.344). An individual is considered to have an addiction to the internet when they encounter problems with physical, social, and academic aspects of their life caused by uncontrollable internet use (Baş & Karatay, 2020). Digital Gaming Addiction (DGA) may be present when a person experiences social and/or emotional problems as a result of their compulsive overuse of computer or video games (Baş & Karatay, 2020; Lee & Kim, 2017). Recently, the World Health Organization (WHO) added “Gaming disorder” to the 11th revision of the International Classification of Diseases (ICD-11) [effective on the first of January 2022] as a result of its marked negative effects on mental health (Baş & Karatay, 2020; Paulus, Potenza, & Bagot, 2021). Along these same lines, smartphone or mobile phone addiction is present when individuals excessively overuse their devices, even when they are aware of the adverse consequences, and experience symptoms of withdrawal when they try to establish control over their device use (Desouky & Abu-Zaid, 2020).

It is important to note, however, that it is not just an individual’s use of technology that leads to addiction, but rather the way in which the technology is used. A study by Caner and Evgin (2021) with 856 adolescent participants found that individuals that spent the majority of their online time doing homework had a significantly lower chance of acquiring digital gaming addiction. Additionally, a study by Hu, Long, Lyu, Zhou, and Chen (2017) found that subjects who used their smartphones mostly for gaming, media, or entertainment were more likely to experience smartphone dependence than those who used their smartphones mostly for calling and texting.

Technology addiction may lead to structural alterations in the brain. The amygdala is a structure of the brain (located in the temporal lobes of each hemisphere) that plays an important

role in processing emotions and influencing the reward center of the brain (Tymofiyeva et al., 2020). When the brain receives a 'reward', such as dopamine, it becomes motivated to repeat the behavior that led to the reward. "In addicted individuals, the amygdala becomes over-sensitized due to repetition of a rewarding behavior and becomes overresponsive to reward" (Tymofiyeva et al., 2020, pg. 2). During adolescence, actions are guided more by the emotional amygdala than by the logical frontal cortex (Meyer, 2020). A study by Tymofiyeva et al. (2020) examined the neural mechanisms of adolescent individuals with and without smartphone dependence using diffusion magnetic resonance imaging (MRI) to assess the structural connectivity of their white matter. Their results revealed a statistically significant, positive correlation "between the node centrality of the right amygdala and self-reported smartphone dependence" (Tymofiyeva et al., 2020, pg. 1). Node centrality refers to the number of neural connections the node has with other regions of the brain (Tymofiyeva et al., 2020). This implies that "the amygdala may become over-sensitized with repetitive smartphone use and the associated strong rewards", leading the user to have a continuous desire use their device (Tymofiyeva et al., 2020, pg. 4).

As mentioned in Chapter One, children's and adolescents' recreational use of technology puts them at an increased risk for developing technology addiction (Baş & Karatay, 2020). A study by Amendola, Spensieri, Biuso, and Cerutti (2020) examined the technology use of 408 students aged 11-18 in relation to their personality functioning. Aligned with previous studies, their findings implied that the problematic use of technology "constitutes a vulnerability factor for mental health" (Amendola, Spensieri, Biuso, & Cerutti, 2020, pg. 815). Indeed, several studies have found that overuse of technology is related to the severity of depression and anxiety symptoms (Desouky & Abu-Zaid, 2020; Glover, Ariefdjohan, & Fritsch, 2022; Lu et al., 2018; Salmela-Aro, Upadyaya, Hakkarainen, Lonka, & Alho, 2016). The relationship between the

over-use of technology and mental health is important because mental health challenges impede engagement in childhood occupations (Ratcliff, Fingerhut, & O'Brien, 2020). Mental health challenges may also restrict the child from participating in activities that develop their self-efficacy (Ratcliff, Fingerhut, & O'Brien, 2020).

Optimizing Technology Use

Several researchers agree that negative consequences come about when excessive time spent with technology displaces time that would typically be spent engaging in valuable childhood occupations (Ceranoglu, 2018; Gerwin, Kaliebe, & Daigle, 2018; Hale et al., 2018). It is vital to understand what strategies can be implemented to limit the overuse of screen-based technology in order to minimize the impact of these negative consequences.

Accepted Media Use Guidelines.

The American Academy of Pediatrics (AAP) has developed recommendations for the screen-based technology use, or media use, of young children (Council on Communications and Media et al., 2016). AAP suggests avoiding all screen-based technology/media before the age of 18 months, with video-chatting (e.g., FaceTime® or Zoom®) being the only exception. Between the ages of 18 months and 24 months, it is recommended that parents/caregivers, if desired, gradually expose their children to programming that is high quality and engage alongside their children (Council on Communications and Media et al., 2016). AAP suggests that high-quality programming be continued through ages two – five with a maximum of one hour per day. It is recommended that children six years old and older have regular time limits for technology use, as well as consistent expectations for the types of media that they can use (Council on Communications and Media et al., 2016). According to the Mayo Foundation for Medical Education and research (2019), as children age, "a one-size-fits-all approach" to moderating

technology use is less effective; parents/caregivers will need to determine the type and amount of screen-based technology/media that is beneficial for their individual child's unique needs (p. 1).

Quality Content.

Although it is necessary to set boundaries for technology use to limit the negative effects of overuse, children do not benefit from limitations that are unduly restrictive (American Psychological Association, 2019). Today's children will grow up immersed in a culture of advanced technology (Prout, 2021); they need to be able to leverage technology in order to optimize their occupational performance (Smith, 2017). With screen-based technology being utilized for a multitude of reasons, including academic purposes, some individuals feel the notion of screen time should be abandoned all together, suggesting that the way in which youth engage with technology is more important than the amount of time (Glover, Ariefdjohan, & Fritsch, 2022). The American Psychological Association (2019) suggests that it is more valuable for parents/caregivers to focus on the quality of content their children are viewing, and the context in which they view it, rather than the quantity of time alone. Parents, teachers, and therapists can support youths' use of quality content by helping them locate educational websites and applications that will enhance their academic and practical skills (Western Governors University, 2020).

