First-Person Parent: A Longitudinal Study Exploring the Role of Wearable Cameras in Parent-Child Interactions

by

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Abstract

This study investigates the user experience of wearable cameras as a less disruptive way to capture and share interactions between parents and their children. In this research, I conducted a longitudinal study and 14 parents (12 female and two male), and 27 children participated in a six week to see how a wearable camera integrated into sunglasses affected parent-child interaction in their everyday routines. According to the preliminary findings of a qualitative travelogue research, utilizing a wearable camera or other semi-inconspicuous wearable devices will help parents to document moments between themselves and their children without having to engage in smartphone use behaviors during non-use times. In addition, the study found that younger children were less likely to feel obligated to "perform" for the wearable camera, and that parents could capture their children's facial expressions and joyful moments in real time.

Keywords: Wearable Camera, Children/Parents, User Experience and Usability, Qualitative Methods, Visual methodologies

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Chapter 1: Introduction

1.1 Motivation

1.1.1 Technology and parenting

Digital technologies and social networks are a big part of our everyday life and still are growing and developing (Morris, 2014). As of 2017 in Canada, 76 percent of people own a smartphone, followed by 71 percent own a laptop or netbook as result shows by Statistics Canada (*The Internet and Digital Technology*, 2017). In addition to digital devices, Auxier, & Anderson, M. (2021) explains that as of February 2021, more than 72 percent of online American adults utilized social networking sites; YouTube was the most popular, with 81 percent of people using it, followed by Facebook, with 69 percent. Parenthood is not an exception to the impact of digital technologies and social networks.

The study of the interaction between technology and parenting is a new but rising area. Parental smartphone usage and its consequences for parent-child relations have recently gotten much attention in the science community (Knitter & Zemp, 2020). Technology has also started to play an essential part in parenting, enabling tools for data sharing, memory-making, and social connection for parents, as well as new methods for them to comprehend ideas of care and welfare (Wang et al., 2017). Knitter & Zemp (2020) also argue that parents are prone to use smart devices during parent-child interactions, such as text messaging while playing with their children since they are immersed in screen media on personal and work-related concerns each day.

It is not uncommon for parents and caregivers to use social media to share pictures and updates about their children with grandparents, friends, and other family members (Kumar & Schoenebeck, 2015). Kumar and Schoenebeck (2015) argue that among Facebook users, 98% of new mothers upload pictures to the site (A. Brown & Smolenaers, 2018; Kumar & Schoenebeck, 2015). New mothers tend to post more photos and videos of their babies throughout the social network. Mothers who use Facebook report posting baby pictures more often than baby-related status updates (Kumar & Schoenebeck, 2015). Scholars focus on mothers more than fathers because they are likely more active in the social network (Brooke Auxier & Anderson, 2021). Despite changing roles, women remain the primary caregivers for their children (Kumar & Schoenebeck, 2015).

In considering the popular mantra: "It takes a village to raise a child", Internet forums can be used to extend one's village globally - allowing mothers, fathers, and caregivers to connect with online parenting communities to discuss concerns and share advice (Gu & Taylor, 2018). Studies show a greater desire for interactive platforms for keeping the expectant and new parents in touch with their friends and family. Technological needs such as baby monitoring devices and pregnancy and informative childcare platforms have been studied for years (Kumar & Schoenebeck, 2015). For example, Kientz et al. (2009) developed BabySteps for digitally journaling child development. Such a project helps parents to provide and share realistic data and information with a child's pediatrician. Women who participate in these types of community groups frequently suffer from issues like postpartum depression, and they

want their postings to be responded to in a fast and appropriate manner (Kumar & Schoenebeck, 2015).

Nevertheless, parents' attention may be directed away from their children during family quality time such as playtime, bedtime, and meals because of using the digital technologies (Knitter & Zemp, 2020) . When parents get distracted by using these technologies while interacting with their child, it may impair the social-emotional development of children, because parents' attention is diverted from their children's demands to their devices (Knitter & Zemp, 2020). Although improper use of technology can have devastating effects, the role of technology and digital devices in parent-child interaction is essential. Countless mobile and wearable technologies make it easier to monitor and manage nearly all aspects of pregnancy and child-rearing (Clarke-Sather et al., 2018; Leaver, 2017; Peyton et al., 2014).

1.1.2 Advantage and disadvantage of the wearables

Parenting in the digital age has introduced a myriad of polarized discussions on the potentially positive and negative effects of digital technologies on parent-child interactions (A. Brown & Smolenaers, 2018; Moore & Abetz, 2016). Questions have been raised about the implications of technologies by parents; wearables are no exemption. Developmental experts have employed wearable camera and video recording to examine child-parent interactions, particularly quality moments like playtime and mealtimes (Schrempft et al., 2017) . The purpose of this study was to see if the SenseCam wearable camera can be used to assess the early obesogenic home environment and if it can be used to validate self-report measures. Despite all its benefits,

the growing use of wearable cameras in families has raised concerns about bystander privacy (Swan, 2013), especially if the camera is concealed (Koelle et al., 2017). Another issue that may occur as a result of using a wearable is surveillance, which is not necessarily negative but is extremely unclear and constantly ambiguous. Different kinds of surveillance are going on globally for beneficial and sinister reasons. Wearables are not excepted from this while using many sensors to capture environmental information.

Wearable devices like Owlet claim that their product can provide "peace of mind" by alerting parents if something is wrong with their child's health (Wang et al., 2017). However, there are worries that this gives parents a "false feeling of security" when it comes to catastrophic situations involving baby health. In these serious instances, the infant's health is in danger, for example, when the baby's heart rate or oxygen levels appear to be abnormal, or sudden infant death syndrome (SIDS) (Wang et al., 2017). Although, this device has also been critiqued for giving too many false alarms as well. However, this device has been criticized for producing too many false alerts. The Owlet correctly identified abnormally low oxygen levels in the infant's blood, it did not always work properly. It frequently displayed alarming pulse rates when the reference monitor showed normal pulse rates. (Wang et al., 2017). These are a few examples of disadvantages of the wearable in parent-child interaction. The line between medical devices and wearables that apparently provide peace of mind remains ambiguous.

The wearable bracelet from Sproutling is a holistic baby monitor. It monitors the baby's vital signs, such as heart rate, skin temperature, movements, and body posture, and sends the information to a smartphone or tablet. It also looks at the baby's vital signs to forecast when they'll wake up and how they'll feel. Finally, the Sproutling Baby Monitor

has sensors that automatically change the ambient temperature, humidity, audio, and lighting levels to ensure that your baby has the greatest possible sleep (Redlitz, n.d.).

Mimo Smart Baby Monitor is another wearable that may be used in childcare. There are two elements to this all-in-one baby monitor and app: A cotton onesie with two breathing sensors and a detachable motion sensor, which is washable and stretchy. Another feature is a charging station that sends data like breathing patterns, skin temperature, sleep activities, and body position to the parents' devices. Mimo is the first baby wearable that deliver you notifications and nighttime sleep activity statistics. It also records and sends sound to the phone, allowing users to listen to it from a different room (Redlitz, n.d.).

With the growing popularity of child wearables, it is more important for parents to be aware of these devices' limitations as well as their potential (Leaver, 2017). The advantages of current wearable technologies include their low cost, compact size, and low energy consumption; these features are very appealing to their wearers (J. Lee et al., 2016). Wearable gadgets have advanced to the point that they can monitor and track users' activities via audio, video, and different types of sensors. These benefits make wearable gadgets more accessible and appealing in the parenting context, in which they can assist parents. In addition, wearables can be used on any part of the body, such as the head, ear, eye, arm, trunk, finger, neck, and foot (J. Lee et al., 2016).

In photo documentation, these features might help wearable cameras play a critical role in parenting. Wearable cameras have the potential to replace mobile phone cameras and other digital cameras in capturing unique moments in families' life, such as playtime, family meals, outdoor activities, etc. Concerns over "distraction" or being

“unavailable” have prompted parents to carve out non-use times to engage with their children without distraction. I was interested in how novel wearable devices could stand in for popular portable cameras (e.g., mobile phones) and how the affordances of such a device might shape parent-child interactions in situ.

Original Snapchat Spectacles version 1.0 in Teal. (*Snapchat Spectacles Version 1.0*, n.d.)

1.2 Research Question

In this study, the researcher examined the impact of using wearable cameras instead of mobile phones on the kinds of photos parents capture of their children. The researcher was also interested in exploring if wearables can take the place of mobile use during parent-child interaction. To this end, this thesis explored the potential use of a semi-conspicuous wearable camera (Snapchat Spectacles, Figure 1) as a way for parents and caregivers as an unobtrusive tool for capturing images and video of their children (needs revision).

To better understand, a longitudinal study was conducted to answer the following questions (Figure 2):

Q1: How do wearable cameras influence the parents' photo documentation of their children?

Q2: How would the use of wearable cameras by parents affect children's attitudes?

Q3: How would participants evaluate this technology, and what was their experience?

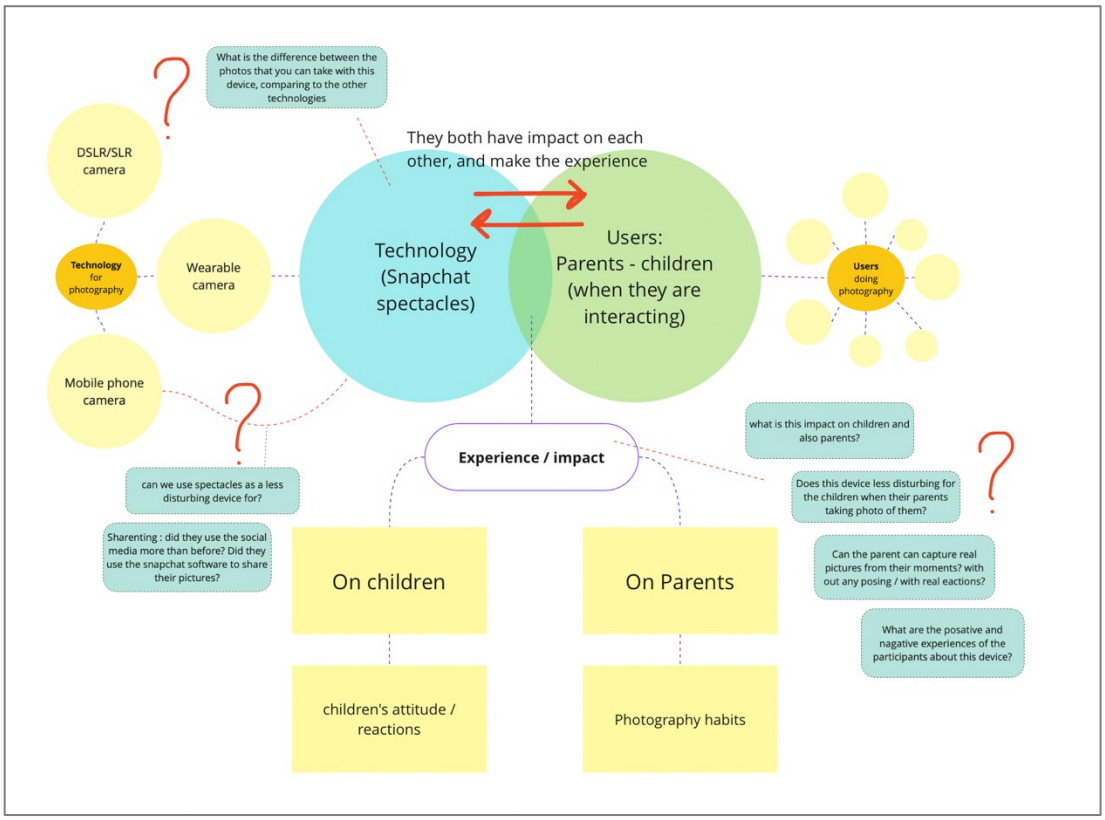

FIGURE 1 THE PROCESS OF DEVELOPING THE RESEARCH QUESTIONS (RQ)

For this research the researcher conducted a longitudinal study. In this study the researcher recruited 14 parents of 27 children to investigate the ways in which such a wearable device might offset caregiver mobile phone use. Participants in the study were

asked to use a pair of Snapchat Spectacles for six weeks in addition to other technologies they own to capture photos of their families. The researcher asked the participants to keep weekly travelogues (hosted on Google forms) using a similar longitudinal distance method described by Taylor et al. (Taylor et al., 2012). In the travelogue, participants were asked to upload three favourite photos captured each week along with details describing the photo, the context in which it was taken, reflections on the affordances of the wearable camera shaped the resultant photo and interactions for the recorded activity. Participants completed one travelogue per week for a total of 6 weeks each.

252 photos were analyzed using visual analysis methodologies described by Rose (2016), mobilizing both content analysis and compositional interpretation. Where content analysis produces quantitative results, compositional interpretation allows for more nuanced, qualitative analysis of images. Compositional interpretation involves looking at the composition of the image: its content, spatial organization, light, expressive content. Both participant photos and textual data were imported into Nvivo software for qualitative analysis, using deductive and inductive coding, constant comparative method, theoretical sampling, and saturation.

1.3 Contribution

In this thesis the researcher explored the user experience of wearable glasses in parent-child interactions. The contribution and novelty of this research is to utilize a semi-conspicuous wearable camera for parent-child photo documenting. A longitudinal, mixed-methods travelogue study enabled us to learn how a wearable camera in glasses

might be a useful tool for documenting interactions between parents or caregivers and their children without using mobile phones. Specifically, to explore how the affordances of the technology could disrupt some of the negative discourse surrounding technology use for capturing these interactions. For the future research in this area, the researcher suggests conducting further travelogue studies on other types of wearable cameras for parents and caregivers while interacting with their children. Based on the results of this study, the researcher proposes best practices to design wearable cameras specifically for prenatal photo documentation.

1.4 Thesis outline

The thesis contains seven chapters (Figure 3); in chapter 2, the researcher presents background and related work on the topic of wearables and the use of wearable cameras in parenting. In chapter 3, the researcher used a cognitive walkthrough method to examine the usability of Spectacles and the Snapshot application when using the device. This chapter focuses on how new users can connect the device to the system, perform tasks with the system, work with the device, and interact with the system. From there, in chapter 4, the researcher presented the methodology and explained the research design and methods in detail. The researcher described the longitudinal approach and six weeks of using Snapchat Spectacles by parents in chapter 4. The participants' recruitment process and the research procedure are explained in detail in the same chapter. Chapter 5 focuses on the study's findings and results and deeply discusses the participants' travelogue and visual analysis. The researcher examined further information and data

analysis in chapter 6, and the researcher also provided some design recommendations regarding some issues raised in the results and discussion. In chapter 6, the researcher presents some study's limitations, followed by a conclusion, and suggests some future work in the same area in chapter 7.

FIGURE 2 THESIS PROCESS

Chapter 2: Background and Related Work

2.1 Overview

Photographs are often regarded as the most potent motivation for former memories among all digital tools. Photographs are cultural artifacts that capture events that shape family life and frequently convey a story about connections within and between family members (Whittaker et al., 2010). As a result, family members make a concentrated effort to capture crucial events on camera (Whittaker et al., 2010).

The tradition of family photo-taking dates to the invention of the camera. Many people take and share family pictures. Family photography significantly increases when people become parents and first-time parents have been shown to be especially inexhaustible photographers (Kumar & Schoenebeck, 2015). Many parents post their newborn photos on social media, and these images are examples of "home mode" communication, defined by Chalfen as "a pattern of interpersonal and small group communication focused on the house" (Chalfen, 1987, p. 8). Images of children dominate family photography (Chalfen, 1987; Spence & Holland, 1991), and the birth of a child is one of the most prevalent reasons for families to purchase a new camera (Chalfen, 1987; Kumar & Schoenebeck, 2015).

2.1.1 Mobile Phone Photography

After communicating and virtual social interaction on social media, using smartphones to take photos is one of the most popular ways of using phones in everyday life (H. Brown, 2019; *These Are the Most Common Activities on Mobile Phones*, 2021). Evolving the phone's camera and focusing on it by phone companies can confirm its importance. Concerns have been raised about the effects of the frequent photo documentation afforded by digital photography and the ubiquity of smartphones (Kumar & Schoenebeck, 2015; Whittaker et al., 2010). Parents' smartphone usage rates are on the rise as they strive to stay connected with their spouses, friends, and coworkers throughout the socially isolating moments of parenthood (Knitter & Zemp, 2020). During the day, parents are used the smartphones and screen media for everyday life tasks. They most likely use smart devices when caring for their child and while interaction with them. They might get distracted by text messaging or social media while playing with their children (Beamish et al., 2019; Knitter & Zemp, 2020).

Concerns about the consequences of mobile use by parents and caretakers have been highlighted in the context of photo documenting. According to child development studies, using phones while caring for children can be destructive (Hiniker et al., 2015). Adult phone use while caring for children has been shown in previous research to be negative to the children in care (Hiniker et al., 2015). Other research has stated that when adults are distracted by electronic devices, they felt guilty, and unpleasant emotional reactions to using technology while caring for children (Hiniker et al., 2015). Children perceive adults' phone preoccupation as alienating and emotionally dissatisfying. (Steiner-Adair & Barker, 2013).

According to researchers, adults' phone usage when caring for children is replacing play-based adult-child interactions (Redlitz, n.d.; Steiner-Adair & Barker, 2013). Because play and face-to-face interactions are the foundations of young children's social learning and language acquisition (Hiniker et al., 2015), adults' phone usage can be disruptive to essential aspects of children's early learning settings. Despite these findings, research in this field is still in its early stages (Radesky et al., 2014), and many of these problems are still hypothetical (Hiniker et al., 2015). Clearly, parents value taking photos of their children, and likely are unaware how much mobile phone use is encroaching on their interactions with their children. Parents may use the phone to take photos of their child or may pick the phone up to quickly respond to a message or notification, but then become distracted by other features of the phone, such as social media. Based on the concerns raised in the literature, I was motivated to explore an alternative technology that would allow parents to capture photos of their children during parent-child interactions without the use of a mobile phone. Specifically, I was motivated to explore a semi-conspicuous wearable camera that could capture photos anywhere parents and children may play and could easily be uploaded to the mobile phone for sharing later on social media.

2.1.2 Wearable Cameras for Parents and Children

Wearable technologies (wearables) are not simply defined as holding portable compact computing devices. “Wearables” are technologies that enhance humans' mental and physical abilities while wearing them during everyday life tasks (J. Lee et al., 2016). With the fast growth of information and communication technology in the past few

decades, wearables have sparked a new part in human–computer interaction. Wearables will become more than just data monitors or entertaining accessories, with broader goals and values that will benefit both individuals and communities.

Wearable technology has begun to play an essential part in parenting, giving tools for data sharing, memory-making, and social connection for caregivers, as well as better approaches for them to grasp ideas of care and welfare (Wang et al., 2017). Wearable technology offers users the characteristics of mobility and connection, allowing them to easily navigate online information and interact with others while on the go (J. Lee et al., 2016). For example, the use of wearables to support Kangaroo Care between caregivers and infants in the NICU (Neonatal intensive care unit) has been explored (Clarke-Sather et al., 2018). Commercially available wearable biosensors for infants have also been used to monitor infant breathing to prevent crib death (Bonafide et al., 2017).

Wearable cameras are one of the various types of wearables typically marketed to sports and adventure enthusiasts; smart glasses are beginning to be used in life-blogging (Drivet, 2018; Koelle et al., 2017). Wearable cameras can be used in many ways, but they are mostly used for recording sports or nature videography. In the context of photo documentation, concerns have been raised over the effects of distraction caused by using cellphone to texting, calling, or even using social media. This focuses on alarmist concerns over “distracted” or “unavailable” parents who may use mobile phones in the presence of their children. Wearable camera technological advances have provided opportunities to objectively help parents interact with their children without any external disruption. Although the use of wearables technologies in parenting is advancing, there

are many debates about the pros and cons of using this technology when caring for children.

One of the potential alternatives could be wearable devices, such as semi-conspicuous cameras. Health monitoring, gaming, and fashion are just a few of wearable technology uses. In this study, I explored more about the use of wearable devices in parent-child interaction. Commercial wearables have even been produced for newborns and children to monitor them or assist parents and caregivers in childcare. However, using wearable cameras for family photo-documenting is not a novel area in Human Computer Interaction (HCI), The study attempted to see if semi-inconspicuous wearable cameras could be used to visually record and share interactions between parents and their children in a less intrusive way.

I explored the related work on wearable technologies and parenting research in the field of HCI. In the first step, I read more about wearable technologies and the usage of these devices. In the next step, I deeply investigated the area of wearable cameras as alternative devices for photo-documenting compared to smartphones. I studied the related works about the use of wearable cameras in the parenting context. The Snapchat Spectacles was chosen as the wearable camera in this study. I gathered more information about this device. However, there has been little prior study in using the Snapchat Spectacles in parent-child interaction; there was a chance for the researcher to study this area further.

2.2 wearable technology

Wearable technologies - or “wearables” – are smart electronic devices that can be worn as accessories or as implants (Park & Jayaraman, 2003) .Wearables are defined by the Defense Advanced Research Projects Agency as "data gathering and dissemination gadgets that enable the user to work more efficiently." (Mann, 2006) named the three fundamental principles of wearable computing, it could be worn, not carried, user-controllable, and always active. During daily routines, the users can wear these gadgets that operate in real-time to facilitate users' tasks (Kumar & Schoenebeck, 2015).

In recent years, wearable technology has evolved as a novel area in human-computer interaction. With the rapid development of information technology, wearables have gained a special place in the field of human-computer interaction. Wearable technologies are an extension to the users’ body and mind, which assist the users to access online information conveniently (J. Lee et al., 2016). Lee (2016) described the current wearables as mobility attributes like being light-weighted, unnoticeable, and beautiful.

It is currently estimated that there are over 325 million connected wearable devices worldwide and smart watches make up over 52% of the global market (Hernández, 2019). Comparatively, wearables are still in the early stage of adoption but are experiencing rapid growth. Health monitoring, gaming, and fashion are just a few of the uses for wearable technology. Fitbits, for example, may be used as pedometers, with certain versions also providing heart rate and activity tracking. Most health-monitoring wearables, such as the FitBit, link through Bluetooth to an app on the user's smartphone to provide weekly progress reports, as well as interfaces to enter nutritional and weight-

loss data and map GPS data to outdoor activities. The Owlet, a wearable sock that monitors an infant's heart rate and oxygen as they sleep, is one example of commercial wearables for newborns. Although wearable cameras are typically marketed to sports and adventure enthusiasts, smartglasses are beginning to see use in lifeblogging (Drivet, 2018; Koelle et al., 2017). However, the growing use of wearable cameras in public spaces has raised concerns about bystander privacy (Singhal et al., 2016), especially if the camera is concealed (Koelle et al., 2017).

2.3 Wearable Cameras

A wearable camera is a recording system that may be worn on the body and records audio, video, or photographs. Wearable cameras, also known as body-worn cameras, are commonly worn on the chest, integrated into a helmet, or built into eyewear. Body cameras are used for various purposes and are available in a range of designs, the most well-known of which is as a piece of police enforcement equipment. Other types of wearable cameras like action cameras are also used for social and recreational purposes such as cycling, commerce, healthcare and medical applications, military applications, journalism, citizen surveillance, and covert surveillance.

Lifelogging is one of the activities that makes the greatest use of wearable camera technology. Lifelogging is the process of regularly documenting one's life events. In contrast to manually capturing everyday life, digital gadgets have become popular in recent decades. A lifelogging system typically consists of a wearable lifelogging device that collects the user's actions in the form of text and/or sensor data, such as picture,

audio, or video lifelogging, and stores and organizes it for later use. Steve Mann (2006) (Figure 4) was the first person to use a wearable camera to gather continuous physiological data as well as live first-person footage. Wearable Wireless Webcam was founded in the early 1980s as a result of his research with wearable computing and streaming video. Mann's wearable camera invention has evolved into what looks like an ordinary eyeglass over these years.

FIGURE 3 EVOLUTION OF WEARABLE COMPUTING IN EVERYDAY LIFE (MANN, N.D.)

Wearable cameras have grown increasingly popular in a society where individuals or creatives continuously capture elements of their lives through lifelogging or live videos. Wearable cameras enable such people to record activities from a first-person perspective while also allowing them to shoot hands-free. Some of the wearable camera's examples can be named: GoPro (2002), SenseCam (2005), Looxcie (2011), Narrative Clip (2013), and Google Glass (Figure 5).

FIGURE 4 EXAMPLES OF WEARABLE CAMERAS ON THE MARKET: FROM RIGHT TO LEFT: GOPRO (*GOPRO*, N.D.), SENSECAM (*SENSECAM*, N.D.), LOOXCIE (*LOOXCIE*, N.D.), NARRATIVE CLIP (*NARRATIVE CLIP*, N.D.), AND GOOGLE GLASS (*GOOGLE GLASS EDITION 2*, N.D.).

Wearable cameras collect data from a user-centred point of view that may be used to evaluate scenes, detect interactions, and categorize physical activity. These devices made it possible to capture experiences from individuals' lives in real-time from a first-person perspective (Oliveira-Barra et al., 2019) (Figure 6). In addition to the imager, a wearable camera can have several sensors such as microphones and inertial measurement units. A wearable camera's data can be highly diversified and comprise a lot of factors. On the one hand, this enhances the data acquired, and makes analysis extremely challenging (Cavallaro Andrea & Brutti Alessio, 2019).

FIGURE 5 EVOLUTION OF THE LIFELOGGING LANYARD CAMERA. FROM LEFT TO RIGHT: MANN (1998); MICROSOFT (2004); MANN, FUNG, LO (2006); MEMOTO (2013). POSSIBLE TO CAPTURE EXPERIENCES FROM INDIVIDUALS' LIVES IN REAL-TIME FROM A FIRST-PERSON PERSPECTIVE. (MANN, N.D.)