Parent/Caregiver Involvement in Technology Use.

The world of screen-based technology can be perplexing for young children; for this reason, parental/caregiver supervision is crucial (Ceranoglu, 2018). Barr, McClure, and Parlakian suggest that learning how to interact with screen-based technology is akin to learning to drive a car; it is necessary for young children to have the supervision of an experienced adult to ensure their safety and help them understand the ropes (2019). Children can benefit from their

parent/caregiver watching screen-based technology or media with them (Mayo Foundation for Medical Education and Research, 2019); this has been referred to as co-viewing. It is recommended that adults and children discuss what they're watching while co-viewing; this provides the child with an opportunity to have an adult make sense of what they're seeing on their screens and explain how it applies to their lives (Mayo Foundation for Medical Education and Research, 2019). The advanced, interactive technology available today may require parents/caregivers to move beyond simple co-viewing and participate in "joint media engagement" (Barr, McClure, & Parlakian, 2019, p.30). Joint media engagement (JME) is comprised of back-and-forth interactions between the parent/caregiver and the child; JME may include describing the scene, naming items within view, asking and answering questions, and discussing the plot (Barr, McClure, & Parlakian, 2019). The responsive interactions involved in JME help children transfer what they have learned through technology "beyond the screen" and into their daily lives, a task that can be challenging for young children (Barr, McClure, & Parlakian, 2019, p.32).

Parent/Caregiver Modeling.

Parents/caregivers have the ability to help their children gain the benefits of using technology while minimizing the negative effects (Western Governors University, 2020). There is evidence to suggest that the way in which parents/caregivers utilize screen-based technology strongly influences how their children use screen-based technology (Bernard et al., 2017). Parents/caregivers are encouraged to recognize that their children watch them and interpret their behavior as signals for when and how it is acceptable to use screen-based technology (Mayo Foundation for Medical Education and Research, 2019). It is necessary for parents/caregivers to be responsible with their own technology use in order to lead by example for their children

(Beauchamp, 2019). Parents/caregivers can support their children by limiting their own use of screen-based technology and by focusing on teaching their children healthy technology habits (American Psychological Association; 2019; Beauchamp, 2019; Mayo Foundation for Medical Education and Research, 2019). Parent/caregiver modeling has been associated with beneficial results for children (Ceranoglu, 2018).

Setting Boundaries for Technology Use.

In addition to modeling appropriate technology use, parents/caregivers can support their children by setting boundaries for when and where technology can be utilized (Western Governors University, 2020). To assist with this, the American Academy of Pediatrics has created a "Family Media Use Plan" which allows families to create personalized family media use rules (Cross, Christakis, Radesky, Reid Chassiakos, & Moreno, 2016). In alignment with the Family Media Use Plan, The Mayo Foundation for Medical Education and Research has several recommendations to help families maintain a positive relationship with technology (2019). These suggestions include establishing technology-free areas of the house and times of the day, setting curfews to limit technology use before bedtime, keeping screens out of bedrooms, and charging devices in common areas. They also recommend that parents/caregivers utilize phone and application controls to pre-determine the length of time specific applications can be used (Mayo Foundation for Medical Education and Research, 2019). Additionally, keeping computers, TVs, and gaming consoles in a common space can make it easier for parents/caregivers to provide supervision (Prout, 2021).

Media Literacy and Safety Online.

'Media literacy' is a broad term used to describe a set of skills needed to not only "read, write, speak", and view information online, but to also "access, analyze, evaluate, create, and

participate with media in all its forms" (Turner et al., 2017, p. 2). Individuals with media literacy skills are able to determine the credibility of information, assess the bias of news outlets, safely navigate online interactions, and make informed decisions (Turner et al., 2017). Children and adolescents are bombarded with messages from the media on a near-constant basis; It is important for them to gain media literacy skills to enable them to critically think about the messages they receive and their intended purposes (e.g., to get you interested in their product). According to Turner et al. (2017), developing media literacy skills is "one of the most viable interventions strategies to minimize media's negative consequences and maximize its positive influences" (p. 2).

There are several things parents/caregivers can do to help their children gain media literacy skills. They can discuss why it is unsafe to share personal information online, and why they should refrain from clicking on unfamiliar links or downloading unknown programs (American Psychological Association, 2019). They can encourage their children to speak with them if they see distressing information/ imagines online, if they observe or experience any cyberbullying, or if they receive uninvited messages from strangers (American Psychological Association, 2019). They can also set up cybersecurity software to ensure safety and utilize parental controls on their electronic devices to restrict access to content that is not appropriate for their child's age (Prout, 2021; Western Governors University, 2020).

Group Treatment

Group treatment offers ample benefits, especially when there is a high demand for services. According to Thompson, "there is an unacceptable gap between current knowledge" of pediatric development and the application of that information in programs to help children and their parents/caregivers (Thompson, 2016, p.18). As mentioned previously, the number of

children diagnosed with a developmental disability has been trending upwards (Zablotsky et al., 2019). A contributing factor to this is the substantial increase in the number of infants surviving serious medical conditions due to advances in medical science and technology (Majnemer, Shevell, Rosenbaum, & Abrahamowicz, 2002). Fittingly, there is a growing need for rehabilitation services for this population (Majnemer, Shevell, Rosenbaum, & Abrahamowicz, 2002). Due to the high demand, parents and caregivers are experiencing long wait times for services, creating a lack of access to care for their children (Kolehmainen, MacLennan, Francis, & Duncan, 2010). Adding to the problem is parents/caregivers' strong preference for the limited number of after-school treatment time slots. Group treatment could help alleviate this problem by allowing more children to be seen at once and during the popular after-school hours. Additionally, group treatment was found to reduce labor costs, and be more beneficial than one-on-one treatment sessions in sustaining behavioral changes (Duncombe & Howe, 1995).

Esmaili et al. (2019) conducted a randomized control trial with 49 children ages seven to eleven that were diagnosed with a specific learning disability to study how participating in peer-play activities effects executive functioning ability. The "Behavior Rating Inventory of Executive Function" (BRIEF) was utilized to determine the child's executive functioning capacity, which includes indices for metacognition and behavior regulation skills (Esmaili et al., 2019, p.2). These researchers found that after peer-play intervention, BRIEF score averages increased significantly, demonstrating improvement in the children's executive functioning skills during occupational performance. Esmaili et al. (2019) posited that occupational therapists can employ activities that involve peer-play to advance the executive functioning ability of children with specific learning disabilities.

A systematic review of 124 articles, 77 of which were level 1 articles, investigated the effectiveness of occupation and activity-based interventions on pediatric mental health (Arbesman, Bazyk, & Nochajski, 2013). Researchers found strong evidence to support the benefit of occupation-based programming in improving the mental health of children with and without developmental disabilities (Arbesman, Bazyk, & Nochajski, 2013). For children that require more intensive services, occupation-based programs were found to be effective for improving social behavior as well as their self-management skills (Arbesman, Bazyk, & Nochajski, 2013). Occupation-based interventions that involve problem solving with peers can enhance children's social skills and ability to cope (Arbesman, Bazyk, & Nochajski, 2013; Thompson, 2016). Notably, working through challenges with peers can also help to lessen the "reactivity of physiological stress systems", reducing the physical symptoms of stress that are experienced (Thompson, 2016, p.23). Together, these findings demonstrate the benefits of pediatric group treatment.

Parent/caregiver Involvement in Group Treatment

Pediatric treatment is unique in that a "therapeutic triad" of communication exists; meaning that it is necessary for therapists to maintain communication with the child and with the parent/caregiver while also facilitating healthy communication between the child and their parent/caregiver (Hines, York, & Kaul, 2020, p. 1). Children make the most progress with therapy goals when their families are involved in the process (Elenko, 2021). This is because therapists have the opportunity to coach parents/caregivers on how to effectively carry-over interventions and best support their child between treatment sessions (Elenko, 2021). A recent systematic review by Laverdure and Beisbier (2021) found that coaching parents/caregivers in successful carry-over can enhance the occupational performance of their children and

adolescents. Parents/caregivers who were coached by providers were found to have more confidence when assisting their child independently (Elenko, 2021). Correspondingly, when therapists worked only with the child, parents/caregivers were unsure of what to do without the therapist's help; the Covid-19 pandemic made this phenomenon especially apparent (Elenko, 2021).

Occupational therapist led groups can be an apt setting for practitioners to provide parents/caregivers with education through modeling and coaching (Fabrizi, Ito, & Winston, 2016). Parents that participated in an occupational therapy group with their children reported experiencing multiple benefits, such as learning with their child, knowing other families experience the same challenges as them, and "the value of therapist time and expertise" (Bowman & Evans, 2019, p. 502). Further, an educational program for caregivers was found to increase caregiver understanding of the value of carrying-over therapeutic interventions into the home (Hines, York, & Kaul, 2020). Occupational therapists are optimally qualified to develop programs for children and adolescents because of their robust "knowledge of physical, mental, spiritual, and psychosocial development" (Kugel & Javherian-Dysinger, 2017, p. 8).

Occupational Therapist's Role

Occupational therapists have the skills, training, and expertise to play a critical role in the development and implementation of a pediatric group treatment program focused on mitigating the negative effects of technology overuse. Occupational therapists are experts in understanding occupational demands, environmental context, and the abilities of unique individuals, making them the ideal practitioners to address technology management (Smith, 2017).

Chapter III

Methods

The developed product is an occupational therapy group treatment program for pediatric clients and their families to be administered in outpatient pediatric clinics. The purpose of the product is to help children and their families benefit from the use of technology without experiencing the negative effects of technology overuse. The theoretical framework that was utilized in the creation of this product was the person-environment-occupation (PEO) model (Baptiste, 2017) as well as the developmental frame of reference (O'Brien & Kuhaneck, 2020). A thorough literature review needs assessment was conducted during the summer and fall of 2021. The literature review was continued, and the product was developed during the doctoral experiential placement in the spring of 2022.

The literature review needs assessment was completed to gather information on the pediatric population, including typical development and common developmental problems, as well as the structure and effectiveness of pediatric group programming. The literature review was expanded to encompass information related to the prevalence of technology and the impact of screen-based technology on youth. Literature was gathered using various databases that were accessed through the University of North Dakota's School of Medicine and Health Sciences library resources. These databases included CINAHL, PubMed, and ClinicalKey. The search engine Google was utilized to gain an understanding of the information that the general public is exposed to when seeking knowledge related to how technology impacts children. Additional information was obtained from government publications, professional organizations, experts in the field, and graduate level course materials. This includes the Center for Disease Control and

Prevention (CDC), the American Occupational Therapy Association (AOTA), faculty and site advisors, and textbooks, handouts, and lecture material, respectively.