Some of the wearable cameras like Gopro produce videos with a high temporal resolution (HTR) of 25 to 60 frames, making them more suited to capturing specific moments such as cooking or sports. A small number of wearable cameras, such as Narrative Clip and SenseCam, are photographic cameras with a low temporal resolution (LTR) of 2–3 frames per minute, making them more suited to long-term data acquisition, such as longitudinal research (Bolaños et al., 2017).

These high-end technologies and features give the wearable cameras the potential to be used in sports and activities, including high physical demand. Wearable cameras have been examined in many studies and have also contributed to the project in many types of research as study tools. Wearable cameras are mainly used as a behavioural

study device in parenting, such as the study of Lee et. Al. (R. Lee et al., 2017) used a wearable camera to examine parent-infant behaviour from the mothers' and infants' viewpoints. These gadgets have also been used to monitor children like the project of Parent-driven use of wearable (Marcu et al., 2012), wearable cameras for school-aged children's lifestyle (Everson et al., 2019), Through baby's eyes (R. Lee et al., 2017), and SenseCam (Schrempft et al., 2017). There is a gap in the literature about using wearable cameras in parent and child interaction and family photo-documenting.

2.4 Wearable cameras in parenting contexts

Many wearable technologies such as smart sock Owlet (Bonafide et al., 2017) and Kangaroo care (Clarke-Sather et al., 2018) are used and developed in parenting and monitoring infants. Some research in Human Computer Interaction (HCI) use wearable cameras as a tool for their study; however, the use of wearable camera technology in parent-child interaction is not studied commonly.

In health behaviour research, wearable cameras are becoming more popular. They have been effectively used with adults to objectively evaluate physical activity, sedentary behaviour, and behavioural nutrition, despite the fact that they are still relatively new (Downing et al., 2019). Downing et al. (2019) performed their study by providing 20 children with a wearable camera that was clipped to the front of their clothes and worn for three days in non-public settings. The camera will begin recording video footage as soon as it is turned on. Parents will be asked to fill out an online survey on their and their

children's experiences with the wearable camera. Wearable cameras are a less expensive and intrusive alternative to direct observation by researchers (Downing et al., 2019). Wearable cameras provide an invaluable opportunity to pursue the frequency and context of certain behaviours. Wearable cameras take pictures of the wearer's surroundings at predetermined intervals, allowing for an objective examination of the research subject's lived experience.

Wearable cameras have previously been utilized as the only tool to research Tongan children's eating episodes, New Zealand children's beverage intake, and young Australian adults' eating and drinking behaviours during transportation excursions (Gage et al., 2021). Researchers have also employed wearable cameras to capture visual observations, to learn how individuals interact with smart watches, and to learn about food consumption habits (Alharbi et al., 2018). Regardless of using wearable cameras as a tool in the research on parenting, there were rare studies on the impact of using wearable cameras on parent-child interaction. Individuals may use these cameras to obtain unforgettable events in their life in personal applications (Alharbi et al., 2018). Despite the expanding number of studies that employ lifelogging, such as using wearable cameras, there is still a lack of research on semi-conspicuous wearable cameras focusing on visual methodologies. Based on this gap in the literature, the focus of this study is on the usage of wearable cameras instead of smartphones as photo-documenting devices in parent-child interaction. Wearable cameras, I believe, can be beneficial and a less distributed device for family photo-documenting compared to cellphone cameras.

2.5 Wearable smart glasses

Wearable computer glasses that add information to or alongside what the viewer sees are known as smartglasses. Some smartglasses' GPS tracking unit and digital camera may be used to record historical data, similar to other lifelogging and activity monitoring devices. Smartglasses, like other computers, may collect information from several different sensors. They have the ability to command or obtain data from other equipment or computers. It might support Bluetooth, Wi-Fi, and GPS, among other wireless systems.

Lik-Hang Lee (2018) demonstrates the sensors on smart glasses now on the market that allow a variety of input techniques in practise and research. A camera is an optical device that records or captures pictures, which can be single still shots or sequences of images that make up films or movies. One of the common components of smart glasses is a camera. The cameras on the glasses may help with a variety of computer vision tasks, and their capabilities vary depending on the camera type. When the camera enters the user input domain, it is normally to capture a wearer gesture, especially hand motions.

Smart glasses are being utilised as a body camera in a variety of applications, including security and healthcare, such as the first hands-free breastfeeding Google Glass app for new mothers in Melbourne, Australia (*Breastfeeding Support Project: Through Google Glass*, 2015). This initiative intends to provide a breastfeeding fundamentals and tutorials programme in partnership with the Australian Breastfeeding Association. The aim was to employ Google Glass in two ways: a) presenting the most up-to-date

information when mothers needed it, and b) connecting her with a certified breastfeeding counsellor for more immediate and personalised assistance.

Smart glasses were commercialized in different shapes, styles and equipped with various sensors. The first commercial smart glasses, Transcend (Figure 7), were introduced in 2010, which are ski-goggles that are equipped with a Heads-Up Display. Transcend included a micro LCD display, GPS and many other sensors, also, Recon HQ will allow you to connect to the goggles and download the data so you may analyse it more closely. Google Glass Figure7) is the first smart glass with a see-through optical display to hit the shelves (L. H. Lee & Hui, 2018). They may superimpose virtual material such as text and images onto the user's field of view (FOV) since the virtual content is viewable in a see-through optical display. Only swiping motions are accessible for user input due to the light-weighted form factor, hence the operating system is structured as a sequence of pixel cards, dubbed Timeline.

In August 2020, Facebook and Ray-Ban company announced a smart glass called "Ray-Ban Stories." The product includes two dual 5-megapixel front-facing cameras, open-ear speakers, a microphone, and a tactile recording button on the glasses built into the gadget's. frame (Heath, 2021). Users can either take a 30-second video by tapping once or take a photo by holding it down on the touchpad. Also, the user may manage them hands-free by saying "Hey Facebook" to capture a video. Facebook published the "Facebook View" mobile app, allowing users to view, manage, and modify information taken on Ray-Ban Stories. Users must first connect using their Facebook account before pairing their Ray-Ban Stories. Ray-Ban Stories is the latest in a line of smartglasses released by major companies, including Snap Inc and Google. Since this device is similar

to a standard pair of Ray-Ban sunglasses, the privacy of the individuals who are not familiar with them can be violated. People have also expressed concern about gadgets' ability to record and listen to them, whether they are aware of it or not (Heath, 2021).

Transcend

Google Glass

Ray Ban Stories

FIGURE 6 TRANSCEND (*TRANSCEND*, N.D.) (LEFT), GOOGLE GLASS (*GOOGLE GLASS*, N.D.) (MIDDLE), RAY BAN STORIES (*RAY BAN STORIES*, N.D.) (RIGHT).

2.6 Snapchat Spectacles

FIGURE 7 SNAPCHAT SPECTACLES FRIST GENERATION (*SNAPCHAT SPECTACLES FRIST GENERATION*, N.D.)

Snapc Inc. developed and manufactured Spectacles, which are smartglasses specializing in shooting video for the Snapchat app. They have a camera lens to record brief video segments and capture photos, which may then be synced with a smartphone and uploaded to the user's Snapchat account (Figure 8). Users could shoot videos without having to hold a camera and capture scenes just as they experienced them. They may be more present and record videos instead of pulling out their phone and staring at a screen. On September 24, 2016, the first generation of spectacles was announced, and on November 10, 2016, they were launched. The glasses were sold through Snapbot (Figure 9), a smart glasses vending machine that was positioned near Snap's offices in Venice, California.

FIGURE 8 SNAPBOT VENDING MACHINE (*SNAPBOT VENDING MACHINE*, N.D.)

2.6.1 History

The first version of Spectacles was released in November 2016 (Figure 10), originally distributed exclusively through pop-up vending machines and became available for purchase online in February 2017. In April 2018, a second version of the spectacles was launched with improved features, including water resistance, increased storage, and a redesigned face (Figure 10). A new style also followed this version in September 2018 that is even less conspicuous than previous designs. In August 2019, Snap launched the Snap Spectacles 3, which had two HD cameras on the gadget.

FIGURE 9 SNAPCHAT SPECTACLES FIRST GENERATION (LEFT), AND SECOND GENERATION (RIGHT) (*SNAP SPECTACLES FIRST AND SECOND GENERATION*, 2018)

2.6.2 Design and features

The very first version of Snapchat Spectacles is a pair of sunglasses with a tiny camera embedded into the sunglasses that allows users to capture 10-second videos and upload them to their Snapchat accounts. The Spectacles 1 package were contained a pair of sunglasses, a charging case, a charging cable, and some user manuals (Figure 11) and were available in three colours: black, coral, and teal. Snapchat appears to have given the design some attention and decided on something modest and not overly complicated. Only a series of LED lights in the top corner of the glasses, which goes on while recording a video for privacy reasons, and the small round camera lenses on the frame, give it away (Pham, 2016). The internal hardware of the Spectacles is kept in two cases on either side of the frame, above and behind the lenses. The record button, indication lights, and charging cable are all on the left. The camera and microphone are located in the right-upper corner.

FIGURE 10 SNAPCHAT SPECTACLES PACKAGING (*SNAPCHAT SPECTACLES PACKAGING*, N.D.)

Images and videos are taken by pressing a button in the upper corner of the frame for 10 seconds, and if it is tapped again, it will record continuously for up to 30 seconds. Other Snapchat users will be able to flip their phone to landscape or portrait mode to view a little more when someone broadcasts a video via Spectacles. A 115-degree lens is also used in videos since it is the closest to what the human eye perceives. These files are then stored on the glasses and can be retrieved later via Bluetooth and the Snapchat application. They can then be posted to Snapchat or exported for use in other social media applications, such as Facebook and Instagram. (Appendix A)

Snapchat Spectacles is not the first of its kind, while it has its own advantages and disadvantages. These sunglasses priced $ 130 USD, and as of May 2018, the company

sold 220,000 pairs (*Review: Snap's Spectacles 2.0*, n.d.); they targeted an audience of 16 to 24 year-old social media influencers who were impatient to get their hands on Spectacles. As Evan Spiegel, CEO and Co-founder of Snapchat, described his eagerness as "I could see my own memory, through my own eyes." He continues, "It's one thing to see images of an experience you had, but it's another thing to have an experience of the experience. It was the closest I'd ever come to feeling like I was there again." (Newton, 2016a).

2.7 Snapchat Spectacles and Our research

One of the main reasons that distinguish these glasses from other options available for this research is that the glasses are less than one-tenth the price of Google Glass and make them much more accessible (Newton, 2016b). Snap puts glasses as a face computer less and more as a mobile camera for your life. Something that a popular GoPros might be able to do, but this time in the form of a wearable like glasses. In addition to the general popularity of this product, its use by celebrities also helped to make it known. The product had its premiere in the prestigious Wall Street Journal Magazine, and Karl Lagerfeld, the fashion legend, shot Spiegel wearing Spectacles. (Newton, 2016a).

As with other wearable camera glasses, Snapchat Spectacles are largely marketed to adventurers, social media influencers, and sports enthusiasts within Snapchat's target demographic ages 16 – 24 (Piwek & Joinson, 2016). Although the glasses are not marketed to parents, a commercial for Brawny brand paper (Jardine, 2017; Smiley,

2017) towels were created by putting Spectacles on children and filming interactions with their mothers from their children's perspective (Figure 12). The commercial, while still problematically featuring mothers in primarily domestic roles, does represent possible uses for a product like Spectacles as an alternative tool for documenting the day-to-day moments of caring for children.

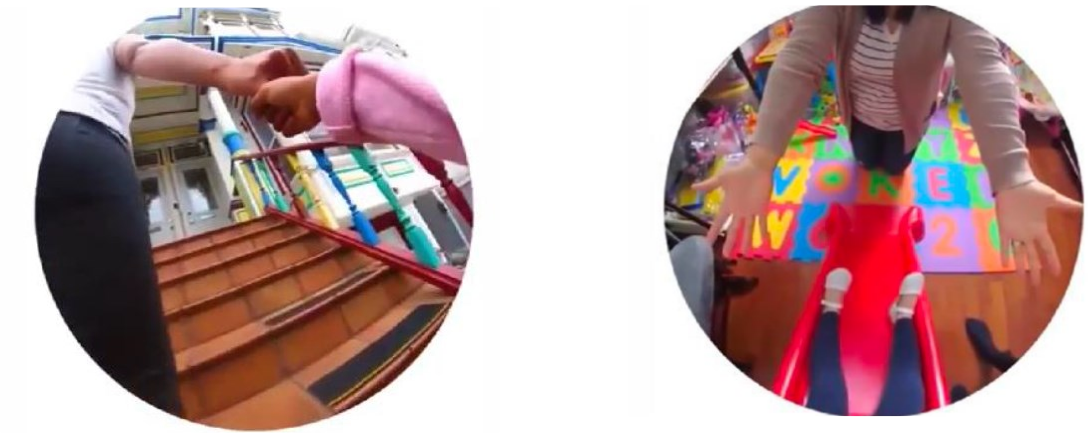

FIGURE 11 SCREENSHOTS FROM A COMMERCIAL CREATED WITH SNAPCHAT SPECTACLES (JARDINE, 2017; SMILEY, 2017)

2.8 Summary

All in all, all parents love to capture memorable moments with their beloved child; however, based on the literature using cellphone cameras can be distracting. Using a phone while taking care of a child can impact the quality of time parent-child interactions. In this study, I wanted to investigate how does Spectacles, as a semi-conspicuous wearable camera, and popular tool in lifelogging, would allow parents to

capture moments between themselves and their children without having to engage in smartphone use behaviours during non-use times. Additionally, as photos can be captured more covertly, children are less likely to feel as though they must "perform" for the camera or be distracted by the introduction of a "screen" in screen-free play. In this research, I focused on the impact of using wearable cameras like Snapchat Spectacles on parents' picture documentation of their children. Through an analysis of both the travelogues and the photos taken by parents, I also examined the children's behaviour and attitudes while parents used these devices. Through this research, I studied the parents' evaluation of this wearable technology and their experiences using Spectacles in their day-to-day lives.

Chapter 3: Snapchat Spectacles Cognitive Walkthrough

Since this study focused on the use of Snapchat Spectacles as an alternative for photo documenting, it was important for the researcher to understand how the cognitive walkthrough of the app used to manage participant photos might impact its adoption and use. Cognitive walkthrough is a type of usability evaluation method that helps us understand how learnable a software application or interactive technology might be for a new user. This method helps the researcher better understand users' expectations and mental framework when using and interacting with a new system without prior training and assigning causes to usability problems (Polson et al., 1992). Researchers and designers can use this method to predict some learnability issues for novice users. In this context, this method was applied to highlight the functionality and usability of the software for the reader and to provide greater context for the user study which follows this chapter.

To perform a cognitive walkthrough session, the researcher needs to provide a detailed description of a system, a pre-designed scenario, clear assumptions about the user and their needs, and a list of actions that the user will take to perform a task. Since the goal is to understand the user's cognitive processes when interacting with the system and performing a specific task, the process of this method is performed in two phases: *preparation* and *evaluation* (Polson et al., 1992). In the *preparation* phase, the researcher designs a detailed description of a system and an evaluated scenario with the details of the required tasks. The interaction between the user and the interface is analyzed in depth

in the *evaluation* phase. Polson (1992) explains that in the process of evaluating cognitive interception, the analyst must determine three things in each action of the user:

1. What objectives the user should have prior to taking the action,
2. Whether the interface's prompts and signs will persuade the user to take the correct action, assuming the user has the correct goals, and
3. How the user's objectives will change in response to feedback from the interface after the action is taken.

In this study, in which the researcher explored the use of Snapchat Spectacles as a photo documentation tool for parents and caregivers, I sought to understand better the learnability of the Snapchat software, which is a necessary tool for managing and accessing photos and videos taken with the Snapchat Spectacles. As mentioned previously, the target audience for Snapchat Spectacles is users aged 16 to 24 years (Piwek & Joinson, 2016), so there is a chance that participants in this study are new to both the app. The use of the Spectacles in taking photos during parent-child interaction is the originality of this research, as this user group are not the target audience of the Snapchat Spectacles and have not been studied using this device. To gain more insight into this, I conducted a cognitive walkthrough of Snapchat Spectacles with one of the participants from the perspective of a novice user. The primary purpose of this cognitive walkthrough is to highlight how users connect the Spectacles to their device (e.g., smartphone) and start using them. In the process, users were asked to achieve a goal in each step, such as taking a photo or video with

the Spectacles. Three main questions then examined the activities users undertook to complete the tasks. As the user completes the tasks, the researcher answers the questions in the following to evaluate his/her activities:

1. Will the user be able to notice the proper action clearly enough?
2. Will the user associate the relevant action's description with the assigned task?
3. Will the user appropriately comprehend the system's feedback to the intended action?

3.1 Steps for the cognitive walkthrough

For the cognitive walkthrough of the Snapchat Spectacles, the researcher considered the following steps of setting up the device with the Snapchat application, and using the Spectacles:

1. Pair the Spectacles with the application,
2. Take a photo and/or video with your Spectacles,
3. Import the photo and/or the video,
4. Save and/or share the photo/video.

I carried out each task while asking the three key cognitive walkthrough questions at each point to conduct the evaluation.

3.1.1 Step 1: Pair the Spectacles with the application

The first step is to pair the Spectacles with the Snapchat application. For this task, the Spectacles should be paired by going through the profile, selecting the setting icon

(⚙) on the profile page's top-right corner, and finding the Spectacles section (Figure 13). Snapchat asks users to enable Bluetooth in order to connect the Spectacles. (Figure 13) The physical button on the Spectacles should be pressed and held for seven seconds, and after a few seconds, the app confirms the connection by showing up the Spectacles name. This step was a bit complicated and hard to find by users, however they managed to complete it. (Figure 13)

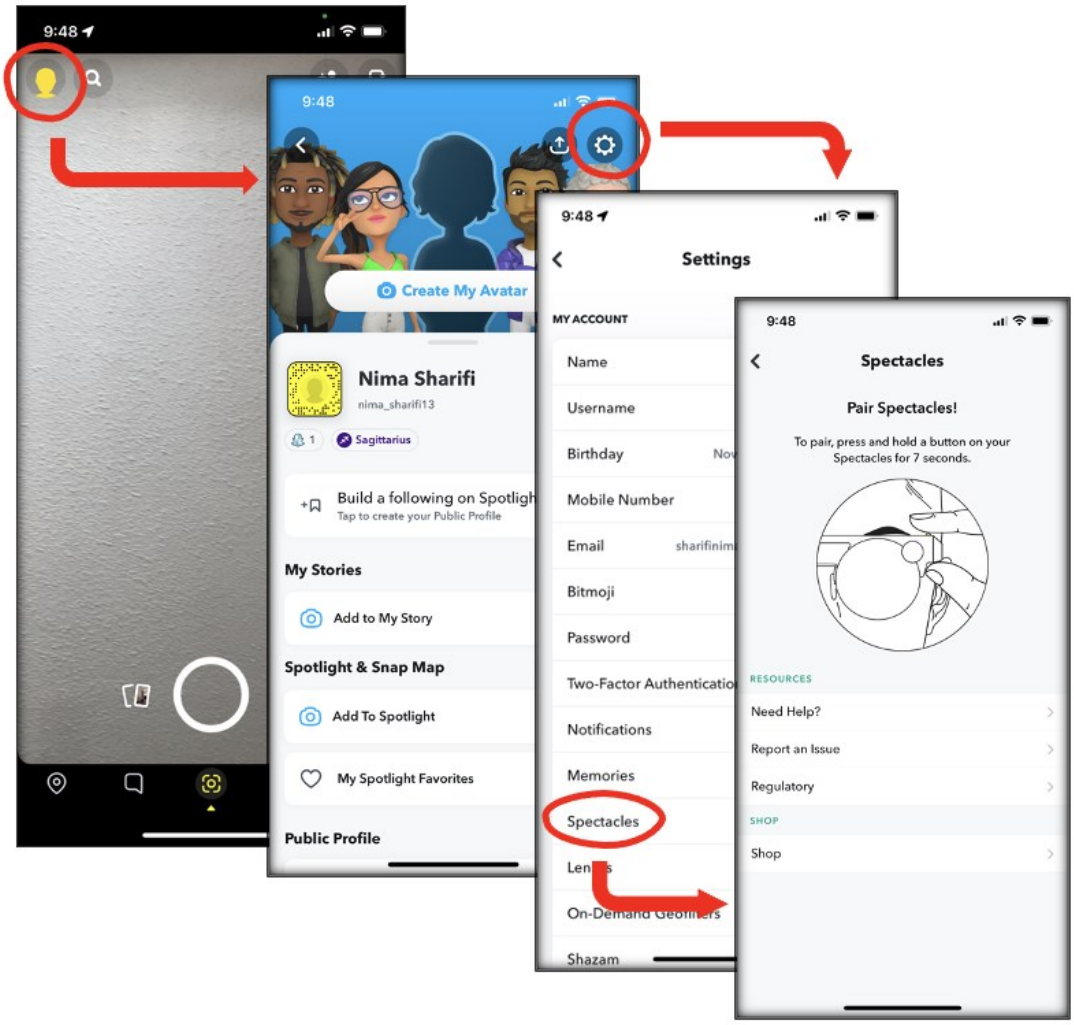

FIGURE 12 PAIRING WITH THE SPECTACLES PROCESS – PART 1

1- Will the user be able to notice the proper action clearly enough?

No, the user did not know how to pair with the device, and at first, they thought they needed to connect with the Bluetooth on their phone. After a few minutes, the user realized that they needed to connect through the app. In the next step, because there was instruction, it was easy for them to pair the Spectacles with the Snapchat application.

2- Will the user associate the relevant action's description with the assigned task?

Yes, however, they had a hard time figuring out where they should go to pair the Spectacles with their device.

3- Will the user appropriately comprehend the system's feedback to the intended action?

Yes, the illustration and signs (icon and text) were clear and noticed by the use

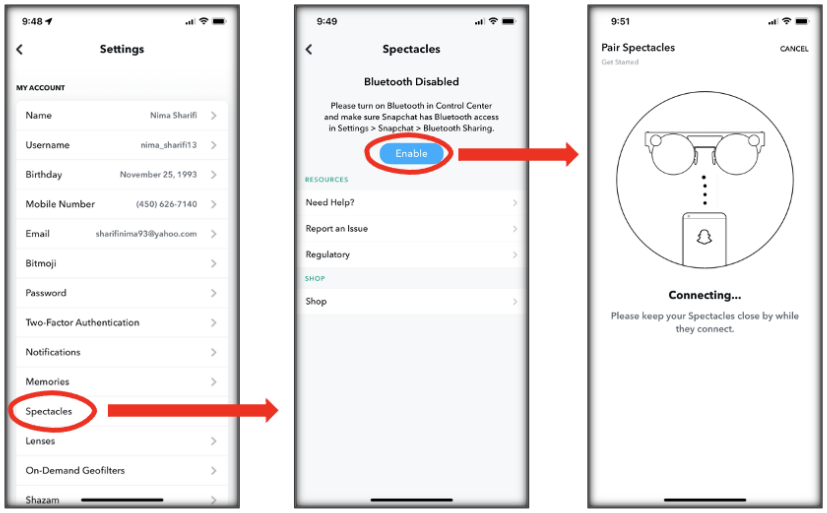

FIGURE 13 PAIRING WITH THE SPECTACLES - TURNING ON THE BLUETOOTH

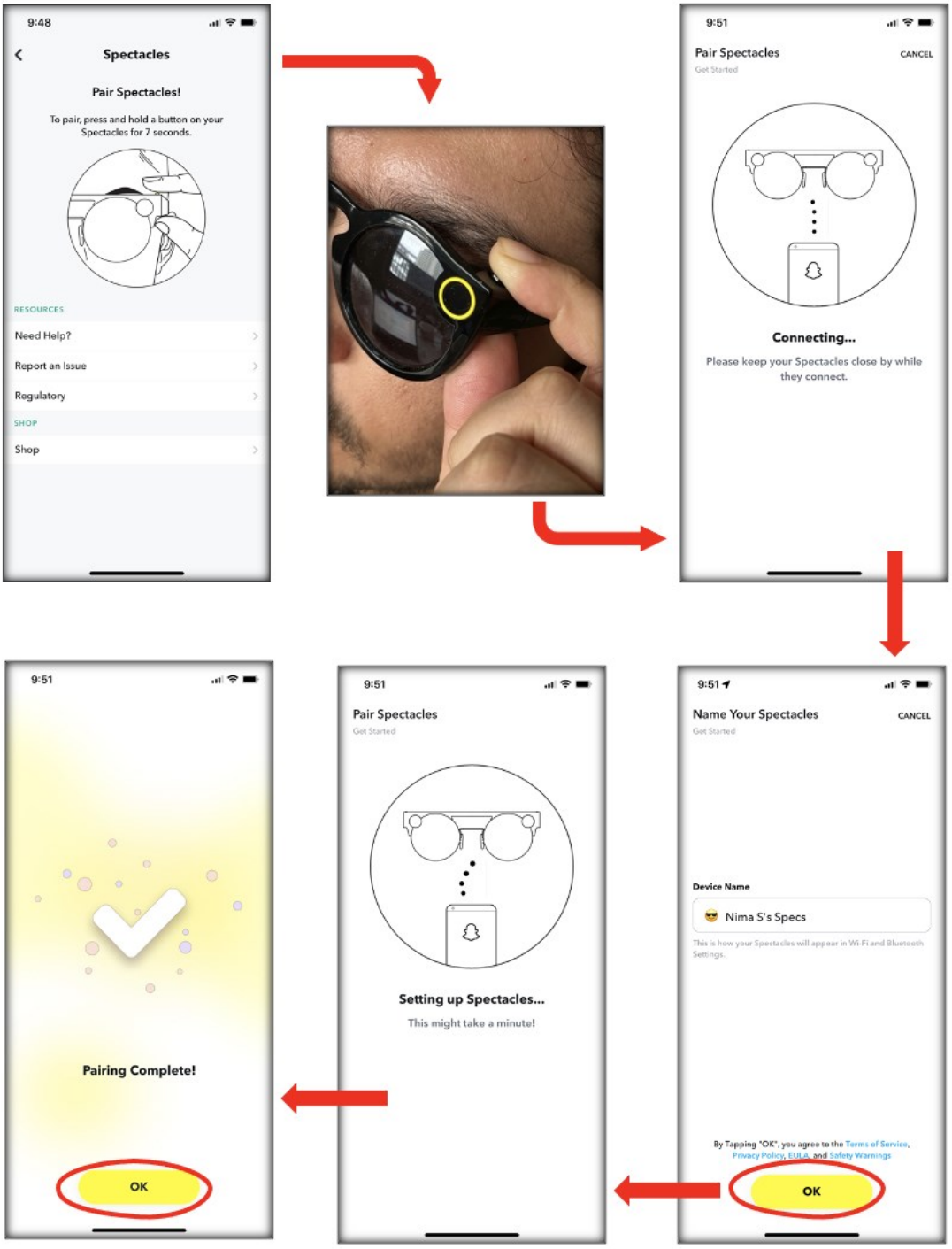

FIGURE 14 PAIRING WITH THE SPECTACLES PROCESS – PART 2

3.1.2 Step 2: Take a photo and/or video with your Spectacles

The goal of this step is to take a photo or video using the Spectacles. The user must start taking a photo or video by pressing the physical button on the top, left side of the glasses. (Figure 16). The button must be pressed once to the Spectacles capture a ten-second video. A small light inside the Spectacles stays on until the end of the video. Users can increase the video's duration by up to 30 seconds by pressing the button three times. The button must be pressed and held to take a photo, and the inside light will blink to indicate that the photo was taken.