Multiple search terms were utilized with the databases listed above to obtain knowledge about the pediatric population, their development, and pediatric group programming. An asterisk (*) was placed after certain terms to search all tenses of the word at one time; in this way, the term 'child*' can be used to represent the words child and children concurrently. Similarly, terms were placed in quotation marks to be searched as phrases rather than separate, individual words. The terms pediatric*, child*, youth, kids, baby, and infant were all used in regard to the pediatric population. In relation to group programming, search terms included program*, "occupational therapy", "program development", "skill development", group*, class, culture, length, frequency, and effectiveness. An example of a typical search combining terms and phrases is as follows: "occupational therapy" AND (pediatric* OR child*) AND program AND "skill development". The inclusion criteria established for this research was peer-reviewed articles, published in scientific journals between 1995 and 2021, with full text available in English. It was necessary to view articles from as far back as 1995 to include seminal research studies that influenced current standards of practice and informed group treatment. Articles were excluded if they were published before 1995, not peer-reviewed, or if they involved participants older than 21. Additionally, conference proceedings, dissertations, theses, and presentations were all excluded.

After the initial search focused on pediatric development and group programming, an additional search was carried out to gather information related to the prevalence of electronic technology and its impact on children and adolescents. Additional search words and phrases that were utilized included technology, electronics, smartphone, internet, development, impacts, "economic status", "technology impacts", "technology addiction", "internet addiction", "phone

addiction", scale, measure, assessment, and questionnaire. The phrases *systematic review* and *meta-analysis* were also utilized in order to obtain high quality, aggregate evidence. The inclusion criteria utilized for this research were articles published in English between 2012 – 2022 with full text available. The date range was further adjusted to articles published between 2017 – 2022 for the bulk of the continued research in order to obtain up-to-date information in the rapidly evolving technology climate. Articles published before 2012, that did not have full text, or were not published in English, were excluded from the literature review.

As a result of the literature review, it has been determined that there is mounting evidence to support negative associations between pediatric occupational performance and excessive technology use. The evidence obtained from this research has been used to inform the content of the product, enabling the product to be as effective and beneficial as possible. The literature review process has reinforced the pressing need for this product to assist occupational therapists in helping families obtain the positive benefits of technology while minimizing the negative consequences of technology overuse.

Chapter IV

Product

The result of this project was a six-week group treatment program, called the Tech Tools Program, designed for children ages four through seven with the intermittent participation of their parents/caregivers embedded throughout the program. The purpose of this program is to provide education to children and their families about the consequences of excessive technology use as well as how to utilize technology appropriately and effectively. The program is structured to take place twice a week, for a total of 12, 60-minute sessions. The program includes a Tech Game Plan and Contract that are correlated with the program content and intended to be fill-out and implemented by each family with the assistance of a skilled pediatric occupational therapist. Beginning in the second week of the program, parents/caregivers are asked to join the last 10-15 minutes of each session to initially fill out the Tech Game plan or contract with their child (first session of the week) and then to discuss how the implementation of the plan or contract has been going for their family (second session of the week). Parents/caregivers then receive supplemental handouts for each week of the program, allowing them to learn the material along with their child and best support their child during and after the program. By the end of the six-week program, all participants will have a fully completed and implemented Tech Game Plan and Contract for their families to utilize in their day-to-day lives to assist with technology management. The intended result of the program is to make positive changes to how children and their families engage with technology to improve the fit between the family, their occupations, and their environments in order to support improved occupational performance. The program was informed by the person-environment-occupation (PEO) theory (Baptiste, 2017) as well as the developmental frame of reference (O'Brien & Kuhaneck, 2020) and is structured to be easily

adapted by the implementing occupational therapist to ensure client-centered care is being provided to the individual group participants.

In order to view the full product, please contact Amy Shaver at Shaver186@gmail.com.

Chapter V

Summary

Today's children are spending more time on screen-based technology than ever before. Unfortunately, children do not yet possess the skills and tools that they need to manage the technology in their lives effectively. This is evidenced by the overuse of technology leading to a variety of problems that impact occupational performance, especially for growing children and adolescents. These problems include a shorter sleep duration, reduced scholastic achievement, musculoskeletal concerns, obesity, and exacerbated symptoms of depression and anxiety (Gerwin, Kaliebe, & Daigle, 2018; Glover, Ariefdjohan, & Fritsch, 2022; Gwynette, Sidhu, & Ceranoglu, 2018). Children require guidance and role modeling from their parents/caregivers to obtain the positive benefits of using technology without experiencing the multitude of negative effects that have been associated with its overuse. However, many parents/caregivers are struggling to model positive technology management for their children. This product can play a crucial role in helping families confront the impact of technology and create positive technology habits that lead to a balanced lifestyle for their family, as well as improved occupational performance.

A strength of this product was the large amount of research that informed program development. This research included meta analyses, systematic reviews, randomized control trials, quasi-experimental studies, large scale surveys, literature reviews, qualitative studies, and expert opinion pieces. The topics covered by this research included pediatric development, pediatric group programming, program development, technology use behaviors, impacts of technology use, and technology management strategies. The product was further strengthened by the input from a skilled pediatric occupational therapist with over 12 years of experience

working with the pediatric population. Lastly, the product was strengthened by its grounding in theory. The developmental frame of reference informed behavior and cognitive ability expectations, influencing the structure and content of the program (O'Brien & Kuhaneck, 2020). The person-environment-occupation (PEO) theory informed product development by promoting an optimized fit between the person, environment, and occupation to maximize occupational performance (Baptiste, 2017). The content of this product was limited by the age range of the intended participants, four through seven years old; the content could be more in-depth and advanced if it was directed at an older audience. Additionally, the success of this program is potentially limited by the parents'/caregivers' willingness to be involved and follow through with program and therapist recommendations.