1- Will the user be able to notice the proper action clearly enough?

Yes, but it wasn't really specific, and they couldn't say if they were capturing the video or photo. They were looking for instruction; however, there was no specific instruction in the application or the package. It was not clear for them the differences between the photo-taking actions with the video-taking action, and they randomly took video or photos. After a while, they managed to capture both video and photo.

2- Will the user associate the relevant action's description with the assigned task?

Yes, they found the button very quickly, and they were able to use it easily.

3- Will the user appropriately comprehend the system's feedback to the intended action?

Yes, however, at first, they did not realize that there is a blinking light inside (Figure 17). The blinking light inside was really hard to see for users, and they could not understand the response properly.

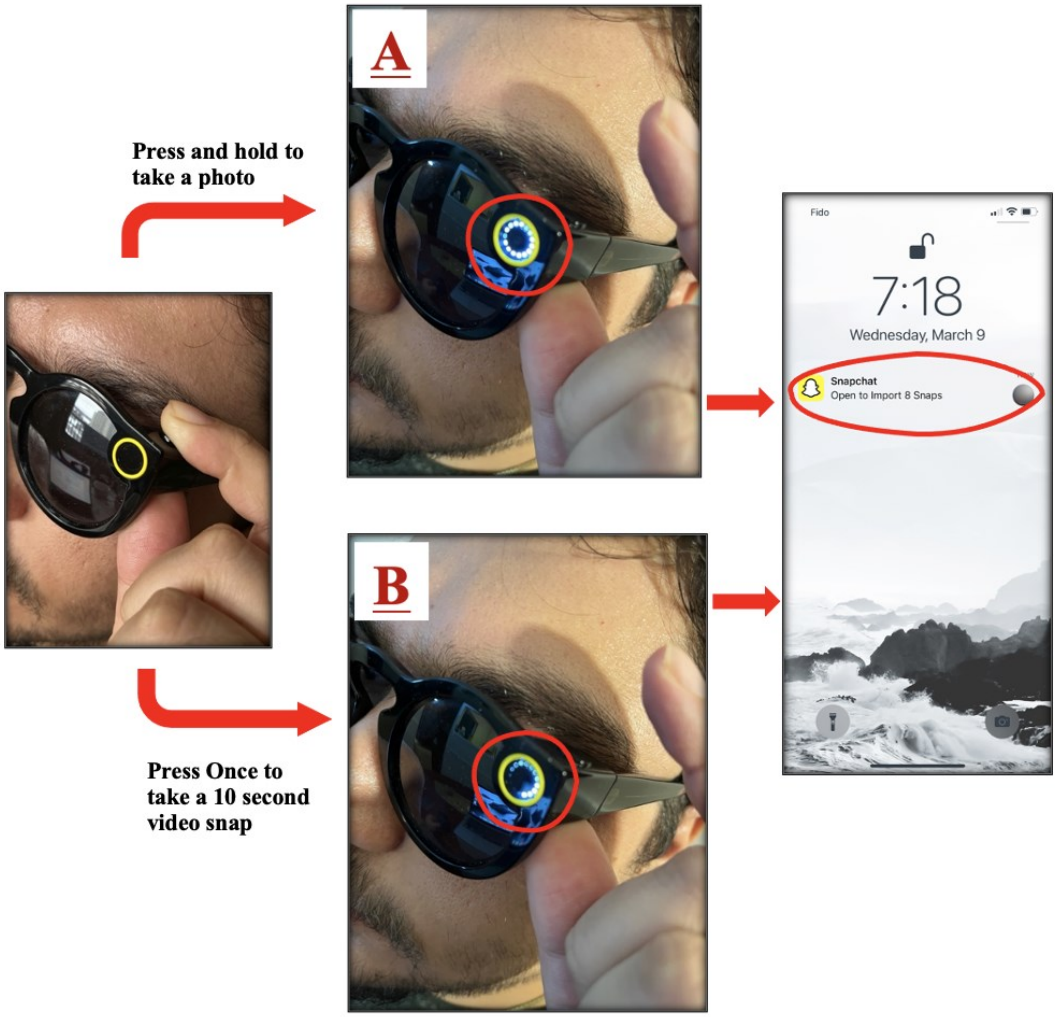

FIGURE 15 PHOTO AND VIDEO TAKING PROCESS AND SPECTACLES FEEDBACK: IN PICTURE (A): THE INSIDE LIGHT BLINKED ONCE THE PHOTO WAS TAKEN. IN PICTURE (B) : THE INSIDE LIGHT WAS LOADING UNTIL THE VIDEO DURATION WAS FINISHED.

FIGURE 16 BLINKING LIGHT INSIDE THE SPECTACLES

3.1.3 Step 3: Import the photo and/or the video

This step involves importing the photos and videos from the Spectacles to the Snapchat app. In order to do this step, users must go to the Memories, and in the Snaps section, they can find the photo and videos (Figure 18). Users must select the option IMPORT, and after a few seconds, the app connects to Spectacles via WiFi. After a few seconds, the app is importing Snaps, which in the app, the solid circle icon indicates that the importing process is completed.

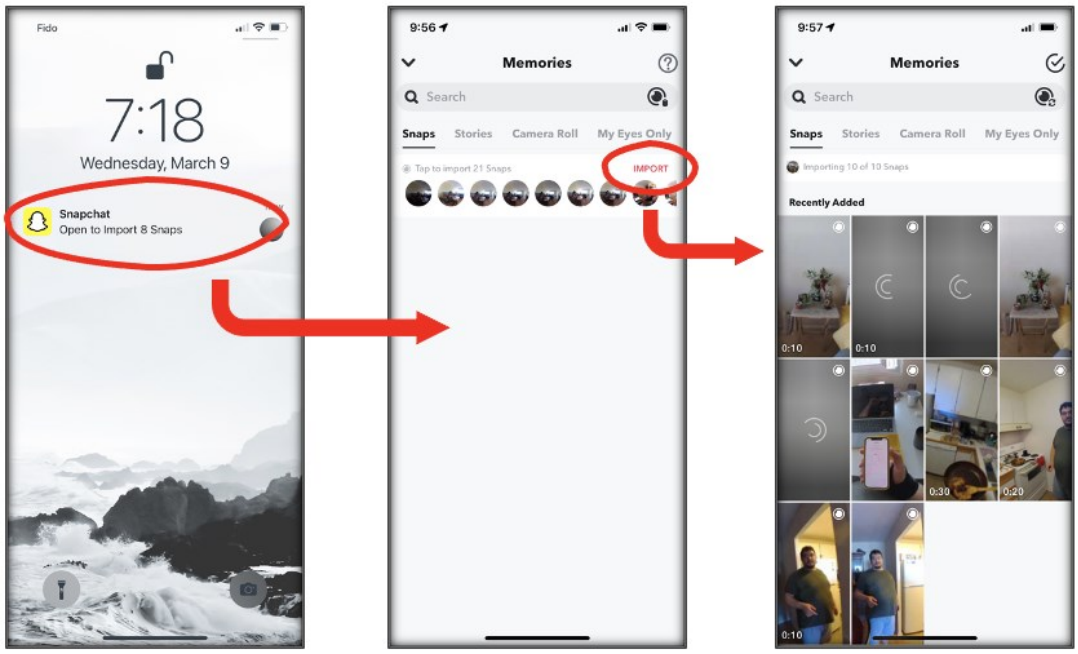

FIGURE 17 IMPORTING THE PHOTO AND VIDEO PROCESS

1- Will the user be able to notice the proper action clearly enough?

No, for first-time users of Snapchat, it was unclear where they should find the photos and videos. However, the Snapchat notification on the screen helps them go where they should be.

2- Will the user associate the relevant action's description with the assigned task?

Yes, they find it hard to navigate to the Memories section, but the icon and text for Importing the Snaps was clear and easy to notice.

3- Will the user appropriately comprehend the system's feedback to the intended action?

Yes, it was blinking, and there was the loading icon ( ) showing the process.

3.1.4 Step 4: Save and/or share the photo/video

This step lets the user see and share and/or save the photos and videos. In Memories, by clicking on one photo or video, users can review what they captured. They can share the photo or video by clicking on the icon ( ) on the bottom right of the screen (Figure 19). They can also export and share the Snap by clicking on the three dots icon (⋮) on the top right corner of the screen (Figure 19) and choosing between options.

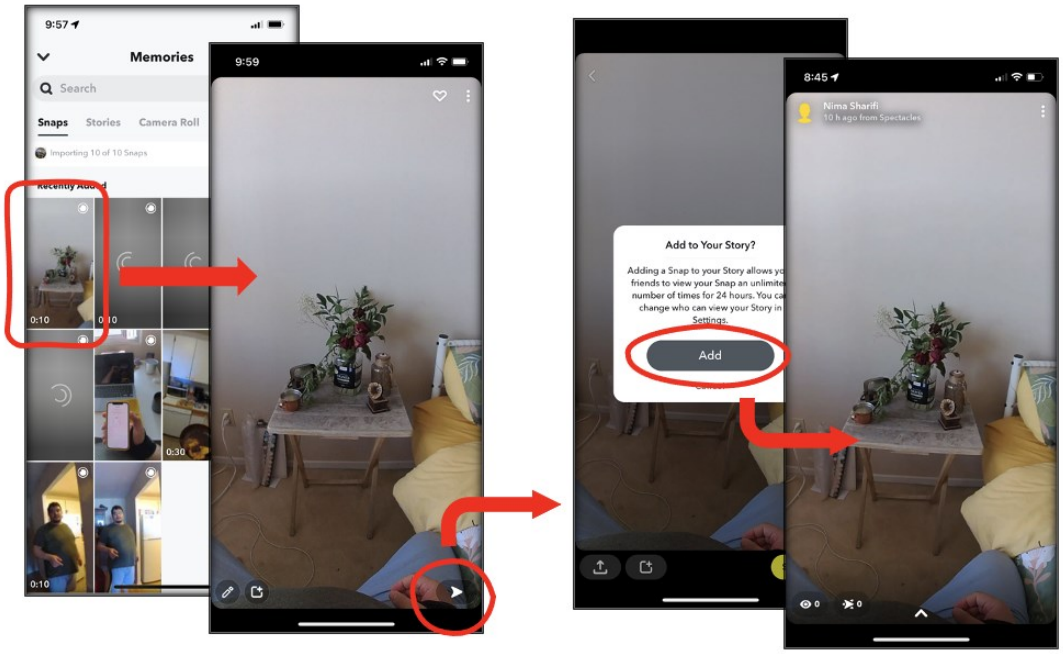

FIGURE 18 SHARING THE SNAP INTO THE STORY

1- Will the user be able to notice the proper action clearly enough?

Yes, the icon ( ) was similar to the common send or post icon in most applications, and the first time Snapchat users can also manage to share the photo or export it to the camera role. However, they might not easily realize that they have few options for framing to export the photos.

2- Will the user associate the relevant action's description with the assigned task?

Yes, they found the buttons very quickly, and they were able to use it easily.

3- Will the user appropriately comprehend the system's feedback to the intended action?

Yes, they can see a Blue line, with “Saved” or “Shared” notification, on the top of the screen, every time that they save or share the story (Figure 20).

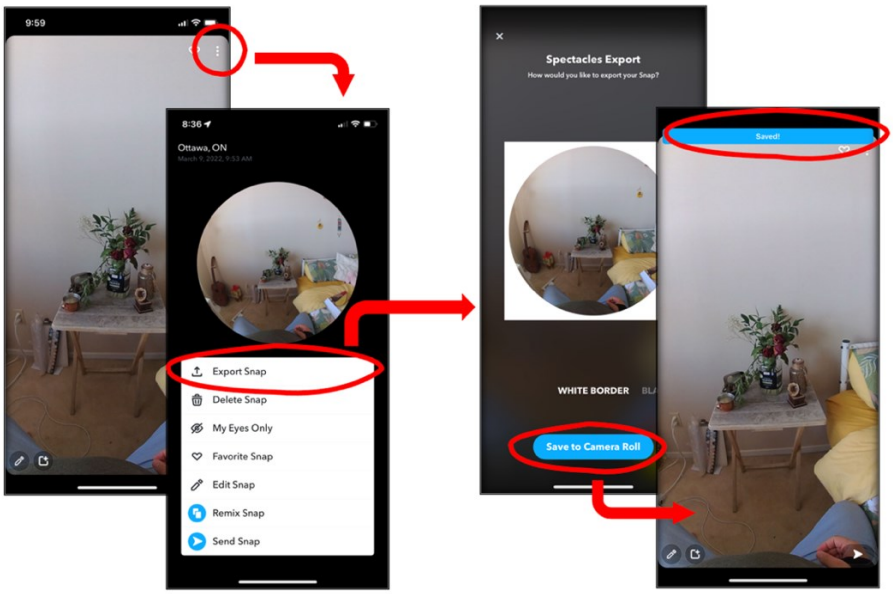

FIGURE 19 EXPORTING THE SNAP INTO THE CAMERA ROLL

3.2 Snapchat Recent Updated: Instruction

Following the conclusion of our longitudinal study, the researcher noticed that Snapchat recently instructions on how to use the Spectacles in their recent application update (Version 11.72.0.31). The user can see these instructions right after pairing their Spectacles with Snapchat. Specifically, Snapchat provides the user with instructions about pairing the device with Snapchat. Although these instructions were not part of the app when the study was conducted, I decided to include it here for reference. These instructions cover four actions: how to take a 10-second video, how to take a photo, how to check the battery level of the Spectacles, and where you can find the Snaps taken with the Spectacles (Figure 21).

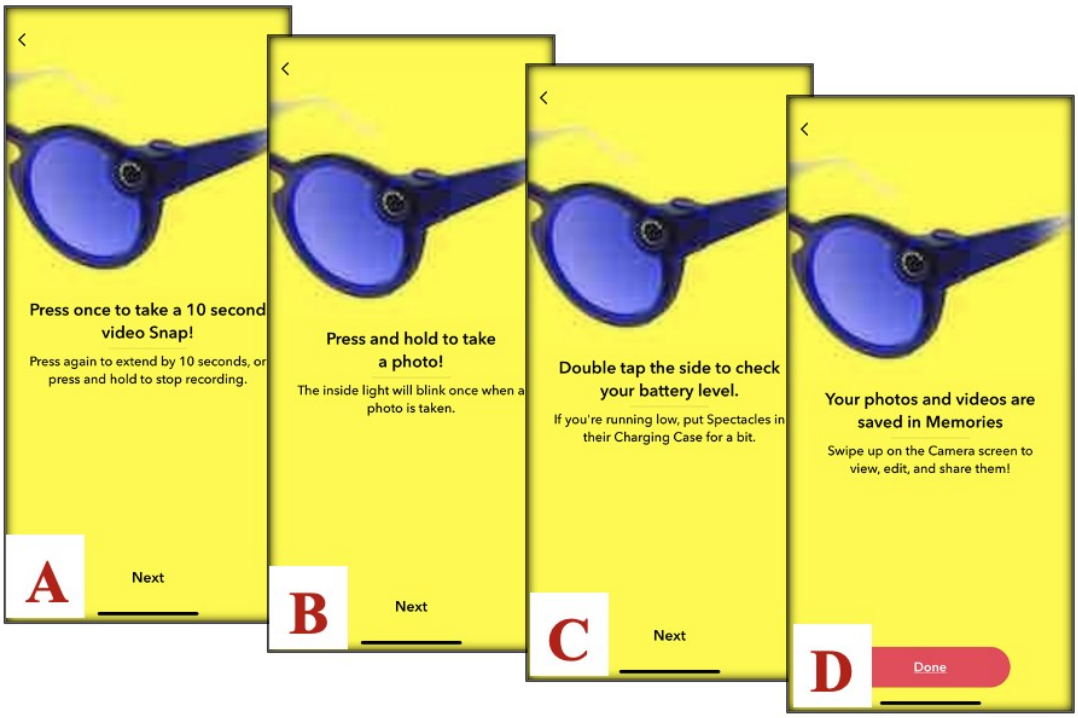

FIGURE 20 SNAPCHAT RECENT UPDATE FOR SPECTACLES INSTRUCTION ON THE APP: (A) HOW TO TAKE A 10-SECOND VIDEO, (B) HOW TO TAKE A PHOTO, (C) HOW TO CHECK THE BATTERY LEVEL, AND (D) WHERE YOU CAN FIND THE SNAPS

3.3 Summary of Findings from the cognitive walkthrough

First, different from other devices that connect to the user's phone directly, the device is connected through the app itself, which can be very confusing for users. Although the beginning of the process is very vague, the application guides the user to perform tasks by providing specific instructions. During the research, users received instructions on how to work with the Spectacles, although in the new updates of the application, how to use the Spectacles after connecting the device to the application is included, making many steps easier to use. During the photo and video capturing, users complained that they were not aware of the frame they were capturing. Also, the LED light inside the Spectacles, which is designed to inform the user about the process of photography and video recording, is difficult to see. Although using the Spectacles is a bit difficult, the process of importing files into the application based on cognitive walkthrough evaluation is the easiest step. Guidelines and illustrative icons at this stage made it easy for users to import photos and videos into the app. The final step, saving and sharing the files once again, seems complicated for individuals who are not familiar with the Snapchat app. The icons do not have any text at this point, and anyone unfamiliar with them can quickly get confused. Finally, using Snapchat Spectacles for the first time

can be problematic, although it seems more straightforward after getting more familiar with the steps.

Chapter 4: Research Methodology

4.1 Research question

In this study, the researcher investigated the effects of using a wearable camera as an alternative to DSLR cameras and mobile phones in the relationship between children and parents. I was interested to know if wearable cameras could be a less disruptive option for these situations. In other words, ***Would using a semi-conspicuous wearable camera be a less disruptive option for capturing and sharing interactions between parents and their children?***

According to articles (Hiniker et al., 2015), professional cameras and cell phone cameras can have results such as distracting parents or children posing in front of the camera. In this study, the researcher examined the parents' experience of using the wearable camera while interacting with their children. Also, the researcher examined the attitudes and reactions of children in the face of wearable cameras and analyzed their effects on children's behaviour. The Snapchat Spectacles wearable camera was used by parents while interacting with their children to conduct this research. This chapter explains the methods utilized to answer the three sub-research questions that support the main question:

Q1: What impact will the use of wearable cameras have on parents' picture documenting of their children?

Q2: How would the use of wearable cameras by parents affect children's attitudes?

Q3: How would participants evaluate this technology, and how would they describe their experience with it?

This study started in summer 2019 by another lead researcher and stopped in winter 2020 due to the COVID-19 pandemic. The researcher relaunched this study in fall 2021 and started to recruit potential participants right away. I used a within-subjects, mixed-method approach by employing qualitative methods for this study. This chapter discusses the different methodologies used to address our main research question, such as surveys, weekly travelogues, and visual methodologies. For this study, the researcher used longitudinal study, which is a research method in which the researcher assesses the same variable in the same manner over many time periods, and the data is obtained from instances that are similar or comparable throughout these time periods (Bala, 2020). In general, longitudinal research studies are important because personal characteristics of individuals like knowledge, skills, attitudes, perceptions, and behaviours develop, grow, and change in essential ways over time (Bala, 2020). Because data on the same variables are gathered for two or more time periods in longitudinal research, the researcher can infer inter-temporal continuity or change by comparing the values of these variables obtained at various times. The longitudinal study can also be used to interpret plausible explanations for such changes. To maintain the comparability of data obtained throughout time, it is recommended that consistent data collecting processes be used for each wave of data collection in the longitudinal study.

In this study, the researcher explored the influence of wearable cameras in parent-child interaction. Fourteen participants who are parents of 27 children aged between 8 to

12 years old were recruited in this study. This research was conducted between December 2020 to April 2021 in Ottawa, Ontario, Canada. The research was conducted locally in Ottawa for two main reasons: geographical difficulty, the cost of mailing the wearable camera to participants, and the long time for sending and receiving the devices. Another reason has arisen by COVID-19 pandemic restrictions across Canada and locally in Ottawa and Ontario. Due to the COVID-19, many travel and gathering restrictions emerged, limiting the research.

4.2 Research design

In this research, the researcher designed a six-week longitudinal study to explore the influence of wearable cameras in parent-child interaction. Parents were asked to capture moments between themselves and their children using a pair of "Snapchat Spectacles" without needing to engage in smartphone use during non-use hours. Meanwhile, a travelogue was created in Google form, using a similar strategy outlined by Taylor et al. (2012), which contained three sections for every six weeks of study. By the end of each week, participants uploaded their three favourite photos and completed the travelogue for that week. Participants shared their comments and insights on the experience of using this device compared to their usual way of photo documenting.

The researcher analyzed the results of this study using within-subjects and qualitative methods. In the first step, the researcher asked participants to complete a quick survey (Appendix B) regards the demographic information and their photo documentation habit. The researcher analyzed this survey using MS excel and created

charts to represent the data. In the second step, participants' photos were analyzed using Rose's visual analysis methodologies (Rose, 2016). The main focus of these methodologies is to analyze the visual data by mobilizing compositional interpretation and content analysis. The travelogue textual data was examined by creating deductive and inductive codes. In the last step, the researcher imported visual and textual data to NVivo software and simultaneously produced deductive and inductive codes for data analysis.

4.3 Ethical considerations

The researcher received training in the Tri-Council Policy Statement 2: Course on Research Ethics (TCPS2: CORE), a Canadian research ethics guideline. According to one key takeaway from the training, examining parents interacting with their children should not subject both parents and their children to physical, emotional, social, privacy, or legal risks that outweigh the hazards they encounter in everyday life. On the other hand, confidentiality and anonymity would protect the opportunity to express more personal views. The research was reviewed and cleared by the Carleton University Research Ethics Board-B with clearance number #110635 (Appendix C).

At the start of the study, participants were recruited by sharing posters in the main campus of Carleton University and local childcare centers. However, the COVID-19 pandemic impacted the recruitment process. As a result, the recruitment method was revised, and the participants were recruited by sharing the invitation poster on social media such as Facebook and WhatsApp parenting groups in Ottawa (Appendix D.1) and

the Carleton Research Participants Facebook group (Appendix D.2). In addition, the researcher used the snowball sampling method by asking participants to share our interests in recruiting participants who are the parents of one or more minor children who use mobile technologies to capture and share pictures of their families. One of the most effective methods to locate more volunteers for the study is to use a technique known as snowball sampling (Goodman, 1961; Heckathorn & Cameron, 2017). Current study participants request new volunteers from their circle of contacts using the snowball sampling approach (Goodman, 1961).

Because this study required curbside hardware exchange, there was a chance that volunteers might become infected with the COVID-19 virus while taking part in it. To reduce the danger of COVID-19 transmission, the researcher took procedures in compliance with provincial, federal, Carleton University, and other public health regulations. However, those who are older, have specific medical issues, or are otherwise vulnerable to COVID-19 have been proven to be at higher risk of catching the virus or to experiencing more severe symptoms from it.

Another consideration was the privacy and anonymity of the participants. In this study, a pseudonym, for example, P1, P2, etc., was assigned to each participant to protect their identity while indirectly indicating the association of their data. All data, including coded information, will be kept in a password-protected file on the researcher's personal password-protected computer. All images were anonymized adequately after analysis, and all personal information like children's faces was blurred or blocked to protect the participants' privacy. The researcher ensured that all images would be anonymously used in publications and presentations. Also, at the end of each user study, the researcher

asked the participant to delete all the photos saved in the wearable camera memory by themself to ensure that the camera would not contain any image.

The researcher conducted approximately 20 minutes of online meetings with each participant to explain the research process and provide more information about how to use the "Snapchat Spectacles." Operation data, such as meeting and performance data, was stored and protected by Zoom on servers located in [the geographic location relevant to you as identified by Zoom], but maybe disclosed via a court order or data breach. (Note: The researcher may need to contact the company to learn the server location, or can also check here: https://support.zoom.us/hc/en-us/articles/360042411451-Selecting-data-center-regions-for-hosted-meetings-and-webinars).

All data is kept confidential unless release is required by law, such as child abuse, harm to self or others. Participants' data is stored and password-protected on a Google server but maybe disclosed via a court order or data breach. After completing the study, each participant was responsible for returning the "Snapchat Spectacles." In coordination with the researcher, participants returned the wearable camera by considering all COVID-19 regulations. All participants who completed the study received a $50 Amazon gift card, which was sent to them via email.

4.4 Participants

The participants of this study were 16 parents. One of the participants withdrew from the research after the second week of the study regarding the difficulty of using the Snapchat Spectacles. The participant also had some concerns regarding their children's

privacy because of using the Snapchat platform to upload the images. Another participant stopped responding to the researcher in the third week of the study. After a few follow-ups by the researcher and the project supervisor, their participation remained incomplete. In overall, 12 female and two male parents between the age of 31 to 43 years (mean 37.27, SD 3.84) completed this study (Figure 22).

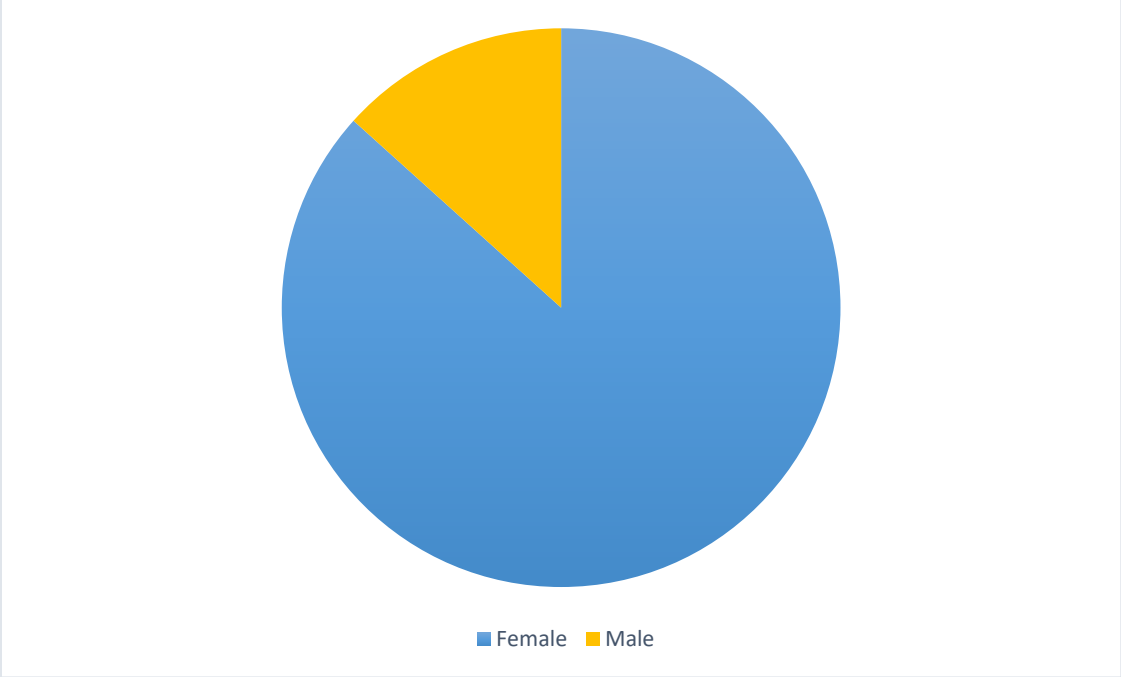

FIGURE 21 PARTICIPANTS BY GENDER

To participate in the research, the participants had to be the parent or caregiver to at least one child under the age of 18 and live in Ottawa because of facilitating the exchange of the Spectacles. Each participant had one to four children, aged between eight months to 12 years old (Figure 23), with the majority of participating families having one or two children.

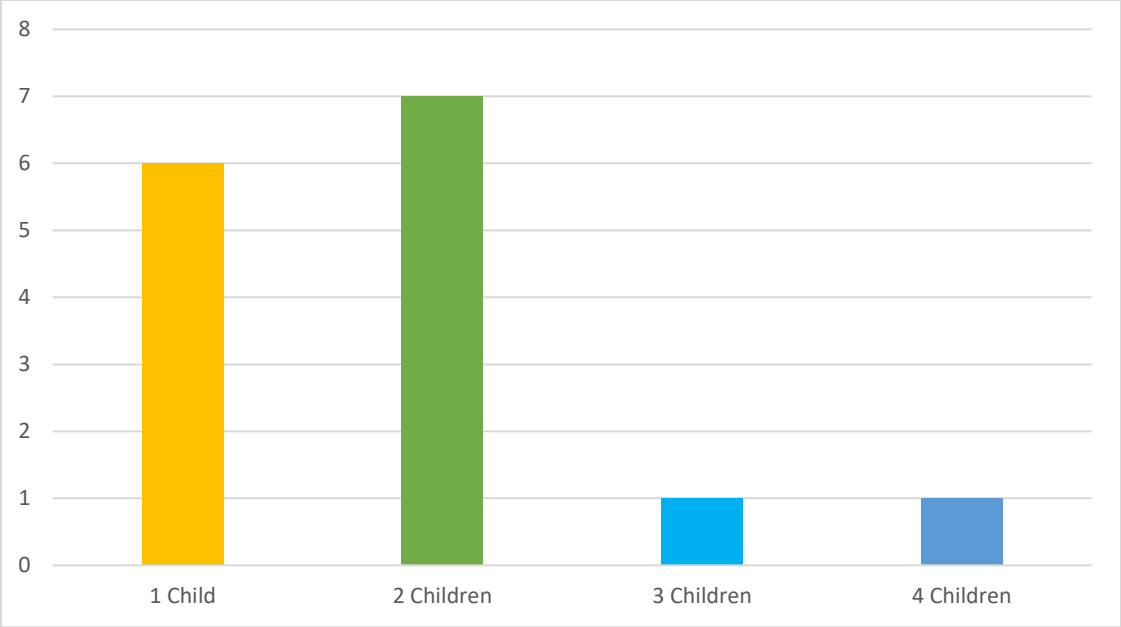

FIGURE 22 NUMBER OF THE CHILDREN IN EACH FAMILY

At the start of the study, the researcher planned to recruit the participants on the Carleton University campus by locating posters in on-campus buildings and at local childcare centers. However, by the start of the COVID-19 pandemic, the recruitment method was revised to leverage social media parenting groups in Ottawa (e.g., Facebook) and snowball sampling. The lead researcher contacted each participant via email and arranged for contactless curbside drop-off of the Spectacles at the start of the study. Participants who completed the six weeks of the study were remunerated with a digital Amazon gift card.

4.5 Procedure

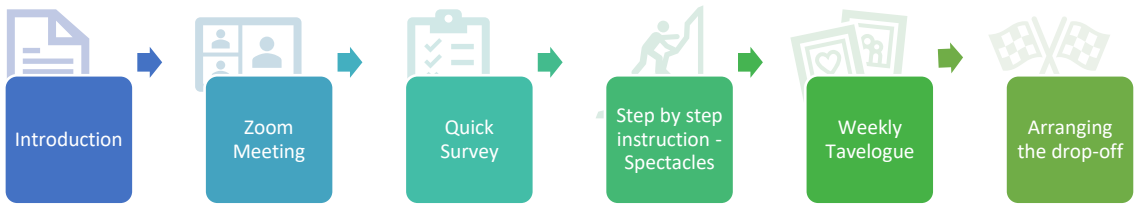

FIGURE 23 STEP BY STEP PROCEDURE

Participants received the consent form (Appendix E) via email and sent it back to the researcher after electronically signing it. After participants signed the consent form, I explained the study more deeply to the participants via Zoom call at the start of the study. During 20 minutes virtual meeting, the researcher explained the research process in detail. The researcher introduced them to the Snapchat Spectacles as the selected wearable device. This device is a sunglass that can allow them to capture pictures short videos and import the digital format of the images/videos on the Snapchat application. I provided the Snapchat Spectacles to the participants to document their family photos when interacting with their kids and evaluate their weekly experiences during the six-week longitudinal study.

The researcher arranged a pick-up to exchange the Snapchat Spectacles during the Zoom call. After participants received the wearable device, the researcher asked them to fill out a survey (Appendix B) to assess their current experience using different technologies to capture photos of their children or family activities and determine the

technologies they are currently using. Also, I asked some questions to find out more about the parents' photography habits. This survey aimed to evaluate the participants' experience with the different capturing technologies. The information gathered from this step also enabled us to learn more about the demographics of the participants and the number of children they have. The researcher also provided a step-by-step guideline of using the Snapchat Spectacles and some informative links (Appendix A).

In the next step, 14 participants were asked to incorporate the Snapchat Spectacles into their regular photo-taking activities for the next six weeks and fill out the weekly travelogues was created using Google Forms. The longitudinal distance approach was utilized in this travelogue, which entails numerous follow-up measurements on a random sample of people (Kalaian & Kasim, 2012). Over a six-week period, some of the measurements I applied in this study were their accomplishment, performance, behavior, and attitude. In this step, I was interested in how the participants use the Spectacles to document every aspect of their life as a parent.

Each week, after day 5th, the researcher sent the travelogue link to the participants. Participants completed one travelogue per week for a total of 6 weeks each. The travelogue contained three main sections, in which they were asked to upload an image and answer some questions (Appendix F). Participants had to upload three favorite photos taken with the spectacles, provide a brief description of the photo, and reflect on their experience interacting with the wearable camera. Also, in the travelogue, they must mention who takes the photo and if they shared it on social media. The researcher followed up with comments and feedback on participants' responses after each week.

To answer the second research question, I gathered some information and data regarding their experience using the Snapchat Spectacles vs. the other photo-taking technologies. In these travelogues, I was also concerned about How the kids behave when taking photos with the Spectacles vs. other technologies. I also asked them if they shared the photo taken by the Spectacles and if their habits changed after using this product. It also provided us with the participants' feedback to obtain their experience working with the wearable camera and identify improvements for future design. At the end of the six weeks study, the researcher asked all participants to erase the Spectacles memory by themselves completely. The researcher and participants also arranged a drop-off to return the Spectacles and the digital $50 Amazon gift card sent to them via email by the research supervisor afterwards.

4.6 Analysis

The researcher used qualitative methods to analyze the data in this study. In the very first step, the researcher analyzed the data, which was gathered through the survey manually by importing them in MS excel. Demographic data such as age, gender, number of children and their age are presented by creating visual charts. The researcher analyzed Qualitative data of the survey for open-ended questions using a spreadsheet in MS excel. The researcher read through the participants' answers and analyzed the similarities and

contrasts.

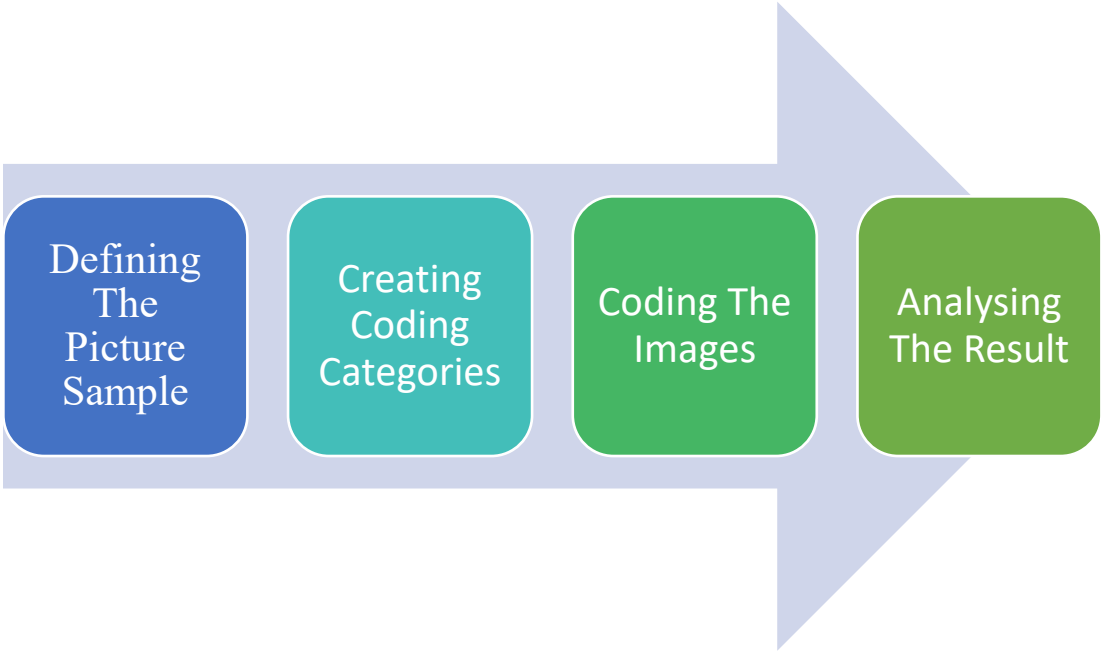

FIGURE 24 CONTENT ANALYSIS BY ROSE (ROSE, 2016)

In the next step the researcher utilized the content analysis methodology. Content analysis provides several strategies for dealing with huge amounts of photos in a consistent manner (Rose, 2016). The content analysis process consists of four steps: 1- defining the picture sample, 2- creating coding categories, 3- coding the photos, and 4- analysing the outcomes (Figure 25). In the first step, I gathered and chose the most relevant images to our project. The researcher attached the descriptive labels known as codes to the images in the next step. The codes used in this study chose from two ways. First the sites for interpreting visual materials (Figure 26) were listed by Rose (2016, p. 25) at which the meanings of an image are made: “The site of production”, “The site of image”, “The site of circulation”, and "The site of audiencing”.

“The site of production” discusses how all visual representations are created in some form, and the conditions in which they are created may contribute to the influence they produce. The second site where an image's meanings are made is “the site of image itself.” Many authors believe, a picture can have impacts independent of how it is created and received. “The site of circulation” is meant to emphasize that all photos travel to some degree or another. Images are mobile, and how their journey impacts their effects. “The site of audiences” address the audience of the photograph, and, like all audiences, the methods of seeing and other forms of knowledge to it, are the last place where the meanings and consequences of an image are determined. According to scholars, this is the most crucial place where an image's meanings are created, and the term audience refers to the process by which a visual image's meanings are renegotiated, or even rejected, by distinct audiences viewing in specific situations.

All these sites have three Modalities: **Technological**, **Compositional** and **Social**, which are the most fundamental features of visual picture comprehension. Technological Modality is described as any type of apparatus made to be looked at or to enhance natural eyesight, ranging from oil paintings to television and the Internet. Compositional Modality covers all about when an image is made, it draws on several formal strategies: content, colour, and spatial organization. The last in Rose's list is the spectrum of economic, social, and political interactions, institutions, and practices that surround an image and through which it is viewed and utilized is referred to as Social Modality.

Rose (2016) declared researchers should use other qualitative methods alongside the visual analysis, because the content analysis only focused on the image itself. The researcher in this study utilized the textual travelogue to cover other sites and discovered

other codes by reading through the answers in detail. As noted by Rose (2016) the resultant analysis produces "a quantitative account of their content" (Rose, 2016, p. 97). Where content analysis produces quantitative results, compositional interpretation allows for more nuanced, qualitative analysis of images. The researcher also used the survey results to support the categorising the coding of the data.

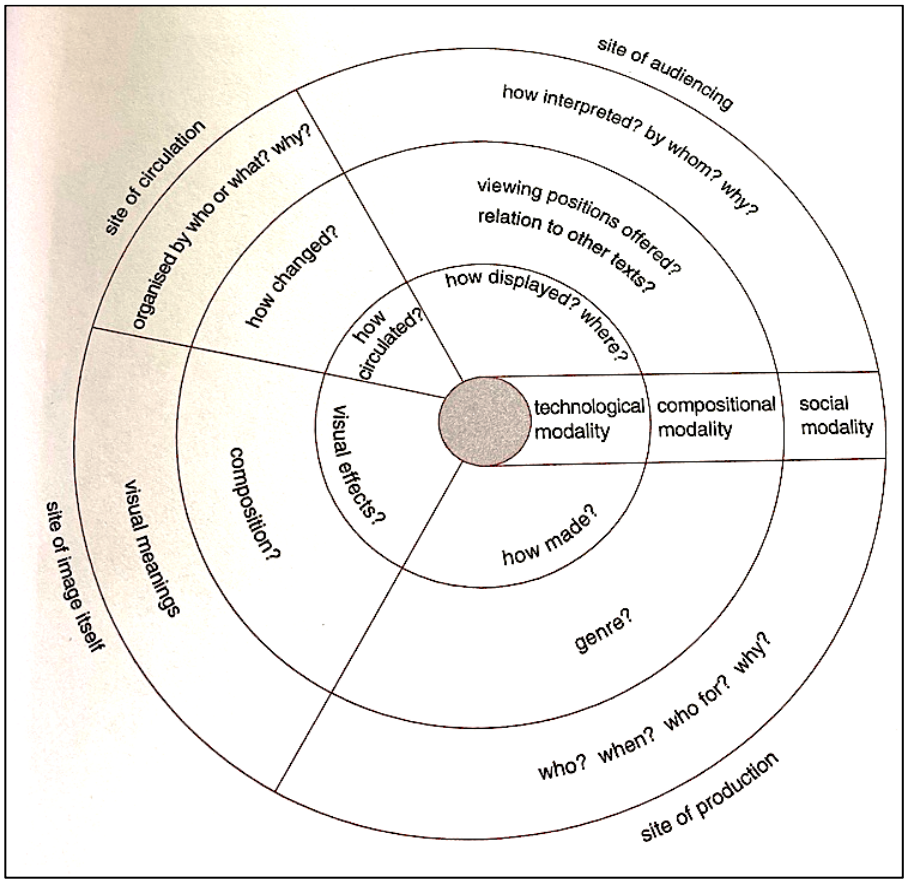

FIGURE 25 THE SITES AND MODALITIES FOR INTERPRETING VISUAL MATERIALS – ROSE (ROSE, 2016, P. 25)

In the third step the researcher used NVivo software and coded the images and textual data, through a deductive and inductive coding. Pre-defined codes were created using deductive coding depending on the specific objective of the researcher's questions. After deductive coding and analysing photos, the researcher used an inductive technique to encode textual data and investigate its meaning. Final step of the content analysis is analyzing the results. After coding the images, the researcher counted the codes to produce a quantitative account of the content. The researcher then selected the most essential frequencies and compares them to another values. By investigating the relationships between coding categories, the researcher built a more complex analysis.

Chapter 5: Results and Analysis

This chapter presents the result of the recorded data and highlights the observation results that I noticed during the six-week experiment sessions. Fourteen participants captured a total of 252 images and wrote more than 15 thousand words on the travelogue. I analyzed the images based on the cultural analysis method and the visual research method proposed by Rose (2016) for this study. I also analyzed the travelogue textual data in order to create a better understanding of the participants' experience. The data acquired throughout the research was analyzed using a deductive and inductive thematic approach. Deductive coding is a top-down strategy in which the researcher begins with a set of pre-set codes and then extracts information from the data that match them (Robson & McCartan, 2016; Saldaña, 2021). Deductive coding was utilized to pre-define codes depending on the researcher's question' specific aim. Rose visual methods (2016) were used to create these standard codes containing Site of Production, Site of the image itself, Site of circulation and Site of Audiencing (Rose, 2016, p. 25).

Following that, the researcher began noticing hidden patterns and developed new codes using the inductive technique by repeatedly reading the replies. The researcher used Nvivo software to look for keywords in the textual data in the travelogue. Based on this method, the pictures were imported into NVivo software for coding and evaluated to support this process. Coding the data enables us to identify the key concepts presented in the participants' weekly travelogues about their experience with the Spectacles. However, after establishing new codes, the researcher needs to reflect on the participants' comments and feedback and make sense of the data by interpreting and comparing replies from

different participants. The codes created based on the survey are “Technologies for capturing”, and “Photo sharing Habits”, and for travelogue are “Experience with Spectacles”, and “Sharing the photos”.

In this research I categorized the research codes in three main themes: Capturing, User Experience, and Sharenting. Based on the visual methodology (Rose, 2016), survey and travelogue data analysis, I assigned each code to these main themes (Figure 27):

Capturing: This theme contains all the data about how a photo is made. Two main areas covered in this theme are technological and social. The technology was used to take photos, and photography habits are the technological modality's main subjects. Social interaction and features that caused the photo's existence are the other subjects covered in this theme.

User Experience: Through this theme, the researcher explored all data related to the user experience of using the Snapchat Spectacles. This section examined the parents’ and caregivers’ experience and the child’s attitudes and behaviours in the face of the Spectacles. This theme also includes the visual analysis of the photos and videos taken by the participants. All the images were analyzed based on the content, framing, camera angle, and image quality to learn more about using the Spectacles.

Sharenting: Sharenting is the behaviour of parents sharing posts and images about their children on social networking sites, which is formed from the terms "parenting" and "sharing" (Marasli et al., 2016). The phrase "sharenting" is described by the Collins online dictionary as “the habitual use of social media to share news and images of one’s children” (Lazard et al., 2019). This tendency has been increasingly widespread among young parents in the last decade, and it can allow parents to shape

their children's digital identities even before they are born (Steinberg, 2017). This theme represents all data about the journey of photos or videos taken by parents and caregivers through social media.

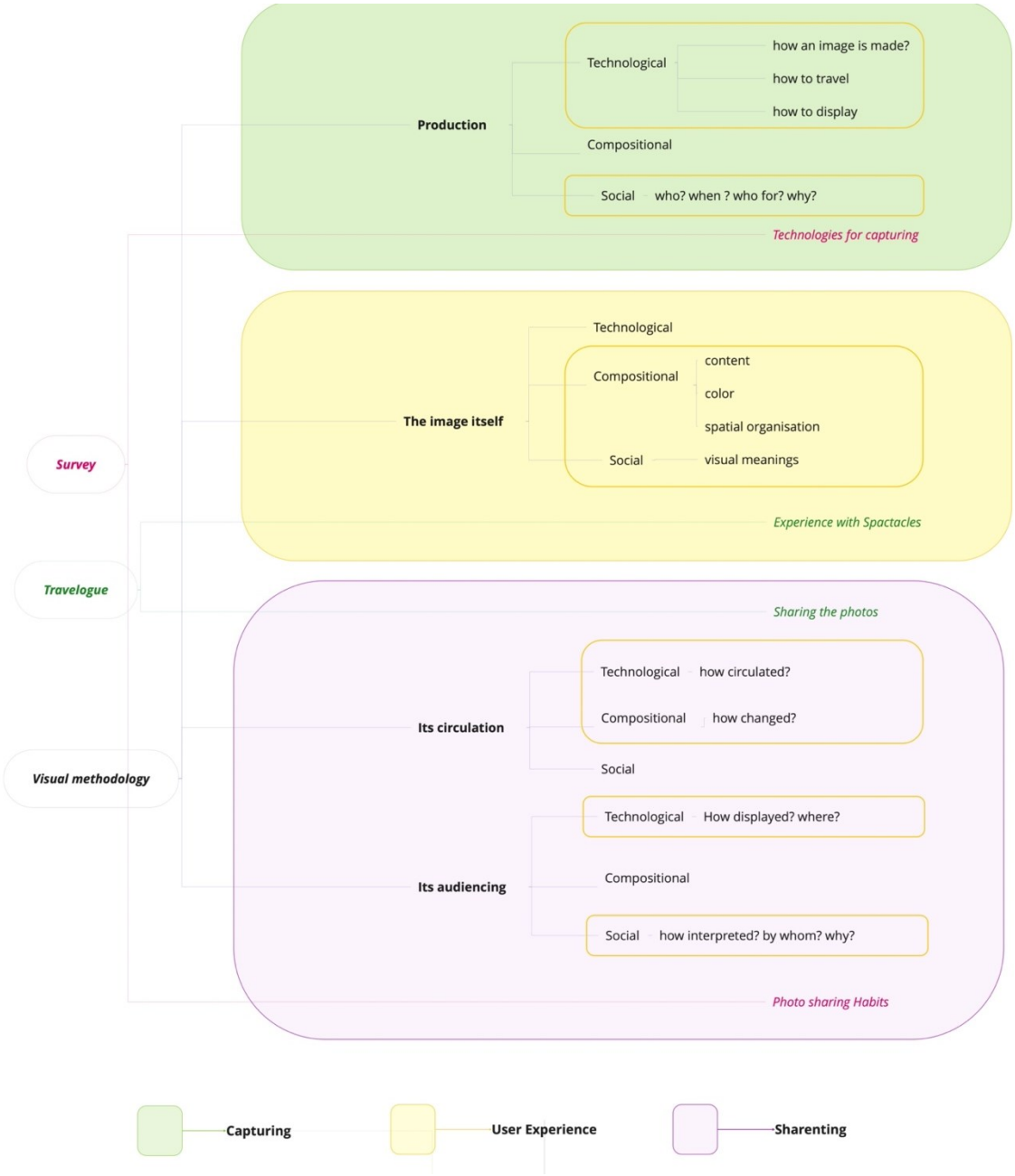

FIGURE 26 THEMES AND CODES OF THE RESEARCH

I focused on the affordances of capturing images with wearable technology, and I analyzed the image itself in terms of framing, composition, and the camera angle. A comparative analysis of the textual data in the travelogues and their associated images further allowed us to study the children's attitude towards the spectacles and the sharenting habits afforded by the technology.