In order to optimize this program, it is recommended that the program be implemented with the target population and then adjusted as needed to ensure optimum functionality. Ideal functionality of this program would involve the participants working together effectively, achieving the just right challenge for all participants, and enthusiastic parent/caregiver participation and collaboration. To secure the sustainability of the program, it is recommended that the program be implemented by an experienced and skilled pediatric occupational therapist who feels comfortable adapting the program as needed to best suit the participants and their families. The final recommendation is to expand the program for older audiences within the pediatric population who could benefit from similar content.

This product contributes to the practice of occupational therapy by providing occupational therapists with a structured way to assist families with their technology management. By improving technology management through the implementation of this program, occupational therapists can guide families towards achieving a balanced lifestyle that

will lead to an optimized fit between the family, their occupations, and their environments, ultimately resulting in improved occupational performance. This product has the potential to be implemented in multiple outpatient occupational therapy pediatric clinics, filling a rapidly growing need within pediatric services. Lastly, the data obtained from this program's pre and post-survey measures could be disseminated to stakeholders to demonstrate the value and efficacy of the program for the pediatric population.

References

Alvarez Gutierrez, S., & Ventura, A. K. (2021). Associations between maternal technology use, perceptions of infant temperament, and indicators of mother-to-infant attachment quality. *Early Human Development, 154*, 105305. doi:10.1016/j.earlhumdev.2021.105305

Amendola, S., Spensieri, V., Biuso, G. S., & Cerutti, R. (2020). The relationship between maladaptive personality functioning and problematic technology use in adolescence: A cluster analysis approach. *Scandinavian Journal of Psychology, 61*(6), 809-818. doi:10.1111/sjop.12664

American Occupational Therapy Association. (2014). Occupational therapy practice framework: Domain and process (3rd ed.). *American Journal of Occupational Therapy, 68*(Suppl. 1), S1-S48. doi.10.5014/ajot.2014.682006

American Psychological Association. (2019). *Digital Guidelines: Promoting healthy technology use for children.* Retrieved from https://www.apa.org/topics/social-media-internet/technology-use-children

Arbesman, M., Bazyk, S., & Nochajski, S. M. (2013). Systematic review of occupational therapy and mental health promotion, prevention, and intervention for children and youth. *American Journal of Occupational Therapy, 67*, e120–e130. doi.org/10.5014/ajot.2013.008359

Arias-de la Torre, J., Puigdomenech, E., García, X., Valderas, J. M., Eiroa-Orosa, F. J., Fernández-Villa, T., . . . Espallargues, M. (2020). Relationship between depression and the

use of mobile technologies and Social media among adolescents: Umbrella review. *Journal of Medical Internet Research, 22*(8). doi:10.2196/16388

Barr, R., McClure, E., & Parlakian, R. (2019). Maximizing the potential for learning from screen experiences in early childhood: What the research says. *Zero to Three*, *40*(2), 29–36.

Baptiste, S. (2017). The person-environment-occupation model. In J. Hinojosa, P. Kramer, & C. B. Royeen (Eds.), *Perspectives on human occupation: Theories underlying practice* (pp.137-182). Philadelphia, PA: F.A. Davis Company.

Baş, N., & Karatay, G. (2020). Effects of technology usage on the addictive behaviors of secondary school students. *Perspectives in Psychiatric Care, 56*(4), 871-877. doi:10.1111/ppc.12504

Beauchamp, N. (2019). Sneaky ways technology is affecting your family's health and may affect your child's new school year. *Exceptional Parent*, *49*(9), 31-33.

Bernard, J. Y., Padmapriya, N., Chen, B., Cai, S., Tan, K. H., Yap, F., . . . Müller-Riemenschneider, F. (2017). Predictors of screen viewing time in young Singaporean children: The gusto cohort. *International Journal of Behavioral Nutrition and Physical Activity, 14*(1). doi:10.1186/s12966-017-0562-3

Bowman, S., & Evans, C. (2019). It's not just me. Parents' perceptions of a multi-disciplinary therapy group for infants with disabilities. *Physical & Occupational Therapy in Pediatrics*, *39*(5), 502–513. doi-org.ezproxylr.med.und.edu/10.1080/01942638.2019.1577785

BrainPOP (Producer). (2022). *Media Literacy* [Video file]. Retrieved from https://www.brainpop.com/technology/digitalcitizenship/medialiteracy/

Cahill, S. M., Egan, B. E., & Seber, J. (2020). Activity- and occupation-based interventions to support mental health, positive behavior, and social participation for children and youth: A systematic review. *American Journal of Occupational Therapy*, *74,* 7402180020. doi.org/10.5014/ ajot.2020.038687

Carson, V., & Kuzik, N. (2021). The association between parent–child technology interference and cognitive and social–emotional development in preschool-aged children. *Child: Care, Health and Development, 47*(4), 477-483. doi:10.1111/cch.12859

Caner, N., & Evgin, D. (2021). Digital Risks and adolescents: The relationships between digital game addiction, emotional eating, and aggression. *International Journal of Mental Health Nursing, 30*(6), 1599-1609. doi:10.1111/inm.12912

Center for Disease Control and Prevention. (2022). *Childhood overweight & obesity*. Retrieved from https://www.cdc.gov/obesity/childhood/index.html

Ceranoglu, T. A. (2018). Inattention to problematic media use habits. *Child and Adolescent Psychiatric Clinics of North America, 27*(2), 183-191. doi:10.1016/j.chc.2017.11.009

Challita, J., Chapparo, C., Hinitt, J., & Heard, R. (2019). Effective occupational therapy intervention with children demonstrating reduced social competence during playground interactions. *British Journal of Occupational Therapy*, *82*(7), 433–442. doi-org.ezproxylr.med.und.edu/10.1177/0308022619832467