In this section, I illustrated how wearable cameras can shape parent-child interactions in situ and report the result of the participants' experience of using such a device. Beginning with a word frequency query in NVivo, I was able to refine and identify our codes. In the subsections below, I focused on the three most common themes that emerged in our analysis and their associated sub-code: Capturing (Who? when? who for? Why, how is an image made?), User Experience (Children attitudes and reaction, Parent's experience, Camera Angle, Framing, and Quality of the Pictures), and Sharenting Habit (Sharing the snaps, The audience, Shared photos, and Social media for sharing).

5.1 Capturing:

Capturing theme formed based on Rose's Site of Production. Technological Modality like "how an image is made?", and Social Modality like "who captures the image?" and "who for?" are two layers of "Site of Production" that I used to generate the Capturing theme. The compositional modality of the site of production was not included in this theme because the genre of the photos is established, and all are focused on parent-child interaction. Technologies for capturing the image is the code that emerged based on the

survey. Photography habits and Technology that parents use to capture the family photo were two main areas in the survey. In this research, the Capturing theme is included two main codes: “Who? When? Who for? Why?” which indicate the social modality and “How is an image made?” which represent the technological modality (Figure 28).

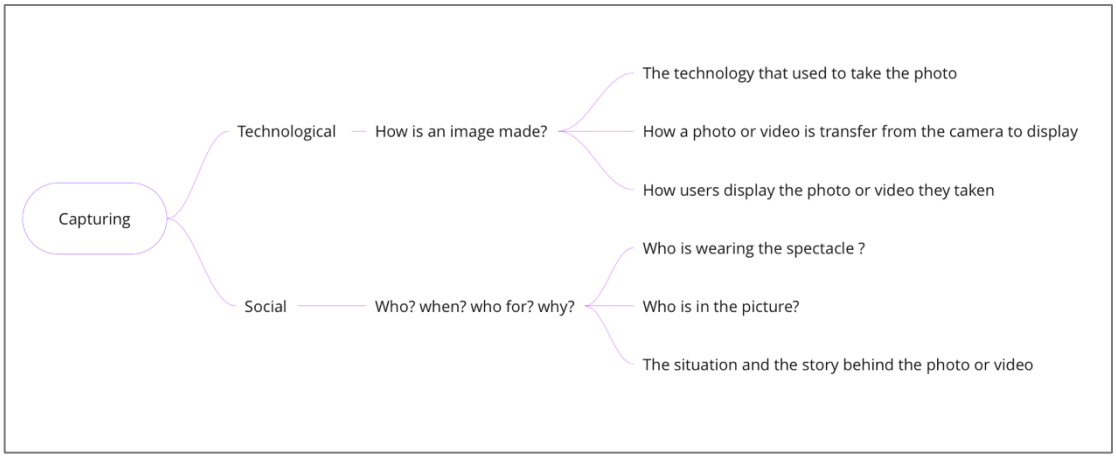

FIGURE 27 CAPTURING THEMES’ CODES AND SUBCODES

Social

5.1.1 Who? when? who for? why?

This code includes all data about the social modality of the capturing which can be categorized in three groups. First group is about who wear the Spectacles therefore took the photo or video. Second group is indicating the people who are in the photo or video, which might be the child and/ or the others. Last but definitely not least is about the situation and the story behind the photo or video, which usually can be consider as the reason of capturing.

All participants were asked to fill out the travelogue and indicate all things related to the use of the Spectacles during the photo taking. I imported all responses into NVivo to create a few word clouds for an overall impression of responses. Also, the researcher did the same thing with the intake survey answers and, in order to find meaningful differences, compared two sets of findings together. The colour and size of the words represent the frequency with which they appeared.

The first sub-code is represented that who wear the Spectacles during the photo taking. As the word cloud shows (Figure 30) “mothers” are the one who usually use the Spectacles. It should not be ignored that 12 of the study participants were females, which could have affected the usage process. On the other hand, as can be seen in the word cloud, fathers and children also used the Spectacles during the study. For example, participant P7 noted that the dad is who responsible for photo taking in their family. As noted in the related works chapter, Kumar & Schonebeck (2015) discuss that mothers seem to play a leading role in taking and even sharing photos because they are more likely to be more active on social media using their smartphones.

Based on the participants' experience, the child aged 6 or older seems to get interested in the Spectacles and use it even more than their parents. As Participant P8 quoted: "I find it has become sort of a technology for my daughter." (Figure 29). However, it was not part of the research, but the participant's children used the Spectacles several times during this study. Parents even uploaded the photos taken by their children and noted some interesting comments. One of the participants mentioned, "There is something nice about them not having other games or extra apps to overstimulate her when she is already doing virtual learning." Since the glasses are designed for the target

group of 16 to 24 years (Piwek & Joinson, 2016), it was expected that children close to this age would be attracted to use them. For example, according to one of the participants P4, her daughter, aged 12, took more pictures as she wanted to ensure that at least one would be good. She also took more "sneaky" pictures as she said she felt like a spy (Figure 29). It is clear from the data in this section that children aged 6 and over noticed the Spectacles and tried to pose in front of them or use them to take some pictures.

FIGURE 28 PARTICIPANT'S CHILDREN USED THE SPECTACLES SEVERAL TIMES DURING THIS STUDY: **LEFT:** THE CHILD IS USING THE SPECTACLES TO TAKE A PICTURE, **RIGHT:** THE CHILD TOOK THIS PICTURE OF HER MOTHER STEALTHY .

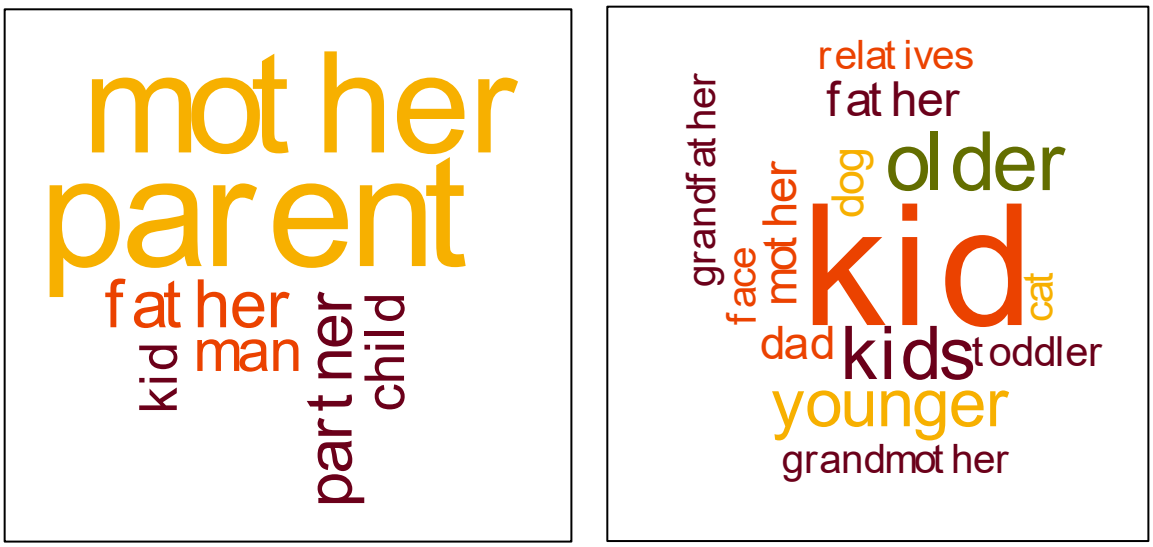

FIGURE 29 **LEFT:** THE WORD CLOUD FOR FIRST SUB-CODE: WHO WEAR THE SPECTACLE, **RIGHT:** THE WORD CLOUD FOR SECOND SUB-CODE: WHO IS IN THE PICTURE.

The next thing which is very important in capturing social modality is what is in the picture and, more importantly, who is in the picture. It is vital to determine who took the photo, but who is in the photos is also significantly important. The people in the image can reflect its situations and help tell the photo's narrative. For example, in the photo of one of the participants, you can see that the child's grandparents are in it; at a glance, it can be recognized as a family day. Another travelogue and photo (Figure 30), which shows the child and its parents, can be understood to be a quality time between parents and child. For example, one of the participants commented on the photo of his child sunbathing: "After a long, long cold and cloudy days, there was a beautiful sunshine and we decided to take some vitamin D."

FIGURE 30 THE PEOPLE IN THE IMAGE CAN REFLECT ITS SITUATIONS AND HELP TELL THE PHOTO'S NARRATIVE: **LEFT:** A FAMILY DAY - GRANDPARENTS IN THE PICTURE. **RIGHT:** QUALITY TIME BETWEEN PARENTS AND CHILD – "WE DECIDED TO TAKE SOME VITAMIN D"

In the travelogue of another participant, it is seen that their child is playing with other children. The primary understandable result of this image is that the child is having fun with his playmates. As this participant pointed out, the presence of other children allowed them to take much more natural photos while none of the children had any idea that they would be photographed. The same participant stated, "My kids do not behave anything different, so did the new kids who joined our bubble; they did not think it is a camera." (Figure 32). The presence of more people when photographing as a subject causes a more natural environment to be formed.

FIGURE 31 THEY DIDN'T THINK IT'S A CAMERA: "THE PRESENCE OF OTHER CHILDREN ALLOWED US TO TAKE MUCH MORE NATURAL PHOTOS WHILE NONE OF THE CHILDREN HAD ANY IDEA THAT THEY WOULD BE PHOTOGRAPHED"

Eventually, almost all 14 participants in the study noted that anyone could see the Spectacles' blinking light and realized they were being photographed. However, what was stranger for photography with the Spectacles, especially for the children, was the use of sunglasses at home. However, using the device outdoors was justified and made children pay less attention to the camera. In this regard, participant P12 noted: "It is awkward since they are sunglasses inside, so I would prefer a clear lens." (Figure 33).

FIGURE 32 **LEFT:** SHE NOTICED THE SPECTACLES, AND HER PARENT' MENTIONED THAT SHE WANTED TO TAKE A PICTURE WITH HER SUNGLASSES LIKE HER DAD. **RIGHT**: IT WAS OUTDOOR, AND THE CHILD DIDN'T NOTICE THE GLASSES.

The last important sub-code title is the subject of the photo, in which the following categories can be mentioned: Arts and Crafts, Play at home, Play outside, Eat, Special event, Family gathering. The researcher has formed these categories by carefully examining each photo and comments written in the travelogue by the participants. For example, participant P12 mentioned several times during the study: "The spectacles were great for arts and crafts (stamping) because I was hands-free." (Figure 34). During the six-week longitudinal study, parents several times mentioned in the travelogue that glasses allow them to take these photos without using a mobile phone. They point out that

these glasses get much less attention when the child is doing their homework or focusing on a task (Figure 34). One example would be participants P12 who mentioned: "I love to snuggle up and read with the kiddos." They continued: "If the spectacles were attached to regular glasses, it would be perfect. I was able to read along with my little man without reaching for a phone to capture the moment. He did not mention the glasses at all and cooperated with the picture." In the case of parent-child interaction, glasses seem to give parents a choice to be able to focus without distraction and when interacting with the child.

FIGURE 33 **LEFT**: THE SPECTACLES WERE GREAT FOR ARTS AND CRAFTS, **RIGHT**: GET MUCH LESS ATTENTION WHEN THE CHILD IS DOING HER HOMEWORK, AND DRAWING.

Another participant, P7, noted that "This picture was captured when we had a snack. For the past several months, our little guy tends to shy away when we pull out our phones for pictures, so the spectacles allow us to capture these types of moments where

he (usually) engages with the camera." (Figure 35). Another series of photos is about children eating, with parents photographing children while eating. Another contributor, P21, commented: "I took this photo during lunchtime. He always smiles when I put the spectacles on. The photo turned out nice with the daylight." (Figure 35). Spectacles seem to help capture more natural photos at times when parent-child interaction is one-on-one. Also, once again, the parents' free hands are one of the important points that they have paid much attention to in their travelogues.

FIGURE 34 **LEFT**: "THE SPECTACLES ALLOW US TO CAPTURE THESE TYPES OF MOMENTS". **RIGHT:** SPECTACLES SEEM TO HELP CAPTURE MORE NATURAL PHOTOS.

One recurring theme on photos that parents submitted is when children was playing, which has occurred both indoors and outdoors. Due to the COVID pandemic and winter, many of the participants took photos at home, and the data mostly contained indoor pictures. Participant P19 explained: "I still find I forget to use them, so the phone is still my default, but when I do, it's quicker and nice to be able to play hands-on." Another parent added: "My child was engaged in his puzzle, and I could document his

success without distraction." (Figure 36). Using the Spectacles seems to be a great alternative to cellphone cameras since participant P7 explained: "Another moment of playing captured with the glasses." (Figure 36). They added: "It's much more difficult to capture these moments with a phone because we've missed the moment by the time our phone is out and ready. The spectacles allow us to capture the moment in real-time." (Figure 37). Eight participants declared that having these glasses on to take photos of their child enabled them to take some on-time moments. It was very important for the participants in this study to be able to take pictures of their memorable and attractive aspects while playing with children and at the same time to be able to interact with them.

FIGURE 35 MOMENT OF PLAYING: **LEFT:** "IT'S QUICKER AND NICE TO BE ABLE TO PLAY HANDS-ON", **RIGHT:** "MY CHILD WAS ENGAGED IN HIS PUZZLE

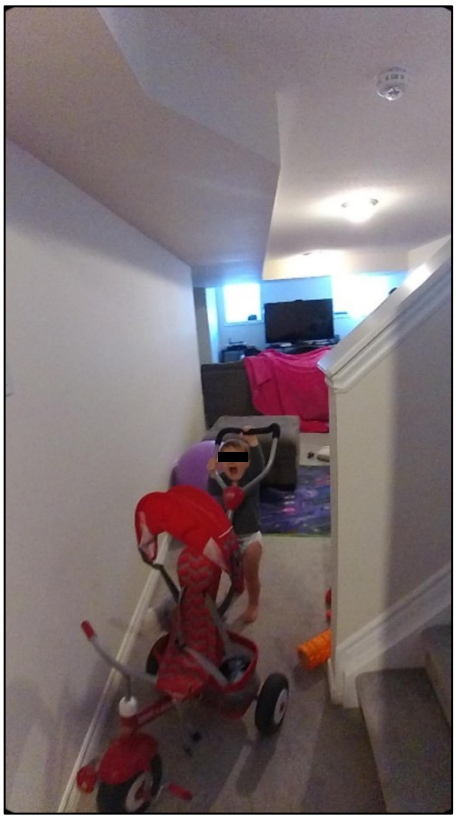

FIGURE 36 **LEFT:** CAPTURE THE MOMENT IN REAL TIME, **RIGHT:** UNEXPECTED PHOTO OF PLAY: "I WAS ABLE TO CAPTURE WHAT I WAS LOOKING AT WITHOUT HIM NOTICING"

Family gatherings and special occasions are other subjects of photography that we see in the photos. In these special ceremonies, the reason for its specialness and the people presents in the environment usually affect the image. However, the presence of other people in the photo makes it a bit difficult to take a photo, for example, to fit everyone in the picture (Figure 38). The researcher noticed that, in a few cases, the child asked their parents to take a picture of them, explicitly using the Spectacles. They think it's cool, and in some cases, it's silly. Based on the participants comments and feedback

It was also interesting that children were much more comfortable in the face of spectacles and asked their parents to use them when photographing.

FIGURE 37 FAMILY GATHERINGS AND SPECIAL OCCASIONS: **LEFT:** "THE WIDE ANGLE WAS NICE TO CAPTURE OUR CHRISTMAS ROOM." **RIGHT:** FAMILY GATHERING.

Technological

5.1.2 How is an image made?

In this code, the researcher covered all data about the technology that is used in order to take, transfer and display the photo. First categories that Rose (2016) describes is the technology that used to take the photo which determine its form, meaning and effect. Next, is all about the how a photo or video is transfer from the camera to display by user. Finally, the researcher examined all data about how users display the photo or video they taken. All these sub-codes helped the researcher to explore the real-life photography and the process of take a photo or video. The survey that I used in the very first step of the

research helped the researcher to discover the technology and photography habits that participants use to take a photo in parent-child interaction.

According to the first sub-code in this section, the Snapchat Spectacles was used to produce photos, which is a semi-conspicuous wearable camera. As explained in the related work chapter, Spectacles are a pair of sunglasses mounted on the upper left of a camera lens for taking photos and videos. Some LEDs indicate that the camera shows the photo-taking process on the right side of the glasses and above the lens. Users can take pictures and videos by pressing the button on the left handle. In this research, parents could use these glasses to photograph the moments of their interaction with their child. The use of these glasses allowed participants to take pictures freely and interact with their children simultaneously. As it was mentioned in Chapter 3: Cognitive Walkthrough, participants anticipated capturing a photo by pressing once and recording a video by holding the same button. Almost all of the participants mentioned that they had difficulty figuring out how to capture a photo or video even after the researcher described how to work with the Spectacles. They also had access to the step-by-step instruction (Appendix A) provided by the researcher in that matter.

One of the parents (P3) shared the photo (Figure 39) and commented about taking photo or video with the Spectacles: “I would not have been able to take a photo or video like this without the glasses as I need two hands to get my son swinging. This way, once he was moving, I could take a picture with one hand without being encumbered by my phone.” This technology is not designed for the target group participating in this research, although parents use it in this context. Eight participants said it was easier for them to take pictures without having to pull out the phone, unlock and load the camera app. Also,

10 people mentioned directly that this is why they do not miss the opportunities that are worth taking photos. However, in the travelogue of seven participants, it was found that this is a bit annoying because they still need to connect their glasses to their phone, so they have to engage their phone a bit.

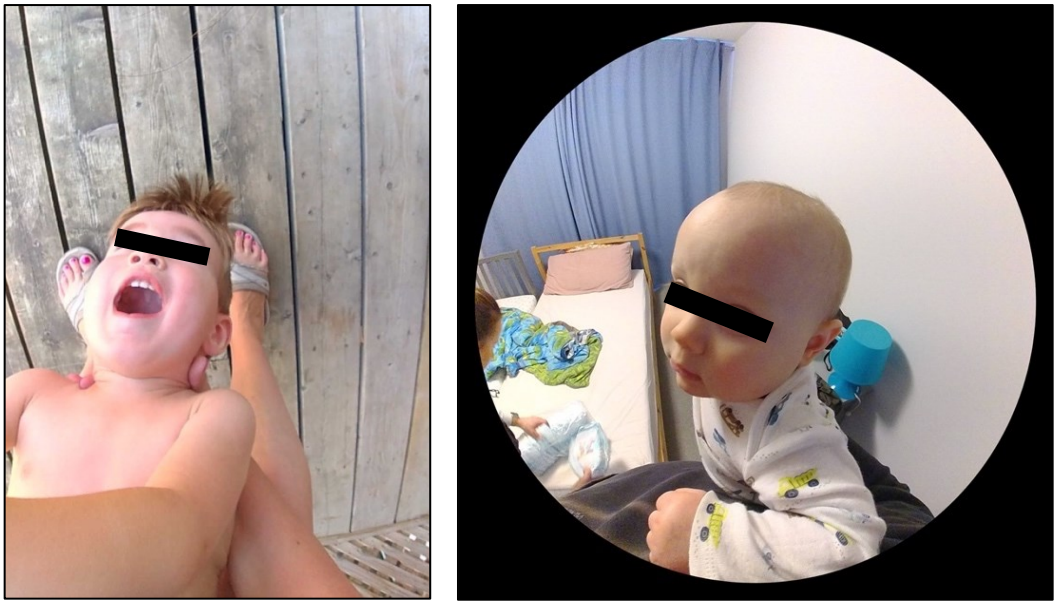

FIGURE 38 **LEFT:** P3: "I COULD TAKE A PICTURE WITH ONE HAND WITHOUT BEING ENCUMBERED BY MY PHONE", **RIGHT:** P23: "HANDS FREE WHEN HUGGING THE TODDLER."

The next sub-code contains all the data on how to transfer photos from the camera and prepare it for display. The use of spectacles in this study caused participants to face limitations in this regard. To import photos from glasses to their phone, parents had to first log in to the Snapchat app and then share the photo with this app or save it on their mobile phone. This process has been very complicated and unnecessary for all users and is often annoying. One of the participants made a very interesting comment about this in his travelogue: "She wanted to show the pictures I took to his painting teacher, but she

could not. So, I had to connect the device to my phone. She asked me why it is not possible to show photos immediately after taking them like your phone. I tried to explain to her, but she was somehow disappointed not to have this feature and started crying."

The problematic process of uploading photos led many participants to point out that they still prefer their other devices, such as the phone camera for photography. One of the parents also told the researcher that he did not want to have a Snapshot account to take these photos. It should be added that several other participants also expressed concern about their children's privacy. However, they were assured that these photos would only be stored in the Snapshot app and would not be shared without their permission. One parent who used Instagram and Facebook to share photos of their children noted that the importing process had worried them as a parent.

Using the latest sub-code, the researcher tried to evaluate the data related to the display of images. Although there is more about sharing photos taking by the Spectacles in the Sharenting theme, this section is more about reviewing the results and analyzing data about parents' habits in photography of their children. The researcher obtained information about the participants' habits in the field of photography with the help of a survey, which was the point of reference on the analysis process of using the Spectacles in the study. The word cloud of the participants' responses (Figure 40) indicated that they were more inclined to print the photos, keep them in a photo album, or share them with close family and friends.

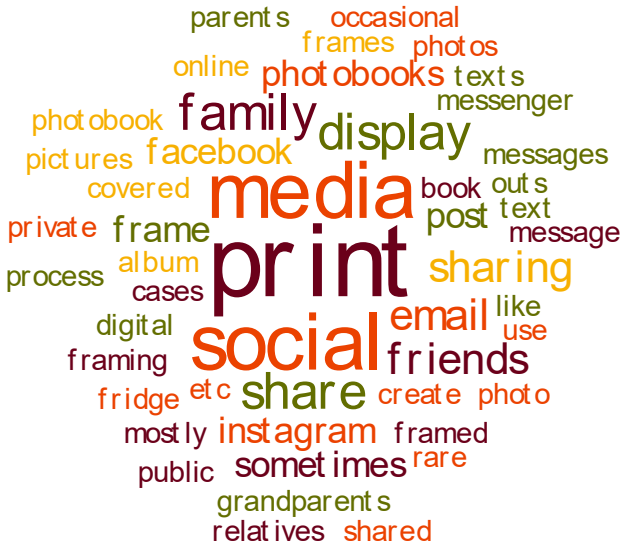

FIGURE 39 THE WORD CLOUD FOR ONE OF THE TECHNOLOGICAL SUB-CODE: DISPLAY.

All in all, Snapchat Spectacles technology was very new to parents, and it was a little complicated to use. In using this device for family photography, participants had fundamental challenges such as how to photograph; such things influenced the process of producing photos. However, giving parents the freedom to use their hands when photographing has led to unique photos being taken. Another issue that made the process of producing pictures with this device complicated was the requirement to use the Snapshot application, which was a constant challenge for all participants during the six weeks of research. Although many users have become habituated to working with the device over time and during the research period, there are definitely steps in the process that can make photography and photo production easier for parents. Eventually, however,

it was almost uncommon for participants to use the Snapchat app process to display photos.

5.2 User Experience:

User Experience theme is formed based on Site of the Image Itself from Rose (2016) visual methodologies, and only its social and compositional Modalities. Compositional Modality addresses the content, colour and spatial organization of the photo or video. Following, Social Modality reviews the visual meaning of images. In addition to Rose's visual methods, I created and developed some codes for this theme based on the travelogue itself. Experience of using the Spectacles is the one that related to this theme. Children's attitudes and reactions to the Spectacles and Parents' experience and their insights are the most important take away from this section. User experience theme in this research is included the codes “Children attitudes and reaction” which covers the data about the child confront the Spectacles, “Parents’ experience” which includes the parents experience of using the Spectacles as a photo taking tool and “Compositions” which contain the data about the image itself and its content. The compositional modalities codes are “Camera Angle”, “Framing” and “Quality of the Pictures” (Figure 41)

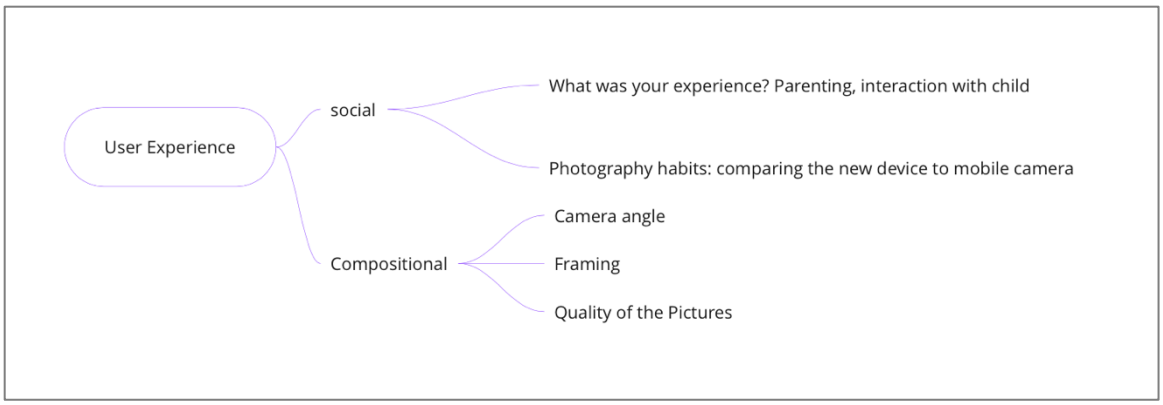

FIGURE 40 USER EXPERIENCE THEME AND SUBCODES

Social

5.2.1 Children's Attitude:

The first code in the user experience theme that fits into the social category is children's attitudes. Although children were not directly involved in this study, being the subjective case in the photos was the reason for the impact of parents' use of the Spectacles. Through our analysis, it quickly became apparent that the age of the child has a significant impact on their reaction toward new technologies. The first point that the participants made was that the older children are, the easier it is for them to realize the existence of the technology, so their curiosity motivates them to explore. Parents' travelogues show that children older than six years in the study quickly realized that these were no ordinary sunglasses. Usually, children who noticed the presence of a camera tried to pose in front of it or make funny faces. One of the participants (P11) noted: "My daughter loves when she does notice the glasses." They continued: "I always get some

great poses! Indoors I don't find them as effective as my phone because I find it a little strange to wear sunglasses insides." (Figure 42)

According to all the participants, children loved to perform in front of the camera; they always posed and behaved abnormally. The presence of semi-conspicuous technology allowed parents to take more natural photos of their children. One of the parents (P9) participating in our research on Spectacles and using it by sharing an image (Figure 42) The participant, P9, in the travelogue stated: "she knew I was taking a picture. No "cheese" though." Summarizing the participants' opinions, the researcher found that ten users directly mentioned that spectacles helped them take more natural photos than a mobile phone.

FIGURE 41 **LEFT**: P11: CHILDREN WHO NOTICED THE PRESENCE OF A CAMERA TRIED TO POSE IN FRONT OF IT OR MAKE FUNNY FACES. **RIGHT:** P9: OVER TIME FOR CHILDREN ACTED MORE NATURAL.

This is also true over time for children who notice spectacles. Many children over six who realized that Spectacles were a camera reacted less over time. Examining the participants' weekly travelogue better illustrates how, over time, the use of this new technology has become ordinary for children. An example of a travelogue that describes this well is the P9 participant:

- P9W2: "I wore the glasses for the entire time my daughter was playing Lego. This lets me be a bit more discrete in my photo taking (I.e., since I already had the glasses on, she did not notice when I was pressing the button as it was subtle.)."
- P9W3: "They understand the glasses take pictures, but I can take pictures more discreetly, so they do not always change their behaviour."
- P9W4: "A bit awkward as they are sunglasses, but the kids forgot about them shortly after. It's easy to take a picture without interruption when I'm already wearing them."
- P9W6: "I remembered to bring them outside for the rest time! The kids understand that they take pictures, but act fairly normally, or as they usually would." They continued, "I was wearing the glasses while uploading photos and took this one. looked right at me and knew I was taking a picture. No "cheese," though."

Children ages six and up not only liked to pose for photos, but many of them liked to use it, at least for the first few weeks of research. It was very interesting to the

researcher that children liked to use these glasses, and they thought it was also a very cool device. One of the parents (P10) wrote in his travelogue: "My niece who is 12 years old uses snapchat all time and she was curious about this eyeglass. After taking the picture, she got the eyeglass and tried to take a picture of others. My little one was happy taking pictures of her. Since my niece asked a few questions about this device, she taught that she has something specious in her hand to get other people's attraction." Another participant (P20) wrote: "They all wanted to wear (I did not let them). They were more interested in trying on the glasses than the actual technology." (Figure43)

FIGURE 42 OLDER KIDS WERE CURIOUS ABOUT THE TECHNOLOGY, AND THEY WANTED TO TRY IT.

Some parents reported that spectacles became an accessory for children for a time. Although this is a bit far from the field of research, the impact of this technology on children's behaviour is undeniable. According to five of their parents, they were very

eager to show the spectacles to other children or those around them. For example, one participant (P10) noted that in the early weeks of study: "I had this device for few weeks and left it on the counter in my family room to see the reaction of my little one every day. She barely used it. She just used it for not more than 5 min during these weeks." This participant continued: "After having this device for a few weeks, she really doesn't like to take pictures with this device. As soon as we have new people around, she just takes a picture or two with this and passes it to me. She only used it when we had my family or friends around."

Using a new wearable technology can be very exciting for everyone, but children were more curious to get acquainted with it in the first weeks of research. After a few weeks of research, they gradually became aware of the Spectacles' presence and accepted their existence. This led to the fact that they indicated that they were no longer particularly excited about the Spectacles and had only accepted it as a typical technology in the final weeks, as mentioned in the parents' travelogue.

In contrast with older children's experience, toddlers and child under six was not really into the Spectacles and only noticed it when they saw their parents use it at home or when they saw the blinking light on the Spectacles. One of the most repeated comments in travelogue during these six weeks of study was that using a sunglass at home was a bit weird for parents and also for the children. Eight participants noted that there was no issue with using the Spectacles outdoor, and compared to mobile-phone, children ignored it more often. For example, one parent P20 noted: “If it’s outside, they don’t even think it’s a camera, play normal and don’t pose. If we were using our phones, they would ignore us with a dismayed look or pose.” (Figure 44). Another participant, P9,

mentioned in this regard: “They understand the glasses take pictures, but I can take pictures more discreetly, so they don’t always change their behaviour.” Participant P22 noted in the first week of their travelogue that their child even less paid attention to the Spectacles (generally their surrounding); therefore, it was easier for parents to take a neutral photo: “She has no idea that my wife is taking a picture, overall, I believe although she knows this device is taking pictures, however, she is more comfortable looking at these glasses rather than posing in front of mobile camera.” In the last week of the study, the same participant mentioned that: “My daughter is feeling really comfortable and natural with Spectacles.” (Figure 44).

FIGURE 43 **LEFT:** P22: SHE IS FEELING REALLY COMFORTABLE, **RIGHT**: THE KID DIDN'T NOTICE THAT HAS BEEN CAPTURED.

It seems that children felt more comfortable being in front of the Spectacles rather than the cellphone cameras. Parent excitedly noted this in the travelogue, for instant participant P7 in two weeks in a row commented about this: “the spectacles allow us to capture these types of moments, natural everyday moments.” In the following week, P7 mentioned the same thing “My favourite part of using the Spectacles is capturing silly moments like these where my son would normally shy away from our phone camera.” Another participant described the same moment: “This picture was captured when we were having a snack. For the past several months, our little guy tends to shy away when we pull out our phones for pictures, so the Spectacles allow us to capture these types of moments where he (usually) engages with the camera.” (Figure 35).

FIGURE 44 TODDLERS OR YOUNGER CHILDREN NOTICED THE BLINKING LIGHT AND TRYING TO GRAB THE GLASSES.

Although the Spectacles is not unnoticeable all the time, in the same week, P7 mentioned that: "Our little guy started to become very curious about the glasses since he could see the flashing light in the corner of the lenses. We were able to capture this moment of him reaching for them on my husband's face." (Figure 45). As noted in the travelogues of the parents with a child under six, the blinking light attracted their attention and made them more curious. Participant P21 noted: "I took this photo during lunchtime. He always smiles when I put the Spectacles on." They continued: "I put these on to snap a quick picture. My son always likes to see the light when I press the button and smiled. I would usually use my phone and try to get his attention for a smile. He behaved pretty normally and gave us a smile easily." All in all, the researcher sums up that the young children noticed the Spectacles and that it usually got their attention, making them laugh or look at their parents. Participants with toddlers or younger children also noted that their children would frequently try to grab the glasses from their parents' faces, especially when they saw the blinking lights on the Spectacles (Figure 45). Participant P19 reported in their travelogue that: "Even after six weeks, my 1-year-old constantly tried to grab at the flashing light on the glasses any time I tried to take a picture or video." Many other participants note the same thing their report, for example:

- P8: “This is the first photo I’ve taken with the spectacles that I really love. The light and glasses themselves may have elicited that confused face and that was pretty entertaining. I can stand right over here, and she looks right at me rather than a phone which results in a slightly better connection with my baby in this particular photo.” (Figure 46).

- P6: “Every time I photographed my daughter, she asked - Mom, are you photographing something? Apparently, it was a reaction to the light indicators on the glasses.”
- P3: My daughter thinks the glasses are great and is starting to try them or herself (6 years old). My son loves that there is a light that comes on when I take picture and video, so it is easier to get a smile from him.

FIGURE 45 TODDLERS OR YOUNGER CHILDREN NOTICED THE BLINKING LIGHT. **LEFT:** “SHE LOOKS RIGHT AT ME RATHER THAN A PHONE WHICH RESULTS IN A SLIGHTLY BETTER CONNECTION WITH MY BABY IN THIS PARTICULAR PHOTO”, **MIDDLE AND RIGHT:** THE CHILD IS NOT CAMERA SHY AND HE IS ENGAGING WITH THE CAMERA.

As the last words for this section, the researcher wants to mention that despite the shreds of evidence and parents' reports on the travelogues, the Spectacles are a less distractive alternative compere to phone cameras for children. While using the Spectacles, children noticed it less and behaved normally in front of them. However,

children aged six or less may get attracted to the blinking light of the glasses. Also, it is undeniable that it is weird for children to use sunglass indoors. After six weeks of study, the reports in the travelogues noted that children of any age get used to the novel technology and lost their interest in the Spectacles.

5.2.2 Parents' Experience:

The novelty of this research was all about using the Spectacles for photo-documenting parent-child interaction. As the user of this device, parents' experience and their insights were two measures that could determine the impact of the Spectacles. "Parents' Experience" was a code to gather and analyze data about participants' (parents) experience using the Spectacles to photo-document their beloved child moments. Parents' First-Person perspective with the Spectacles is about how parents can capture memorable moments from a first-person point of view. This can be important when they want to choose a photo to display. People are more likely to select the picture they experienced with a First-Person perspective.

This code represents in two different focusses:

1- Unique Camera Angle: Under the umbrella of the first-person concept, the camera angle shows what parents see.
2- Actively Engagement: Based on some results, it seems that parents can actively engage and interact with their children by using the Spectacles.

Overall, participants reported that the hands-free design of the Spectacles made it possible to capture more spontaneous moments and afforded a unique opportunity to

capture their first-person perspective as parents watching or playing with their kids. Participants noted they could easily capture moments from their perspective while playing sports with their children, like hiking or playing on a trampoline. Also, the Spectacles give parents the opportunity to capture some extraordinary photos during activities that often do not allow for mobile phone use, for instance, while riding amusement park rides, and even provided unique opportunities to capture moments from their child's perspective by sharing the glasses with them during play.

Although Spectacles allows participants to take photos hands-free, parents do not have any viewfinder for the photos. Almost all participants from the first week of the study pointed out that they felt irritated because they could not see the frame they were photographing. Following the research process, although many participants became familiar with the concept of first-person photography and it was no longer clear that they did not consider it an issue, seven participants continued to cite this point in the last week. The following Paragraph covers examples where the participants complained in their weekly travelogues about the lack of a frame to determine the limits of photography with the Spectacles. Participant P17 stated: "I didn't realize until I checked afterward that my hair was covering one of the lenses, and that the picture wasn't centred; I still struggle a bit to know exactly how to look at my subject, the frame I want." (Figure 47). Participant P19, in the first week of the travelogue, noted: "The quality of the picture is so low. I don't have control over the framing." This participant in the following weeks noted: "This was after I had the glasses on for a while, and my daughter went about playing normally. It can also be a challenge to be aware of what is actually being captured by the glasses. In this photo, you can also see a large portion of my 1-year old's

head because she was sitting on my lap. Since there is no zoom function or way to really control what your focus is, the photos all seem to be very busy with a lot in the background. It is also out of focus and blurry since she is constantly moving." (Figure 47). After a few weeks, P19 also added: "Still find it hard to center pictures, and my hair often gets in the shot. Girls are getting more used to them, so I can capture more natural photos. Nice to be hands-free." Parent P3, in this regard, also mentioned: "I understood how to take a picture vs. video; it was fun. But the camera catches more of my surroundings than anticipated. My chest is in the bottom part of most pictures/videos I took and had to be edited out using a different app."

FIGURE 46 YOU DON'T HAVE CONTROL OVER THE FRAMING.

Another topic that parents reported in the travelogues during these six weeks was how the Spectacles allows them to engage more with their children and capture that unique moment with the Spectacles. Participants noted that the device allowed them to spontaneously document parts of their child's day. At the same time, they were engaged

in activities such as play, family outings, reading, or talking to their parents. Participant P20 mentioned in the travelogue: “Action shot while I was jumping. I can take video and pic while partaking in the Action (jumping), where I know it’s not doable with my phone (the device I am jumping on has bars for me to hold onto, if I was using the phone, my safety would be very questionable).” (Figure 48).

FIGURE 47 SPECTACLES ALLOWED PARENTS TO GET MORE ENGAGED WITH THEIR CHILDREN AND CAPTURE UNIQUE MOMENTS WHILE INTERACTING WITH THEIR KIDS. **LEFT:** JUMPING ON TRAMPOLINE, **RIGHT:** SNOWBALL FIGHTING.

Many other participants made this point very clearly. Users were very pleased with the idea that they could take pictures without a mobile phone and while interacting with their children. Participants commented on how the device's design makes it easier to engage directly with their children rather than having their interactions mediated by a mobile device. For example, one parent, P19, noted: "Loved using these when we played

outside! So much easier than taking off gloves, getting the phone out of a coat pocket in the cold, Etc., definitely what I feel like I would use them for the most." (Figure 49).

FIGURE 48 SPECTACLES CAN GIVE PARENTS THE ABILITY TO CAPTURE MEMORABLE MOMENTS WHILE THEY ARE INTERACT FULLY WITH THEIR CHILDREN.

Five participants in the travelogue wrote that some of their photos were very meaningful to them. This device allowed them to capture memorable moments in a way they had never been able to before. In this regard, one participant, P6 shared with us: "It was handy to have spectacles while my partner and I were helping my 2.5 years old daughter do skating for the first time in her life." This example alone shows that giving parents the freedom to interact fully with their children and at the same time able to capture memorable moments has very satisfying results for parents. Another participant,

P3, stated, "My son wanted to "climb" a tree. I felt that he was safer with me wearing the glasses than if I had a phone out." (Figure 49).

Parents' experience shows that the use of the Spectacles outdoors gave parents the chance to record significant moments that do not last more than a few seconds. Participant P3 noted in the travelogue: "My son loves to tell me when the light comes on the spectacles... So, he is already excited when he notices me taking a picture. In this picture, I was flooding in the pool and capturing him trying to hit me with a water gun." (Figure 50). Another participant, P4, described her experience using the Spectacles outdoor like: "I didn't want to bring extra items on our hike, and my phone didn't fit in the diaper bag I was carrying. Having the glasses was great as it didn't require anything extra on my part." (Figure 50). They also add: "My kids didn't even realize I had a camera with me until I showed my daughter. I didn't have to worry about dropping the camera if I slipped on the rocks or in the water." In the following weeks of the study, the same participant noted that: "Wearing them while camping got lots of great shots." In another example, after three weeks of using this device, participant P19 stated: "I still feel like my favourite use of these glasses is outside where the background is part of the moment."

FIGURE 49 USE OF THE SPECTACLES OUTDOORS GIVES PARENTS THE CHANCE TO RECORD SIGNIFICANT MOMENTS HANDSFREE: **LEFT:** WHILE THE MOTHER WAS SWIMMING, SHE TOOK A PICTURE OF HIS SON SHOOTING AT HER WITH WATER GUN, **RIGHT:** HAVING THE GLASSES WAS GREAT AS IT DIDN'T REQUIRE EXTRA SPACE IN THE CAMPING BAG.

On the other hand, many users mentioned that wearing sunglasses at home is a little difficult for them and sometimes questionable for children. Participant P11 mentioned this in the travelogue: "My kids absolutely love the glasses. They get really excited when I pull them out. I find pictures are not as natural as they could be because I have sunglasses on inside. It makes it a bit obvious. I do think they are a lot of fun! I just wish I had them in a different season." Though aside from the fact that Spectacles lenses are sunglasses, participant P11 pointed out another dissatisfied experience while using the device: "I also wear glasses, so I have to put them over my glasses which makes me look

a little silly when I'm outside. I think that if they were prescription (or I could wear contacts) and it was summer, I would use them a lot more."

Based on the parents' experience and children's attitudes, the researcher sums up that the use of the Spectacles creates some opportunities to take some unique and extraordinary photos. This novel device also gives parents the ability to get deeply engaged when interacting with their children. On top of all, this device less distracts children and allows parents to capture natural photos. Although parents' experience of using the Spectacles was positive, they had some difficulties in this journey. For example, few participants have struggled to take a photo or video with a correct commend. Although they mentioned it is easier than pulling out a phone and unlocking it, the Spectacles button command is uncommon from parents' mindsets and expectations.

5.2.3 Ease of use

Ease of use for participants is one of the areas of user experience analysis. There was a lot of talk about this from the parents, for example one of the participants P6 said: "There are a few things that limit the number of situations in which I wear the glasses: (1) a large number of errors when pressing the shutter button, and (2) cloudy weather, when it becomes too dark in the glasses." The ambiguity and complexity of the shutter and being sunglasses were two of the most important factors in the ease of use of the device. One of the participants P19 mentioned: "I prefer the video function to the photo function." It seems that they prefer to take a photo with only one click and use the press and hold option for the video recording. Participant P4 regard to shutter button noted this in the travelogue: "I almost wish it was tap for a picture, and hold for video, as that seems

like a more natural way to capture pictures quickly." They continued: "As opposed to having to hold it down for two seconds for every picture. Often times with kids that's enough time to miss the moment.".

Another issue that participant claimed they had was the lake of viewfinder. Participant P4 noted in this regard: "It was weird to not be able to look at the pictures once they were taken - something we have become quite used to being able to do." However, some participants mentioned that it is actually a good thing that the Spectacles not showing the result afterward, participant P4 noted in their travelogue: "On the plus side, we didn't spend as much time staring at a device or trying again and again to get a good selfie - we just snapped and moved on - which I liked as I hate spending too much time on devices during my limited time with my daughter."

One parent noted that sometimes they forgot to take the Spectacles with them when they go outside: "It was also hard to remember to take the glasses with us when we went out and we were always worried about them being broken in some way or lost." The fact that this device was given to users by the researcher as part of the research made it challenging for them to use it in all situations.

Compositional

5.2.4 Camera Angle:

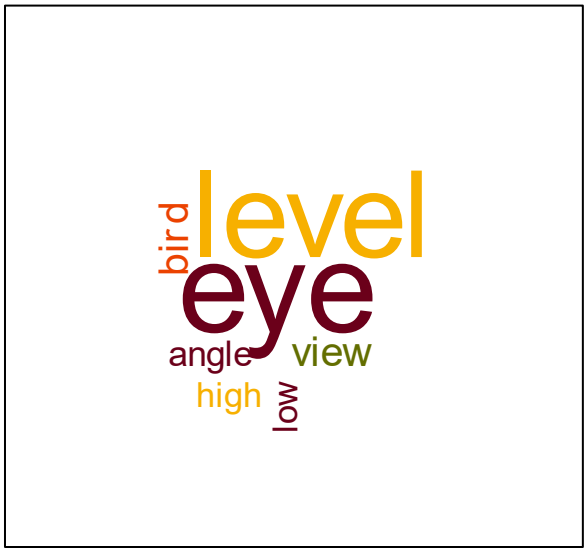

FIGURE 50 THE WORD CLOUD FOR ONE OF THE COMPOSITIONAL CODE: CAMERA ANGLE.

The code "Camera Angle" was the next code the researcher used to analyze the data, which is inspired by Rose's compositional modality for the site of "The Image Itself." Based on the photos and comments shared by the participants in the travelogue, the data of this section was analyzed. From the beginning of the research three participants noted that they felt irritated because they had very little control over the angle of the camera when taking photos. Even though the photos are normally captured from the eye-level and first-person perspective, participants indicated that they wished they would have adjusted the angle of the shot if they had been able to preview it easily

while taking it. The photos taken during our six weeks of longitudinal research include three types of angles:

1. The first-person angle reflects the parents' perspective when photographing.
2. Unusual angles were mainly taken when parents played with children and sat with them to get to their eye level.
3. Rare angles include moments that occur rarely or are taken only by the Spectacles.

First Person Angle (Parents eye level): As expected, this shooting angle is the most common in this study. Parents usually tried to take pictures of their child from their point of view, although this angle was something new for half of the participants, and they were so excited about taking such pictures. One of the participants, P21, shared a photo of their child from the first-person angle and noted: "I grabbed the spectacles off the counter to take these. It's an interesting angle to capture my son. He always climbing on to our legs to stand up and especially when we have his bottle. He didn't really notice the spectacles this time." (Figure 52) Another participant, P12, stated that they had not been able to take a good photo of themself playing with their child with the phone's camera, although they can do so with the help of Spectacles. Although first-person angle was very normal due to the use of the Spectacles and attracted the participants' attention, many also mentioned in their travelogues that they tended to be able to change the angle

of view as they wished. However, many participants took new initiatives and tried to shoot from different angles.

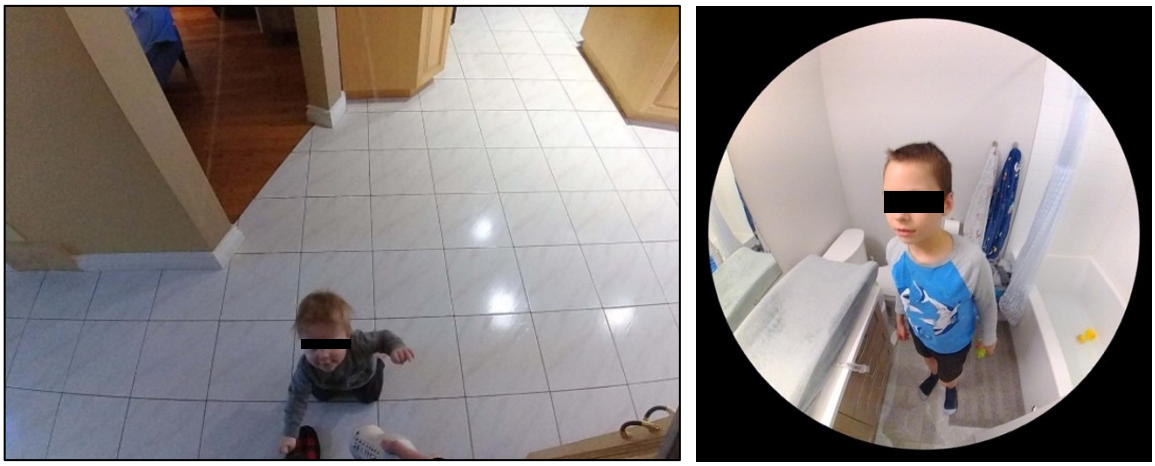

FIGURE 51 FIRST PERSON ANGLE: **LEFT:** INTERESTING ANGLE BECAUSE HE IS LEARNING HOW TO STAND-UP, **RIGHT:** P23 "LIKE THE ANGEL OF THE PHOTO."

Different angle (Parents get creative): Parents usually took these angles when they wanted to be at the same level as their children or play with them (Figure 53). Parents captured such a photo indoors rather than outside. One of the participants, P19, stated in this regard: "Taking this picture, I felt like I was right up in her face to try and get more of a close-up shot. It still manages to capture so much of the surrounding area, which isn't always the focus you want with pictures of kids. I still feel like my favourite use of these glasses is outside where the background is part of the moment." The same participant noted again in the following week that: "Good for getting down on their level, hands-free. Still finding it hard to center." They also mentioned: "I find I also have to get down on their level and essentially be kneeling to get the shot you want, whereas, with a camera, you could just hold your arms down." It was easy for parents to take photos from

these angles hands-free with the Spectacles, and sometimes only take a picture with only one click. However, due to the spectacles being sunglass, as they have to wear it on their eyes, many participants stated that this makes it a bit difficult to take pictures from different angles other than first-person angles. For example, one participant regard to hands-free feature and taking photos from different angles noted: “One day we were outside, and I was wearing my 1-year-old in a carrier, and so it was very hard to bend down and get pictures of the other one. They all ended up being more of a bird's eye view.”

FIGURE 52 PARENTS USUALLY TOOK THESE ANGLES WHEN THEY WANTED TO BE AT THE SAME LEVEL AS THEIR CHILDREN OR PLAY WITH THEM.

Rare angle (Selfies, or down on the ground): Although I asked participants to use the Spectacles to capture photos and videos while interacting with their children, seeing how creative they became was interesting. It was so rare, and just a few

participants used the device in abnormal angles and for very rare reasons. One of the participants, P6, who shared photos on social media regularly noted: “It is fun to make videos and do not hold any devices in hands.” This participant took advantage of wearing glasses and got some shots from rare angles; for example, in (Figure 54), they took the photo from the ground level. This is so uncommon because this device is designed to capture the moment from a first-person view, and as discussed in the Related Work chapter, this device has been used to record the first-person user experience. Another participant, P4, added that “Taking selfies - which is a common practice - was weird as well! Just staring into glasses and smiling looks a bit odd on the street.” However, taking selfies is very common in photo documentation; it is very uncommon to use such a novel device for this purpose (Figure 54).

FIGURE 53 RARE ANGLE: TAKING PHOTOS FROM LOW LEVEL, AND TAKING SELFIE WITH THE SPECTACLES.

Although the researcher designed this study to examine using the Spectacles as a less disruptive alternative for cellphone cameras to take photos of their interaction with

their child, it is interesting to see how participants used it. The Spectacles are designed as a semi-conspicuous wearable camera in the form of sunglasses. Users should wear them like other glasses and then start to take a photo, but in some cases, the photography habit of the participants overcame the Spectacles objective. Moreover, participants managed to use the device in some uncommon ways, like taking a photo from ground level by lying down or taking selfies off.

5.2.5 Framing:

Framing a photo or video can be done by using a viewfinder in cameras, which happens to be a screen in digital devices. One of the main reasons a mobile phone distracts parents when photo taking is that all the information is shared through the same screen. Although the Spectacles design does not have a screen to display information, no viewfinder is provided for framing either.