Chang, M., Benjamin, L., Burkey, C., Blake, T., & Chau, A. (2019). The relationship between sleep and interactive technology usage among adolescents: An occupational perspective. *The American Journal of Occupational Therapy, 73*(4_Supplement_1). doi:10.5014/ajot.2019.73s1-po4005

Cliff, D. P., McNeill, J., Vella, S., Howard, S. J., Kelly, M. A., Angus, D. J., . . . De Rosnay, M. (2017). The preschool activity, technology, health, adiposity, behaviour and cognition (Path-ABC) cohort study: Rationale and design. *BMC Pediatrics, 17*(1). doi:10.1186/s12887-017-0846-4

Council on Communications and Media, Hill, D., Ameenuddin, N., Reid Chassiakos, Y. (., Cross, C., Hutchinson, J., . . . Swanson, W. S. (2016). Media and young minds. *Pediatrics, 138*(5). doi:10.1542/peds.2016-2591

Crain, E. F. (2014). Pediatrics and the lure of technology. *Academic Pediatrics, 14*(1), 4-7. doi:10.1016/j.acap.2013.09.004

Cross, C., Christakis, D., Radesky, J., Reid Chassiakos, Y., & Moreno, M. (2016). Family media use plan. Retrieved from https://www.healthychildren.org/English/media/Pages/default.aspx

DeGangi, G. A., & Royeen, C. B. (1994). Current practice among neurodevelopmental treatment association members. *American Journal of Occupational Therapy*, *48*(9), 803–809.

Desouky, D. E., & Abu-Zaid, H. (2020). Mobile phone use pattern and addiction in relation to depression and anxiety. *Eastern Mediterranean Health Journal*. doi:10.26719/emhj.043

Duncombe, L. W., & Howe, M. C. (1995). Group treatment: goals, tasks, and economic implications. *American Journal of Occupational Therapy*, *49*(3), 199–205.

Elenko, B. K. (2021). They said: Coaching alongside families in early intervention. *Open Journal of Occupational Therapy (OJOT)*, *9*(3), 1–7. doi-org.ezproxylr.med.und.edu/10.15453/2168-6408.1837

Esmaili, S. K., Mehraban, A. H., Shafaroodi, N., Yazdani, F., Masoumi, T., & Zarei, M. (2019). Participation in peer-play activities among children with specific learning disability: A randomized controlled trial. *American Journal of Occupational Therapy, 73*(2):7302205110. doi.org/10.5014/ajot.2018.028613

Esmaili, S. K., Mehraban, A. H., Shafaroodi, N., Yazdani, F., Masoumi, T., & Zarei, M. (2019). Participation in peer-play activities among children with specific learning disability: A randomized controlled trial. *The American Journal of Occupational Therapy, 73*(2). doi:10.5014/ajot.2018.028613

Fabrizi, S. E., Ito, M. A., & Winston, K. (2016). Effect of occupational therapy–led playgroups in early intervention on child playfulness and caregiver responsiveness: A repeated-measures design. *American Journal of Occupational Therapy, 70*, 7002220020. doi.org/10.5014/ajot.2016.017012

Fryar, C., Carroll, M., & Afful, J. (2021, February 08). *Products - health e stats - prevalence of overweight, obesity, and severe obesity among children and adolescents aged 2–19 years: United States, 1963–1965 through 2017–2018*. Retrieved from https://www.cdc.gov/nchs/data/hestat/obesity-child-17-18/obesity-child.htm

Gerwin, R. L., Kaliebe, K., & Daigle, M. (2018). The interplay between digital media use and development. *Child and Adolescent Psychiatric Clinics of North America, 27*(2), 345-355. doi:10.1016/j.chc.2017.11.002

Giovanelli, A., Adams, S. H., Jane Park, M., & Ozer, E. M. (2021). Delivering anticipatory guidance about technology use to adolescents in primary care: Rates in a representative California sample. *Journal of Adolescent Health, 69*(6), 1044-1047. doi:10.1016/j.jadohealth.2021.06.007

Glover, J., Ariefdjohan, M., & Fritsch, S. L. (2022). #KidsAnxiety and the digital world. *Child and Adolescent Psychiatric Clinics of North America, 31*(1), 71-90. doi:10.1016/j.chc.2021.06.004

Gwynette, M. F., Sidhu, S. S., & Ceranoglu, T. A. (2018). Electronic screen media use in youth with autism spectrum disorder. *Child and Adolescent Psychiatric Clinics of North America, 27*(2), 203-219. doi:10.1016/j.chc.2017.11.013

Hale, L., Kirschen, G. W., LeBourgeois, M. K., Gradisar, M., Garrison, M. M., Montgomery-Downs, H., . . . Buxton, O. M. (2018). Youth screen media habits and sleep. *Child and Adolescent Psychiatric Clinics of North America, 27*(2), 229-245. doi:10.1016/j.chc.2017.11.014

Harris, C., Straker, L., Pollock, C., & Smith, A. (2015). Children, computer exposure and musculoskeletal outcomes: The development of pathway models for school and home computer-related musculoskeletal outcomes. *Ergonomics, 58*(10), 1611-1623. doi:10.1080/00140139.2015.1035762

Hester, M. (2020). 10 tips for using technology to promote health. *Contemporary Pediatrics*, *37*(11), 29.