In our six-week longitudinal study, participants noted that the lack of a viewfinder made it very difficult to photograph a particular subject. Participants said they usually rely on being able to see how a shot would be framed before taking it. During analysis, I noticed that in almost 30% of the photos, many participants accidentally captured their own finger, thumb, hair, or hat brim in the image by accident. As mentioned earlier in the Parenting Experience section, the seven participants described the problem as very frustrating and profound. More than half of the participants also reflected on the framing of images in the travelogue, noting that they would have framed the image differently had they been able to preview the framing somehow. For example, participant P6 stated in the travelogue: "It is fun to make videos and do not hold any devices. But it's not comfortable

not being able to see what is recording on the screen (you have no control over the composition)." Another participant, P19, expressed their experience by sharing the photos (Figure 55) and comments: "I have bangs and long hair, and I find they are often covering the lens without me realizing it. More user error than a problem with the glasses, but still a very common issue I'm having!" They continued: "I still find sobering always makes it into the frame that I wasn't intending on. (Part of my jacket in the bottom corner) (Figure 55). In other ones, it would be my scarf, part of my hood, my arms, etc. It's still difficult to know exactly what will be captured when you take a picture." Participant P17 also noted about this: "I am getting a little better at aiming with the glasses, but I am still finding that I have to check Snapchat right away to see if I actually captured what I wanted to or not". However, some participants took some photos and intentionally tried to capture their presents; for example, Participant P12 captured a moment that they were playing cart with their child by including their hand in the frame (Figure 56).

FIGURE 54 USER ERROR AND DIFFICULTIES FOR FRAMING.

FIGURE 55 SOME PARTICIPANTS TOOK SOME PHOTOS AND INTENTIONALLY TRIED TO CAPTURE THEIR PRESENCE.

In the case of both framing and camera angle, it is worth noting that the only way to see the photos after taking pictures is by opening the Snapchat app on mobile and forcing or waiting for passive Bluetooth file collection. Once the images are on the mobile device, users can view them and decide which ones they want to share on Snapchat or export to other platforms. Six parents considered not reviewing photos after taking them a positive feature, as opposed to five participants that did not like being unable to see the picture after taking it. In general, it seems that parents preferred to have control over the frame of the photos they take and know what they are shooting. Although Spectacles is used for uncensored recording, videotaping, and capturing the experience, having a viewfinder can help the user. Although reviewing photos after

photography is not necessarily considered positive for all parents, the complex process of accessing pictures has not been satisfactory for all parents.

5.2.6 Quality of the Pictures:

The quality of the pictures captured by Spectacles was also critically important for the parents who participated in this research. The quality of photos and videos should be acceptable to users to compare and use as an alternative device. The small size and low quality of the pictures taken by this device was one of the most common critiques of the Spectacles wearable camera. Nine of our participants mentioned that the low quality of the images, especially when taking photos indoors, impacted their decision to switch back to a mobile phone camera or other cameras to capture images. Three participants indicated that they only used the Spectacles to capture images for the study due to this limitation, and they were not going to use it afterward. Participant P19, in this regard, commented: "I find the photo quality is poor compared to other technologies. The video quality is much better than the photo quality in these glasses. I think it struggles to focus." However, all participants were asked to share just three to five photos each week; they shared some photos representing their experience. Half of the participants noted they took so many photos to ensure they had some good images to share. As noted, before, participant P4 mentioned they took more pictures as they wanted to ensure that at least one would be good.

While the quality of the photos is related to many features, almost all participants mentioned that the lighting is something they find effective in order to take better photos. While inside photo-taking with Snapchat Spectacles can still be a good option, the actual

possibility is outside, where the lighting is considerably better. The researcher finds a noticeable difference between what the lighting indoors and outdoors offers (Figure 57).

FIGURE 56 DIFFERENCE BETWEEN WHAT THE LIGHTING INDOORS AND OUTDOORS OFFERS.

Participant P19 shared their comment: "I still like using these outside more than inside." Also, about this, another participant, P17, noted: "I tried them over at my in-laws' house, and they have a bit more light, and I found the pictures came out clearer, so I definitely think they would be great for outside use, I suppose that may be what they are designed for since they're sunglasses." (Figure 58). The researcher finds it interesting that participants acknowledge that these are sunglasses and probably designed for outdoor use. If the user is taking photographs with the Spectacles indoors, the ideal practice is to locate some natural or white light to capture the moment. Also, avoid recording straight into the light or in shadows when outside. For example, participant P9 shared an indoor photo with great natural light and background. Better lighting also helped the participants

to capture photos with sharp and natural tune colours (Figure 58 on the left). While the photos on the outside are usually very clear and the colours are more accurate, the photos on the inside seem to be darker and unrealistic.

FIGURE 57 INDOOR PHOTOS WITH GREAT NATURAL LIGHT AND BACKGROUND.

In general, most parents did not consider the quality and usability of this device as an alternate for mobile phones, although they did mention some positive points from their experience. In short, the semi-conspicuous nature of the device helped children and subjects behave more normally when capturing images. Freehand also allows parents to photograph their interactions with their children without worrying about anything. However, the technological capabilities of this device have caused some limitations. The fact that the design of this camera included a pair of glasses does not allow them to shoot in any situation and position. The lack of a viewfinder made it extremely difficult for the participants to frame the photos, yet some parents came up with creative solutions with

their creativity. Despite all the advantages and disadvantages, most users seemed satisfied that they can use this device for photo taking in some conditions. Nevertheless, they did not consider this experience and output quality a complete alternate for mobile phone cameras.

5.2.7 Dynamic images taken by the spectacles

The study discovered that some of the photographs are comparable to those pictures with a smartphone or other cameras, while others could only be captured with the Spectacles. The first-person angle mirrors the parents' perspective when photography, which is the most noticeable feature of using the Spectacles. Also, it allows parents to take photos of their children hands free when they are playing with them or when they wish to document family time, dinner time, etc. Some participants used this gadget to document their presence in photos while interacting with their children, by photographing their hands and legs. some of the examples of such photos in this project can be named as First time skating on the canal, and snowball throwing with the kids.

FIGURE 58 DYNAMIC IMAGES THE PARTICIPANTS COULD TAKE BY SPECTACLES.

5.3 Sharenting Habits:

As previously said, "Sharenting" is the practice of parents communicating online and sharing personal information and photos about their children on social media (Lazard et al., 2019; Marasli et al., 2016). In the Sharenting Habits theme, the researcher combined the Modalities from two different Sites: Site of Circulation and Site of Audience, to create a theme about sharenting. Technological Modality of Site of Circulation addresses the journey of the digital photo through various hardware and software before it becomes visible on a computer screen. Compositional Modality from the same Site addresses how users can choose how they want to share the picture, framing, or even the image's colour and size. Site of Audiencing cooperates in this theme with Technological and Social Modalities. Technological Modality investigates how an image is displayed, and Social Modality talks about how an image is interpreted and who the audience of the photo or video is. Survey and Travelogue each contribute by "Sharing the photo" code. However, in the survey, I focused on photo-sharing habits, like how parents share photos and videos; in the Travelogue, I got more into the impact of the Spectacles and the Snapchat app on their photo-sharing habit (Figure 59).

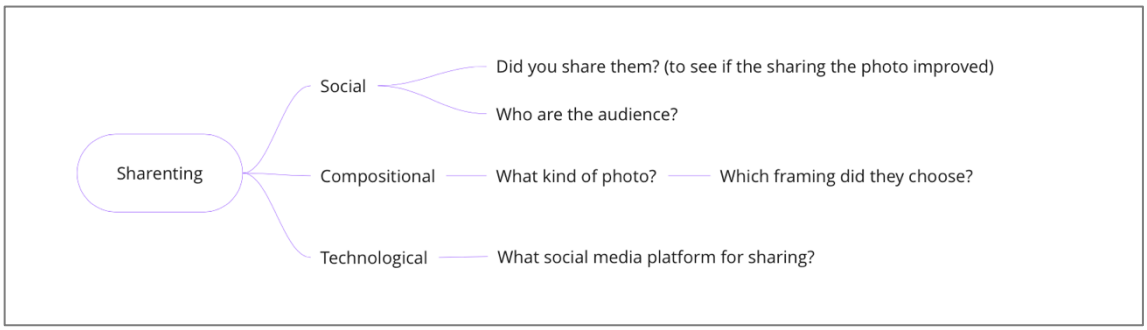

FIGURE 59 SHARENTING HABITS THEME AND SUBCODES

Social

5.3.1 Sharing the Snaps

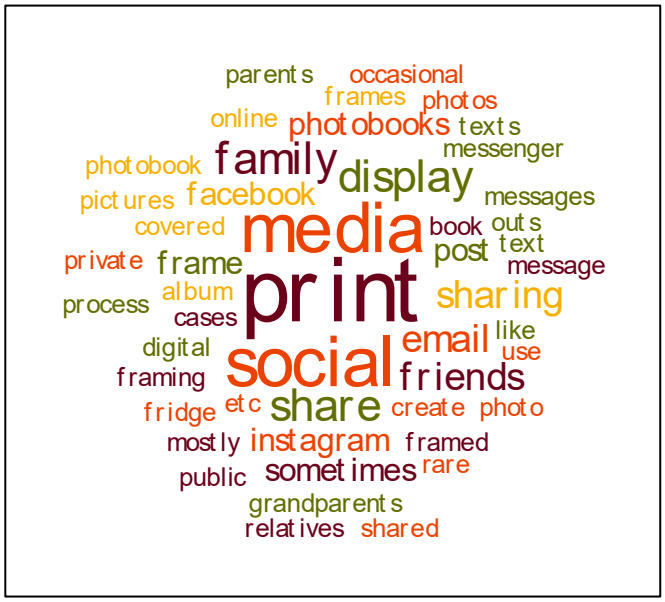

FIGURE 60 THE WORD CLOUD FOR ONE OF THE SOCIAL CODES: DISPLAYING PHOTOS.

The first code of this theme addressed sharing the Snaps -photos and videos- by parents. The researcher used the survey and the travelogue to gather most of the data associated with this code and assigned the data related to sharing the Snaps (Figure 61). The researcher used the survey to asked participants about their photo-sharing habits, like What kind of photo they share? What platform do they use to share them? The researcher used the travelogue data to understand if the sharing habit of parents changed in any way.

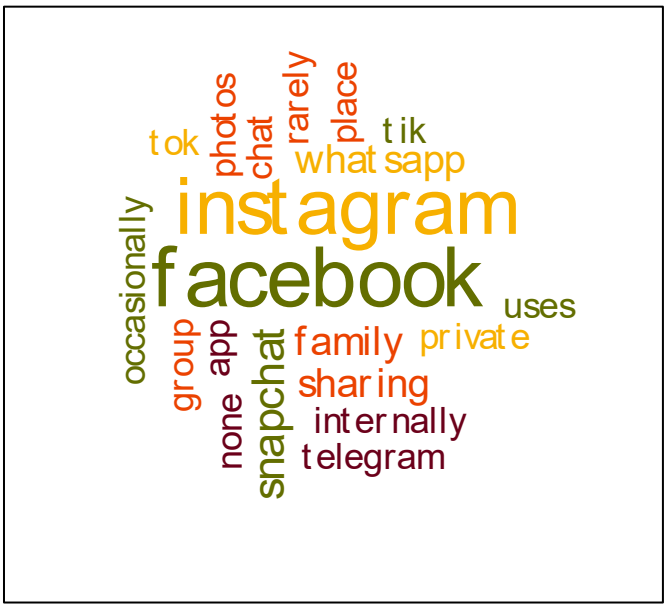

FIGURE 61 THE WORD CLOUD FOR ONE OF THE SOCIAL CODES: SHARING PHOTOS.

In the survey, 12 participants noted that they prefer to print their photos and frame them or place them in albums (Figure 60). This was a common answer that all participants preferred to have images physically printed rather than in social media and the virtual world. However, all participants stated that they also used social media to share photos in some cases (Figure 60). Thirteen participating parents said in response to the survey that they were using Facebook to share photos and that Instagram was second only to one less (Figure 62). Snapchat and WhatsApp are next, with just three people sharing pictures on social media. Based on the results of the intake survey analyzed, the researcher concluded that parents prefer to share photos on social media on networks that can post on a personal page, such as Facebook and Instagram, which they can choose who can see the images. Instead, they use messaging networks such as WhatsApp to send personal photos to people close to them.

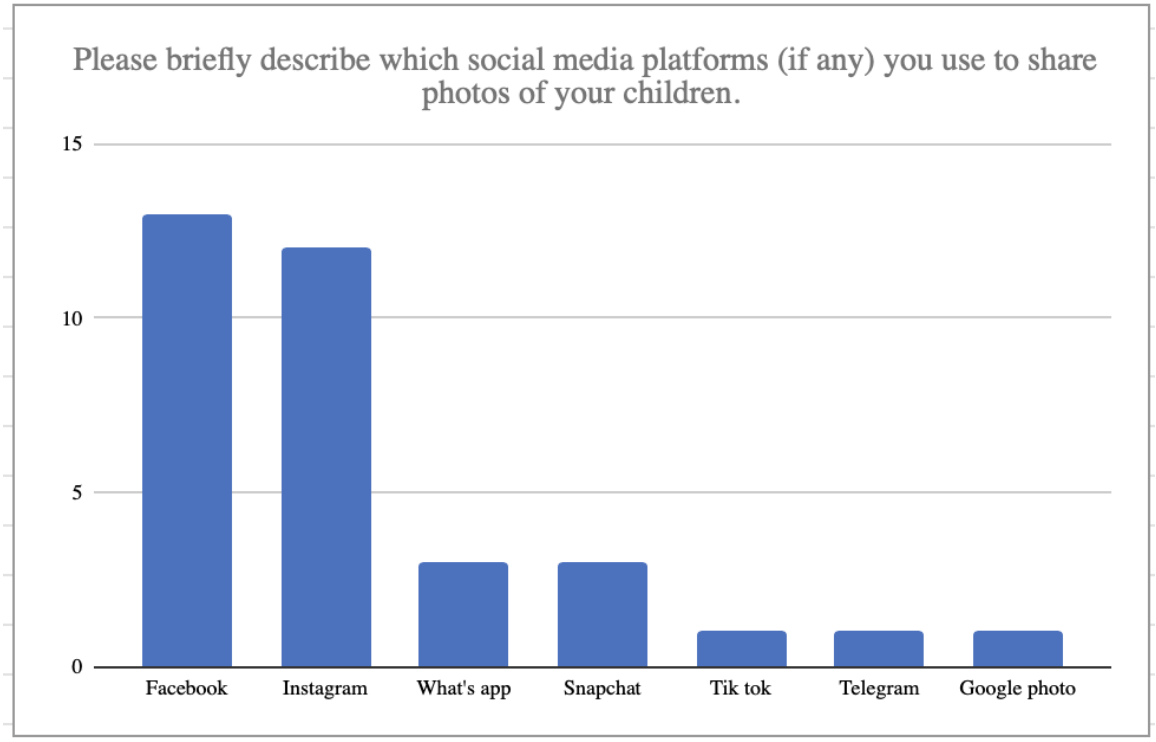

FIGURE 62 SOCIAL MEDIA PLATFORM THAT USED TO SHARE THE PHOTOS.

Through the travelogue and using the Spectacles for six weeks of the longitudinal study, parents did not share the photos almost all the time. Only 17 photos were shared through social media, and only three participants stated that they might share six photos (Figure 63). This means that almost 94% of the time, parents did not share or consider sharing these photos. The researcher understands the main reason for this result can be found in how participants should import their photos from the Spectacles to their phones via the Snapchat app. Eight of 14 participants did not have the Snapchat app on their phones and did not have an account before the study. Four participants had some severe concerns about the privacy of using Snapchat to import or share the Snaps (photos and

videos). It can be said that parents like to share photos of their children on social media; however, they wish to have more control over how to do it.

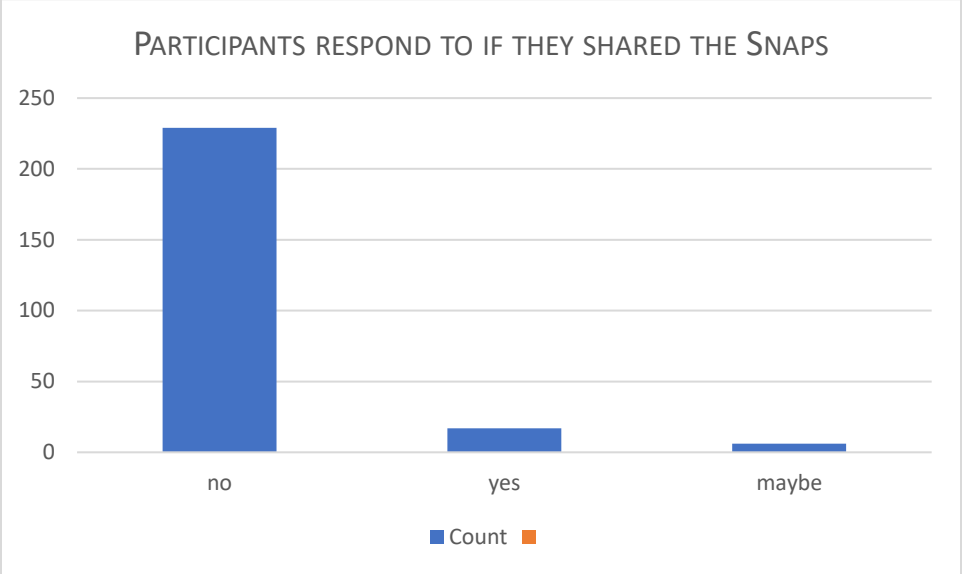

FIGURE 63 PARTICIPANTS RESPOND TO IF THEY SHARED THE SNAPS.

5.3.2 The audience

Through this code, the researcher examined the audience of the photos and videos that participants shared. This code covered all the data gathered from the survey and the travelogue. As noted, before, all participants mentioned they shared the photos on social media or messaging apps with their close family or friends. Ten participants stated that they only shared their family photos to share it with their parents (children's grandparents) or their close friends. Many participants chose Facebook and Instagram to choose their followers, who can see what they post. It can be understood as they preferred to have control over who could see the content they shared on social media. They also

used WhatsApp and other messaging apps to share photos with their contacts, which they already can choose before sharing the photos.

Compositional

5.3.3 Shared photos

This code helped the researcher comprehend which kind of photos were shared by the participants. This is critical to understand the content of the photo, the framing of the picture, and the changes parents made on the image before sharing it, especially on social media. From the survey data, the researcher realized that most of the participants try not to use their cellphone during holidays, family time, or special occasions. 5 participants also mentioned that they might use their cellphone cameras trying to capture moments of play or when they are adorable while still being in the moment and enjoying with their kids. The researcher was expecting the shared snaps taken by spectacles have the same content. Content of photos shared by parents in this study can be described as the moments of parent-child interaction that are very memorable for parents. The images usually illustrate the child doing something memorable, and parents feel it is sharable worthy. For example, one shared photo is of the grandmother holding the child (Figure 64). Another participant, P3, shared a photo of their children where they are playing in a swimming pool (Figure 64). Some participants also mentioned they might consider sharing some images. For instance, one participant, P21, noted that they might share a photo of their child sitting on their knee while playing with them in the travelogue (Figure 64).

FIGURE 64 SHARED SNAPS ON SOCIAL MEDIA: **TOP LEFT:** PHOTO THAT A GRANDMOTHER HOLDING THE CHILD, **TOP RIGHT:** PLAYING IN A SWIMMING POOL, **BOTTOM:** CHILD SITTING ON THEIR KNEE WHILE PLAYING WITH THEIR PARENTS.

The Spectacles' Snaps can be shared in three different ways that can be seen in (Figure 65). Parents used the "Regular Frames (Square shape with different scales) " to share photos that they captured by spectacles. Although eight participants noted during the

research that they liked the new "Circular frames" of Snapchat, none of them considered sharing their photos with this kind of frame on social media. Almost all participants noted the novel way to see the images in the Circular frames in Snapchat and stated that they think it is very creative to see more part of the photo by rotating their phone.

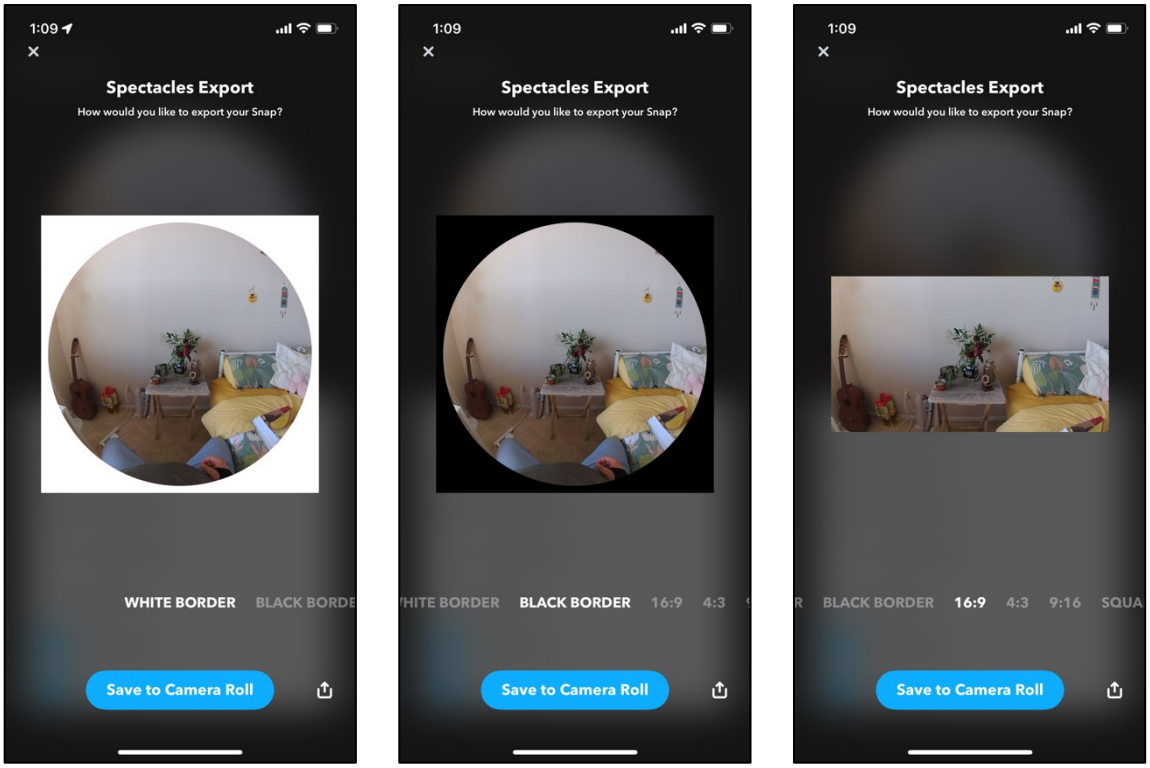

FIGURE 65 DIFFERENT FRAMES ON SNAPCHAT: **LEFT:** CIRCULAR WHITE BORDER, **MIDDLE**: CIRCULAR BLACK BORDER, **RIGHT:** REGULAR FRAMES: SQUARE SHAPE WITH DIFFERENT SCALES.

Technological

5.3.4 Social media for sharing

The data covered in this code represent parents' options to share their Snaps - photos or videos. The social media they chose shows how they would like to share their

content and with which audience. Sharing an image or video digitally on social media can change the whole experience of seeing it. You may listen to music, eat, and answer your phone while viewing a digital photo, but you cannot do so when viewing a picture in the gallery or as an object (Rose, 2016). The differences in features in various social media may change the experience of seeing a photo or video.

Based on the results of our intake survey, Facebook, Instagram and WhatsApp were indicated as the most popular applications among our participants for sharing digital photos, videos, and updates of their families with others. Facebook is considered a social network that allows its users to share the media on their profile and use other services like messaging, group chats, group pages, Etc. On the other hand, Instagram is a media-sharing app focusing on photos; however, it provides many different options like short and long videos, stories, Etc. Next in line is WhatsApp, which is considered an instant messenger and allows users to send text, photos, and videos and start a voice or video call with other users. It also gives their user the ability to create groups and start a group chat, calls or video calls. Based on the result of this research, it seems that parents preferred to share the photos of their children on social media that they can edit, like choosing different frames and adding visual filters to the images before sending them. Also to be able to add captions and notes for the photo they share via Facebook and Instagram. They also seem to be interested in commenting and getting some feedback about their images, which is possible through social media like Facebook and Instagram.

Chapter 6: Discussion

To briefly recap the thesis purpose and objective: The purpose of this study is to see whether utilising Snapchat Spectacles, which is a semi-conspicuous wearable cameras, is a less disruptive choice for documenting and sharing interactions between parents and their children than using mobile phones. A longitudinal study was conducted to address the following questions:

Q1: How using wearable cameras would influence the parents' photo documentation of their children?

Q2: How would the use of wearable cameras by parents affect children's attitudes?

Q3: How would participants evaluate this technology, and what was their experience?

In this chapter, the researcher synthesized the several results shared in the previous chapter into answers to the main question and three sub-questions of this study. The researcher tried to include all data and areas which are worth noting and discussing. The researcher also shared the main research contributions and provided some Design recommendation (Figure 66).