Hines, D., York, K., & Kaul, E. (2020). Optimizing compliance with home programming through neuroplasticity education among parents of children receiving outpatient OT...2020 AOTA Annual Conference & Expo. *American Journal of Occupational Therapy*, *74*(Sup1), 1. doi-org.ezproxylr.med.und.edu/10.5014/ajot.2020.74S1-PO3133

Hood, R., Zabatiero, J., Zubrick, S. R., Silva, D., & Straker, L. (2021). The association of mobile touch screen device use with parent-child attachment: A systematic review. *Ergonomics, 64*(12), 1606-1622. doi:10.1080/00140139.2021.1948617

Hu, Y., Long, X., Lyu, H., Zhou, Y., & Chen, J. (2017). Alterations in white matter integrity in young adults with smartphone dependence. *Frontiers in Human Neuroscience, 11*. doi:10.3389/fnhum.2017.00532

Jamruk, K. (2017). The weight game: Fighting childhood obesity with childhood video technology. *Journal of Legal Medicine, 37*(1-2), 175-194. doi:10.1080/01947648.2017.1303409

Kauffman, N., & Kinnealey, M. (2015). Comprehensive social skills taxonomy: Development and application. *American Journal of Occupational Therapy, 69*(2):6902220030. doi.org/10.5014/ajot.2015.013151

Kolehmainen, N., MacLennan, G., Francis, J. J., & Duncan, E. A. (2010). Clinicians' caseload management behaviours as explanatory factors in patients' length of time on caseloads: A

predictive multilevel study in Paediatric Community Occupational therapy. *BMC Health Services Research, 10*(1). doi:10.1186/1472-6963-10-249

Kugel, J. D., Javherian-Dysinger, H., & Hewitt, L. (2017). The role of occupational therapy in community-based programming: Addressing childhood health promotion. *The Open Journal of Occupational Therapy, 5*(1). doi:10.15453/2168-6408.1259

Lambing, F. (2015). You matter to me. I care about you. *Canadian Nurse*, *111*(8), 36

Laverdure, P., & Beisbier, S. (2021). Occupation- and activity-based interventions to improve performance of activities of daily living, play, and leisure for children and youth ages 5 to 21: A systematic review. *American Journal of Occupational Therapy, 75,* 7501205050. doi.org/10.5014/ ajot.2021.039560

Lee, C., & Kim, O. (2016). Predictors of online game addiction among Korean adolescents. *Addiction Research & Theory, 25*(1), 58-66. doi:10.1080/16066359.2016.1198474

Lu, L., Xu, D., Liu, H., Zhang, L., Ng, C. H., Ungvari, G. S., . . . Xiang, Y. (2018). Mobile phone addiction in Tibetan and Han chinese adolescents. *Perspectives in Psychiatric Care, 55*(3), 438-444. doi:10.1111/ppc.12336

Lund, L., Sølvhøj, I. N., Danielsen, D., & Andersen, S. (2021). Electronic media use and sleep in children and adolescents in western countries: A systematic review. *BMC Public Health, 21*(1). doi:10.1186/s12889-021-11640-9

Majnemer, A., Shevell, M., Rosenbaum, P., & Abrahamowicz, M. (2002). Early rehabilitation service utilization patterns in young children with developmental delays. *Child: Care, Health and Development, 28*(1), 29-37. doi:10.1046/j.1365-2214.2002.00237.x

Matuska, K., & Barrett, K. (2019). Patterns of occupation. In B. A. Boyt-Schell (Eds.), *Willard and Spackman's occupational therapy* (13th ed., pp. 212-222). Philadelphia: Wolters Kluwer

Mayo Foundation for Medical Education and Research. (2022). *Tips for setting screen time limits as a parent.* Retrieved from https://www.mayoclinic.org/healthy-lifestyle/childrens-health/in-depth/screen-time/art-20047952

McGarrigle, J., & Nelson, A. (2006). Evaluating a school skills programme for Australian Indigenous children: a pilot study. *Occupational Therapy International*, *13*(1), 1–20. doi-org.ezproxylr.med.und.edu/10.1002/oti.10

Meyer, M. (2020). *Health and disease: The changes of cognition* [PowerPoint Sides]. Occupational Therapy Department, University of North Dakota.

Modecki, K. L., Low-Choy, S., Uink, B. N., Vernon, L., Correia, H., & Andrews, K. (2020). Tuning into the real effect of smartphone use on parenting: A multiverse analysis. *Journal of Child Psychology and Psychiatry, 61*(8), 855-865. doi:10.1111/jcpp.13282

Moreno, M. A., Binger, K. S., Zhao, Q., & Eickhoff, J. C. (2021). Effect of a family media use plan on media rule engagement among adolescents. *JAMA Pediatrics, 175*(4), 351. doi:10.1001/jamapediatrics.2020.5629

O'Brien, J., & Kuhaneck, C. (2020). Using occupational therapy models and frames of reference with children and youth. In J. Clifford O'Brien & H. Kuhaneck (Eds.), *Case-Smith's occupational therapy for children and adolescents* (pp. 18-45). St. Louis, MO: Elsevier

Ochoa, W., Reich, S. M., & Farkas, G. (2021). The observed quality of caregiver-child interactions with and without a mobile screen device. *Academic Pediatrics, 21*(4), 620-628. doi:10.1016/j.acap.2020.07.012

Ohl, A. M., Graze, H., Weber, K., Kenny, S., Salvatore, C., & Wagreich, S. (2013). Effectiveness of a 10-week tier-1 response to intervention program in improving fine motor and visual–motor skills in general education kindergarten students. *American Journal of Occupational Therapy, 67*, 507–514. doi.org/10.5014/ajot.2013.008110

Paulus, M. P., Potenza, M. N., & Bagot, K. S. (2021). Screen media activity in youth: Friend or fiend? *Psychiatric Times*, *38*(10), 18–20.

Paulus, M. P., Squeglia, L. M., Bagot, K., Jacobus, J., Kuplicki, R., Breslin, F. J., . . . Tapert, S. F. (2019). Screen media activity and brain structure in youth: Evidence for diverse structural correlation networks from the ABCD study. *NeuroImage, 185*, 140-153. doi:10.1016/j.neuroimage.2018.10.040

Pfeiffer, B., Frolek Clark, G., & Arbesman, M. (2018). Effectiveness of cognitive and occupation-based interventions for children with challenges in sensory processing and integration: A systematic review. *American Journal of Occupational Therapy, 72*, 7201190020. doi.org/10.5014/ajot.2018.028233

Prout, T. (2021). *The negative effects of technology on children*. Retrieved from https://www.nu.edu/resources/negative-effects-of-technology-on-children-what-can-you-do/

Ratcliff, K. Fingerhut, P., & O'Brien, J. (2020). Mental health conditions. In J. Clifford O'Brien & H. Kuhaneck (Eds.), *Case-Smith's occupational therapy for children and adolescents* (pp. 728-763). St. Louis, MO: Elsevier

Reus, E. J., & Mosley, I. T. (2018). The health and development correlates of screen media exposure in children 0-5yrs: an integrative literature review. *Australian Journal of Child & Family Health Nursing*, *15*(2), 12–21.

Reynolds, S., & Andelin, L. (2021). *Sleep and screens: How technology can be used to improve sleep in children.* Retrieved from https://www.aota.org/publications/sis-quarterly/children-youth-sis/cysis-11-21

Sage, C., & Burgio, E. (2017). Electromagnetic fields, pulsed radiofrequency radiation, and epigenetics: How wireless technologies may affect childhood development. *Child Development, 89*(1), 129-136. doi:10.1111/cdev.12824

Salmela-Aro, K., Upadyaya, K., Hakkarainen, K., Lonka, K., & Alho, K. (2016). The dark side of internet use: Two longitudinal studies of excessive internet use, depressive symptoms, school burnout and engagement among Finnish early and late adolescents. *Journal of Youth and Adolescence, 46*(2), 343-357. doi:10.1007/s10964-016-0494-2

Scurlock, D. (2015). Effect of occupation-based groups on self-concept of children aged 5-8: A pilot study. *Occupational Therapy in Health Care*, *29*(1), 63–76. doi-org.ezproxylr.med.und.edu/10.3109/07380577.2014.968942

Shepherd, J., & Ivey, C. (2020). Assessment and treatment of activities of daily living, sleep, rest, and sexuality. In J. Clifford O'Brien & H. Kuhaneck (Eds.), *Case-Smith's occupational therapy for children and adolescents* (pp. 267-314). St. Louis, MO: Elsevier

Smith, R. O. (2017). Technology and occupation: Past, present, and the next 100 years of theory and Practice. *The American Journal of Occupational Therapy, 71*(6). doi:10.5014/ajot.2017.716003

Solet, J. (2019) Sleep and rest. In B. A. Boyt-Schell (Eds.), *Willard and Spackman's occupational therapy* (13th ed., pp. 828-846). Philadelphia: Wolters Kluwer

Starcevic, V. (2021). Commentary: Worshipping the internet – the perils of serving an unpredictable master – a commentary on aboujaoude and Gega (2021). *Child and Adolescent Mental Health, 26*(4), 383-384. doi:10.1111/camh.12510

Merriam-Webster. (2022). *Technology definition & meaning*. Retrieved from https://www.merriam-webster.com/dictionary/technology

The Digital Wellness Lab. (2022). Retrieved from https://digitalwellnesslab.org/

Thompson, R. (2016). What more has been learned? The science of early childhood development 15 years after neurons to neighborhoods. *Zero to Three*, *36*(3), 18–24.

Tripathi, M., & Mishra, S. K. (2019). Screen Time and adiposity among children and adolescents: A systematic review. *Journal of Public Health, 28*(3), 227-244. doi:10.1007/s10389-019-01043-x

Turner, K. H., Jolls, T., Hagerman, M. S., O'Byrne, W., Hicks, T., Eisenstock, B., & Pytash, K. E. (2017). Developing digital and media literacies in children and adolescents. *Pediatrics, 140*(Supplement_2). doi:10.1542/peds.2016-1758p

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*, 271–283. doi.org/10.1016/j.pmedr.2018.10.003

Tymofiyeva, O., Yuan, J. P., Kidambi, R., Huang, C., Henje, E., Rubinstein, M. L., . . . Xu, D. (2020). Neural correlates of smartphone dependence in adolescents. *Frontiers in Human Neuroscience, 14*. doi:10.3389/fnhum.2020.564629

Waldman, H. B., & Perlman, S. P. (2018) American academy of developmental medicine & dentistry. Google is not god! *Exceptional Parent, 48*(10), 14–16.

Western Governors University. (2020). *Impact of technology on kids today and tomorrow.* Retrieved from https://www.wgu.edu/blog/impact-technology-kids-today-tomorrow1910.html

Whitney, D. G., & Peterson, M. D. (2019). US national and state-level prevalence of mental health disorders and disparities of mental health care use in children. *JAMA Pediatrics, 173*(4), 389. doi:10.1001/jamapediatrics.2018.5399

Zablotsky, B., Black, L. I., Maenner, M. J., Schieve, L. A., Danielson, M. L., Bitsko, R. H., Blumberg, S. J., Kogan, M. D., & Boyle, C. A. (2019). Prevalence and trends of developmental disabilities among children in the United States: 2009–2017. *Pediatrics*, *144*(4). doi.org/10.1542/peds.2019-0811

Zimmerle, J. C. (2019). Limiting technoference: Healthy screen time habits for new parents. *International Journal of Childbirth Education*, *34*(2), 54–59.