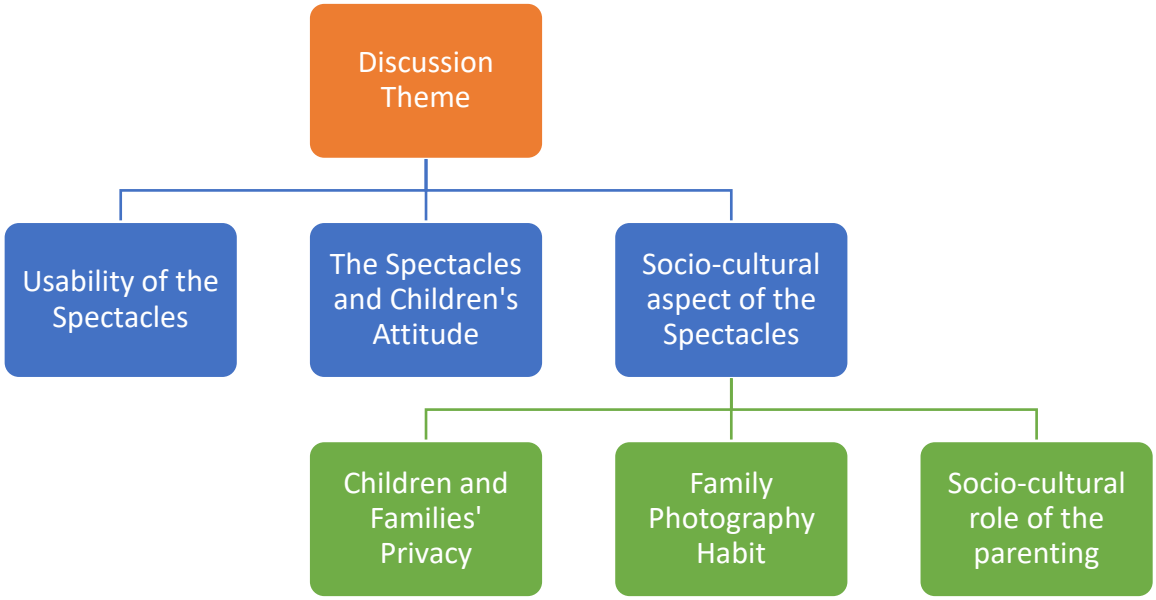

FIGURE 66 DISCUSSION THEME

6.1 Usability of the Spectacles

Usability for participants is one of the areas of user experience analysis. There was a lot of data about this from the parents. For example, there were many comments from parents about the difficulty of connecting the Spectacles to their phones. Although participants expected to connect this device to their phone like many other smartphone accessories via Bluetooth, they had to download and create an account on Snapchat to access the photos. The complexity of the process and being something uncommon, irritated participants. Almost all parents who participated in this research preferred a less complicated process and way more straightforward. Additionally, they preferred to be

able to import the photos to their phone without using Snapchat as a medium, even some of the participants did not have much experience using Snapchat.

The ambiguity and complexity of the shutter were other issues that participants mentioned during the study. Most parents comprehend the camera shutter functionality as one press to take a photo and hold the shutter to record a video. The Spectacles shutter functionality created a mixed feeling and confused the participants even in the last weeks of their participation. Moreover, some of the participants wished for two separate buttons in this regard, making it easier to indicate the functionality of each shutter.

Another debate raised during the study was about the design of the Spectacles, specifically the sunglasses lens of these devices. As mentioned earlier, the Spectacles was designed to be a device for young video content makers who mostly work outdoor, so it is designed as a sunglass. Due to the COVID19 pandemic restrictions and the Winter season in Canada, Parents who participated in this study spent most of their time with their children indoors, and they found it awkward to wear sunglass indoors. Most participants also noted that they prefer to use this device outdoors. In addition to being sunglass, some parents were used prescription glasses, making it way more challenging for them to use the Spectacles. Some of the participants noted they were had to wear it on top of their prescription glasses to be able to use them.

Another issue that participants noted was the lake of a viewfinder in this device as a camera. Almost all participants had some challenges with framing and subjects in the frame. The Spectacles is designed to record users' first-person experience, and it does not necessarily need to have a viewfinder. However, parents used to adjust the view and then shoot the best result possible. Almost all of the participants shared a photo where they

accidentally captured a part of their hair, hand, bag or someone else in the frame. It was also frustrating for parents not to be able to review the photo afterward to make sure of the result. Although more than half of the participants noted they liked to not spend too much time on devices during their limited time with their children.

The Good: Some good features of the Spectacles can be named as:

- The user may record images and films without using their hands, capturing moments as they happened.
- Instead of pulling out their phone and staring at a screen, the user may be more present and record videos.
- All users need to do is press the side button to capture whatever is in front of them.

The Bad: Some features that can be improved on the Spectacles are:

- If the user had long hair, it may be obstructed, and the worst part is that they wouldn't know until they imported the clip into the programme.
- Because the glasses are worn on the user's head, they may not be able to take movies from diverse angles as easily as if they were holding their phone in their hand.

The Ugly:

- It's ideal if consumers use the Snapchat app without Spectacles on a regular basis since they are accustomed to it and find it intuitive. Syncing Spectacles, editing snaps, and publishing them, on the other hand, is a pain. To sync the footage, launch the app, slide up to go to Moments, wait

> 20 seconds for SD videos and 40 seconds for HD videos to sync, click on the group/folder where all the files are kept and sorted by date, touch on the video you want to edit, add a caption or geo-filter, and finally upload it. The entire procedure may take longer than it would if you captured and sent a Snap using your phone.

All in all, it can be highlighted that the participants of this study have not had much experience using Spectacles or similar wearable devices. Also, it should be noted that they were not the target group of the Spectacles in the first place. The researcher believes that improving the Spectacles' design and functionality can make it a more suitable alternative for parent-child photo documenting.

6.2 The Spectacles and Children Attitude

As a new device, the Spectacle was an exciting item for parents, especially children. As parents stated, children loved to pose and make silly faces in front of the camera; the Spectacles are no exception. Parents noted that their children found it exciting and even loved to use it themselves. Although after a few weeks, it was evident that the children did not show any curiosity and overlooked the Spectacle. Parents noted that they liked photos with natural poses of their children, so they found using this wearable camera a less destructive option for children. In this regard, it should be noted that children and parents found using the Spectacles a bit weird indoors since it is a sunglass. However, after six weeks of the longitudinal study, the reports in the

travelogues noted that children of any age got used to the novel technology and lost their interest in the Spectacles.

The researcher finds it interesting that children get used to the Spectacles as a novel technology quickly and lose their curiosity within the study duration. However, there were only children aged six and more who noticed the Spectacles and were attracted to them. It was expected that children closer to the primary target group of Spectacles would be more enthusiastic about the device and even use it. As a result, many parents allowed their children over the age of six to use the device. All things considered, the researcher concludes that the Spectacles is a less disruptive option for parents-child photo documenting. Parents' experience confirmed that taking more natural photos of their child the Spectacles can be beneficial.

6.3 Socio-cultural aspect of the Spectacles

6.3.1 Children and Families' Privacy

Rose (2016) stated that the distribution and consumption of digital materials, such as digital photos, has an impact on social and cultural life. Many say that the technology that allows all YouTube videos and Snapchat photographs to exist is part of the rise of new social and cultural practices (Rose, 2016, p. 290). If, as stated, digital technologies are making us through new ways of organizing all types of data on us, including photos, we must utilize those same technologies and methods to figure out the effects of that organization on social and cultural life, according to Rogers (2013).

Photography is strongly intertwined with privacy and intensified the right to the privacy debate (Kumar & Schoenebeck, 2015). Children's privacy and lives might be potentially leaving risky digital footprints well before the age of consent. Some participants had some serious concerns about their child's privacy and using Spectacles and Snapchat at the beginning of the study. Parents' main concerns were using Snapchat as a medium to import photos to their phones. Some of the participants were not familiar with this app and had some concerns about its privacy.

The researcher acknowledges parents' concerns; however, at the beginning of the study, I assured them that the photos were not shared on Snapchat without their consent, and they have to follow more steps in this regard. The researcher understands that this unfamiliarity with Snapchat and the complexity of importing photos may raise some issues. However, in the last weeks of the study, participants did not show their privacy concerns, but they still had a hard time importing the photos. As part of this research's result, participants still preferred to use their mobile phone camera as their primary choice. They mentioned they would use Spectacles as a secondary device to capture their experience. With this device, parents can be in the moment, truly hang out with their children, and be part of the picture.

6.3.2 Family Photography Habit

The comments and parents' experience were different based on their old habits and how familiar their kids are with any kind of technology. If they are fascinated with the comments and parents' experiences were different based on their old habits and how familiar their kids are with any kind of technology. It depends on how much the

children are fascinated with technology, and specifically with cellphones, and how much they are used to seeing their parents take their photos with the cellphone camera. Also, if the children are using any kind of technology, is there any time limit that they can spend on them. However, I did not measure how much children are exposed to different kinds of technologies; based on the researcher's observation of the 18 photos for each participant, being exposed to digital technologies could impact the children's attitude toward Snapchat Spectacles. It seems that children who are older and exposed to digital devices like smartphones, cameras, tablets, etc., may be more comfortable and less excited about new technology.

On the other hand, parents also benefited from the use of Spectacles. Parents got less distracted while taking photos with the Spectacles and actually had a chance to get more engaged with their children and capture photos. This study has no intention to change the parents' and family photo-taking habits; nevertheless, the results show that parents appreciate such a device. Parents expressed their keen interest in having a device so that they do not get distracted or spend less time checking the photos they just took while around their kids. The researcher believes that an alternative device that is more of an accessory would be a better option in this matter rather than replacing the cellphone cameras. Though, in some cases and situations, the cellphone camera would be a better and easier option to capture some memorable moments.

6.3.3 Socio-cultural role of the parenting

Through analyzing the data, I came across Sharenting, which is the action of parents engaging with one another online and exchanging personal information and

images about their children on social media (Marasli et al., 2016; Steinberg, 2017). Parents may have shared adorable, hilarious, and milestone images with family and friends, but they may have avoided revealing pictures that reflect negativity or nakedness, according to Kumar (2015). Parents might demonstrate "excellent parenting" through their photo-sharing habits, indicating a happy and healthy family. (Kumar & Schoenebeck, 2015).

Based on the results of this study, few parents decided to share the photos that they captured by the Spectacles. Few photos decided to be shared by the number of parents was contained some funny, cute and memorable moments. As participants mentioned during the study, they liked more natural photos that they could take by using Spectacles. Photos that these participants shared show that children's natural pose and joy are very important for parents. These parents initially wanted to post some family moments and reflect on their enjoyable moments with their children. However, instead of some posed and arranged photos, they preferred to share some authentic experiences from their own perspective.

Another socio-cultural phenomenon noted in this study was the presence of mothers compared to fathers. Our study participants represent that the number of mothers who participate is extremely higher than fathers. Here is an issue noted by researchers known as “gender-based stereotyping.” However, the problem of gender-based stereotyping represents a much larger socio-cultural issue, where users themselves are often indicated for performing these stereotypes via their interactions with technology (Einstein et al., 2018). Gender-based stereotypes extend to parenthood, where domestic chores and childcare are often depicted as women’s work (Lindsey, 2015). However, as

noted by Turner and Turner, stereotyping is based on deep psychological roots and is often resistant to circumvention (Turner & Turner, 2011). Combative mothering online (a.k.a. “the mommy wars”) has seen a resurgence of competitive performances of good mothering (Abetz & Moore, 2018; Moore & Abetz, 2016). Performances of perfect motherhood are often depicted on social networking sites like Instagram (de Benedictis & Orgad, 2017; Friedman, 2018; Marcon et al., 2019). In addition to the other forms of labour associated with domestic work, recent work has made visible yet another kind of work: “aesthetic labour” – classified as the work required to stage idealized family photos online (de Benedictis & Orgad, 2017).

Different studies have confirmed that mothers are more active in parent-child interaction than fathers, especially on the internet and social media. Bartholomew et al. (2012) stated that among new parents who use Facebook, 98% of new mothers had posted pictures of their children on Facebook, compared to 83% of fathers. Pictures can be powerful tools to help women navigate their transition to motherhood; photo sharing on social media can also highlight relationships and foster social connections (Kumar & Schoenebeck, 2015; Papacharissi, 2011; Rose, 2004). I realized that most mothers are generally in the shadow of participants' pictures with us by analyzing the photos. It is not the mother's fault that they have an essential parenting role compared to other caregivers. There is a stereotype saying that it is the mother's job to do most of the work, and because of the socio-cultural aspects of our life, they might have been forced to do this part.

With all of this in mind, HCI clearly has an uphill battle with regard to overcoming gender-based stereotypes involving technology, especially technologies designed for parenting and childcare. Although many technologies represent sites for

disrupting these socio-cultural norms, gender roles are deeply ingrained in some cultures and are not likely to be overcome through HCI alone.

6.4 Design Recommendations

Regarding the study results, and due to giving some recommendations for future studies, the researcher provides some design suggestions. These suggestions can help parents use this device more productively and enhance its usability. Also, these recommendations may help Snapchat to develop and improve a new version of the Spectacles with a focus on family photo documenting. Furthermore, some of these ideas are related to the Snapchat application itself, which can help the application to be more user-friendly.

6.4.1 The Spectacles

The Shutter Button

The complexity of how the shutter button works was something that almost all users mentioned, and many of them preferred to use a more straightforward function. Therefore, I recommend designing simple interactions, for example, pressing a button once for photography and pressing and holding the button for a few seconds to start filming. According to the participants, this model is a standard for a shutter button. Another idea that can reduce the complexity is to replace the shutter button for photography and video recording separately. For example, place a button on the handle of the Spectacles in front, close to the lenses, for photography and another button behind for

filming. Although this idea increases the number of buttons, it reduces the ambiguities of how it works, making it easier for users to use the device.

The Feedback Light

This light is located on the left side of the glasses' lens behind the camera boxes, indicating to the user that they are using the Spectacles. This light flashes once when taking photos, stay on continuously during filming, and flashes in the final few seconds of the video recording. Based on a cognitive walkthrough, the researcher found that many users did not notice the light or found it very difficult to understand what it meant. The researcher recommends placing a line of lights behind the Spectacle frame instead of a small light. Also, instead of using the flashing light interaction, different colours can be used to convey the concept. For example, green indicates the beginning of photography, and red indicates the end of photography. During filming, the light can be green continuously and indicate the filming will end shortly with a flashing red light until the red light indicates the end of filming. Since the target group of this research is not people who are very familiar with new technologies, the best solution can be to simplify the concepts and simplify the way they are transmitted.

The Battery Light

This light uses the embedded LED in front of the frame, which indicates the use of the device. To show the level of the battery, the user must double-tap the side of the Spectacle frame. The only problem is that the lights are in front of the frame, and the user cannot be informed of the battery level when he wears glasses. They should either ask

someone else to let them know about the battery level or take their glasses off and look at the battery level light. The researcher suggests that, like in the previous section, a line of lights behind the spectacle frame is used to show the battery's level. This way, users can quickly realize the battery level without seeking help from anyone or taking off their glasses.

The viewfinder (visor)

Like a digital camera, most of the participants anticipate that they can find a perfect frame by using a viewfinder. However, the Spectacles are designed to record the first-person perspective of their user, though it does not necessarily need a viewfinder. This device is designed to capture any moment that the user can see, but it does not entirely act like a camera. The Spectacles have a camera lens closest to the human eye, so the user can capture the exact thing they saw in real life. The researcher recommends putting on a digital viewfinder in the Spectacles' lenses to help parents be aware of what is potentially included in the photos. Although the Spectacles viewfinder might help parents find a better frame and angle to take some pictures, they might get used to how it works even faster and do not use the viewfinder after a while.

A New Design

The first version of the Spectacles that I used in this study was released in 2016, and after that, two other versions were released. However, new versions might focus on new target groups; a few changes might help develop a version specifically for parents. The researcher finds that parents prefer the Spectacles to look more like regular

sunglasses. Therefore, they like to eliminate the yellow circles around the camera lens and LED (Snapchat did the exact thing in the second version). Although Snapchat wants to have its unique design, it might be better to consider working with a fashion accessories brand, preferably an eyeglasses and sunglasses brand (same as the Facebook and Ray-Ban collaboration: Ray-Ban Stories).

Another issue that parents noted throughout the study was the Spectacles being sunglasses. They stated that due to COVID-19 restrictions, they used the Spectacles indoors most of the time, so they prefer to use clear lenses instead of sunglasses. Although the researcher recommends the modular design, which gives the parents the option to use which lenses, they prefer at any time. Modular design makes the Spectacles' lenses interchangeable, and even parent who wears prescription glasses can order customized lenses for their Spectacles.

6.4.2 Snapchat itself

The Snapchat application design was the one issue that all participants noted that they did not want to deal with during the study. Some participants declared that they find using this app confusing and had a hard time working with it. Although most participants did not have any experience using Snapchat and had difficulty using it, the Snapchat signs and icons helped them navigate through the app. The researcher finds it important to provide some suggestions regarding the Snapchat interface and even change some process steps. The researcher recommends using Neilson's 10 usability heuristics for user interface design (Nielsen, 2020) to help Snapchat be a better app for parents. I provided some recommendations inspired by Neilson.

For example, the process of pairing the Spectacles to the cellphone can be more straightforward. When users wanted to pair the Spectacles to their phone, they had to use the Snapchat app, which was not user-friendly (Figure 13). The researcher recommends adding a “Devices” section in the profile to reduce the steps instead of leading users to the setting and then providing the Spectacles pairing option there (Figure 67). Instead of providing a wide range of options, it is better always minimize the user’s memory load by providing simple, recognizable objects, actions, and options. Sharing Snaps process is abit complicated and not easy to follow for participants.

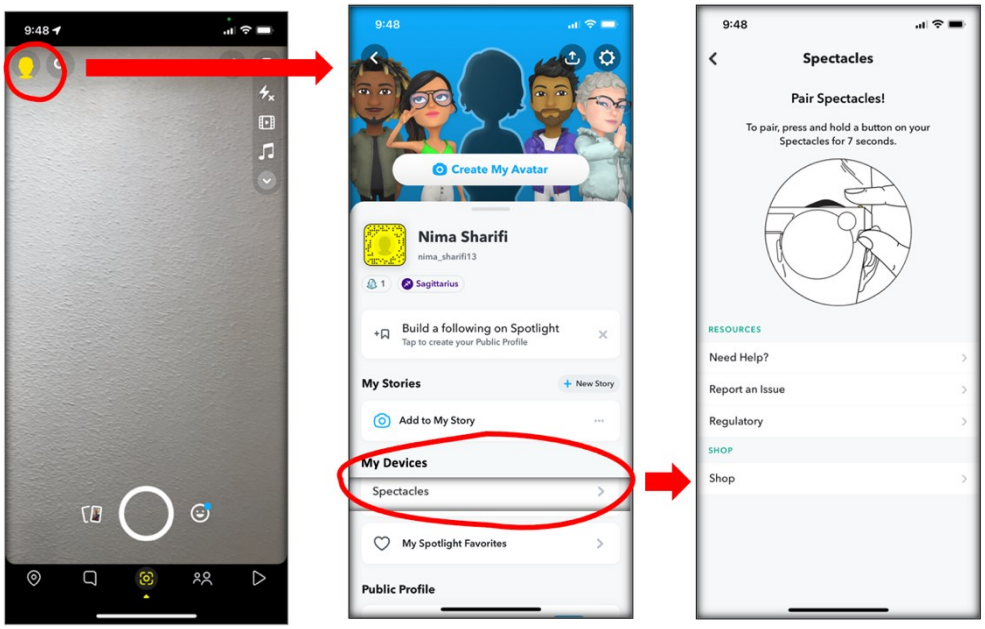

FIGURE 67 SNAPCHAT APPLICATION DESIGN RECOMMENDATION 1

In the process of importing the photos and videos, users must go to the “Memories” section and import the Snaps from there. The researcher suggests adding a separate icon on the main page (◉) to provide access to users (Figure 68). Users can

easily find and recognize this icon on the main page and access their Snaps in order to use them or download them. Snapchat provides some good information in each step, but they can be more specific and bolder about some others. This research target group is not the same as Snapchat, so they should speak the users' language, with words and signs that are familiar to the user so they can understand each step clearly and with no error.

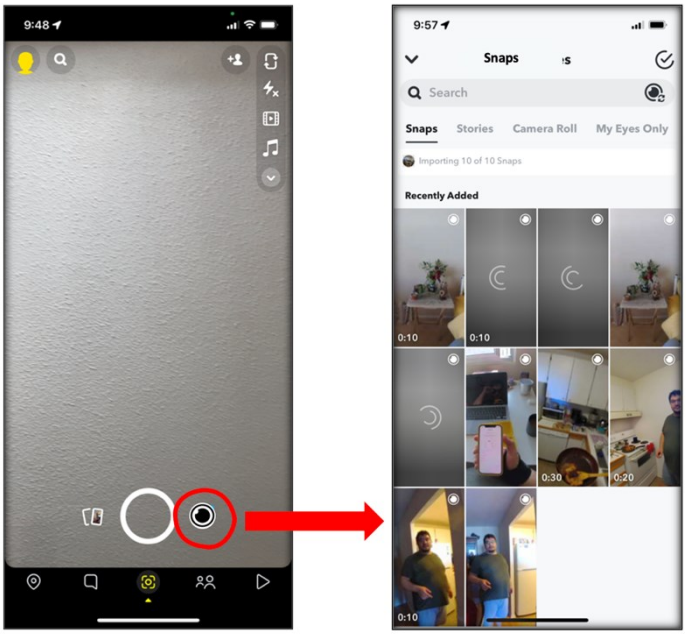

FIGURE 68 SNAPCHAT APPLICATION DESIGN RECOMMENDATION 2

Another recommendation is in regard to the Instruction section (Figure 21) that Snapchat is recently added to its application. The researcher had the same idea in mind and now has some suggestions that can help to improve this section. I recommend that some informative videos or animations be added to the instruction section to provide more understandable information. Through videos or animations, users can better understand what they should do to take a photo and video and what feedback, like

feedback light, they should expect. This slight improvement can reduce the ambiguity and the complexity of the process. Users should not have to guess what different words, situations, or actions signify. Snapchat needs to make sure; they are clear and straightforward about what they want to present. They have to minimize the margin of error for parents and all users.

Chapter 7: Conclusion and Future Work

In this thesis, I evaluated the user experience of a wearable camera embedded in glasses in the context of parent-child relationships. By running six-week longitudinal research and a travelogue study with 14 parents, I discovered how a wearable camera in glasses might be less disruptive for capturing interactions between parents or caregivers and their children instead of using more common devices, such as a mobile phone. This chapter presents our conclusion and proposes recommendations, for further research in this field, and the limitations that have been raised during this study.

7.1 Conclusion

Parenting in the digital realm has sparked divisive debates about the potential advantages and disadvantages of digital technologies in parent-child interaction (A. Brown & Smolenaers, 2018; Moore & Abetz, 2016). However, due to the use of digital technology, parents' attention may be diverted from their children during family quality time such as playtime, bedtime and mealtime. One of the times when parents are often unintentionally involved in technology is when it comes to family photography or photographing their children. In order to reduce the negative effect of using technologies some believe that new technologies have the potential to minimize these problems and allow users to focus more on their social interactions in the real world. Wearables and semi-conspicuous technologies are among the new devices that are used in many cases to reduce the negative effects of the presence of technology.

In this study I began with an intake survey to illustrate a better picture of the course and participants. Through the survey I learned that most of parents still like to print and display family photos in albums, although sharing and posting digital photos via social media is also of great importance. However, many parents say they use a cellphone or camera to take most of their family photos. Through reviewing literature and according to child development studies, using such technologies while caring for children can potentially distract parents from key moments of interaction with their children (Hiniker et al., 2015). For example, Hiniker et al. (2015) state that the use of electronic devices by parents when interacting with their children can lead to feelings of guilt and unpleasant adverse emotional reactions when reflecting upon their level of distraction during time together. Children are also exposed to the use of technology by their parents when interacting with them, which can cause them to feel alienated and emotionally dissatisfied, which can affect their behavioural aspects (Hiniker et al., 2015). In this study, I wanted to know if wearable cameras, specifically Snapchat Spectacles be less distracting than other technologies and enable photo documentation of parent-child interactions without introducing the same types of distraction as a mobile phone. In our user study, I asked 14 participants to use a semi-conspicuous wearable camera in the form of glasses (the Snapchat Spectacles) as an alternative to a cellphone camera or DSLR camera to photograph their interactions with their children.

Through this study our findings show that employing wearable technology for picture documentation can assist parents in taking more natural images of their children while also improving their interaction with them. According to early findings from a qualitative travelogue research, adopting a wearable camera or other semi-conspicuous

wearable technologies would help parents to document moments between themselves and their children without engaging in smartphone use habits during non-use hours. Furthermore, this research found that younger children were less likely to feel obligated to “perform” for the wearable camera, and that parents could catch their children's facial expressions and amusing moments in real time.

Nevertheless, current wearable cameras such as the Spectacles that were used in this study, can be modified, and redesigned for the purpose of use in parents-child interaction. Through the cognitive walkthrough test and travelogues, our results indicated that there were some critical difficulties in learning how to take and share photos captured with the Spectacles. From the design of the shutter button to the lenses of the Spectacles, the researcher provides some design recommendations to improve and develop the next generation of wearable cameras for parents with parent-child and family photo documenting in mind. Although it might not change the parents photo taking habits, it might be an alternative for those who wish for a less disruptive option.

7.2 Future Work

In the next phase of this project, I plan to conduct further travelogue studies on other types of wearable cameras for parents and caregivers and user studies to find a useful tool for documenting interactions between parents and their children. Based on our design recommendations and the results of our longitudinal study, I intend to design and improve a prototype of a wearable camera in order to provide better features for parents to increase the usability of such a device while taking the specific needs of parents and

caregivers in mind with regard to both the physical design of the camera as well as any software UI needed to manage photos.

It is worth it to acknowledge that this study took place in Ottawa, and through it, the potential differences in race and class of participants couldn't be gathered. The willingness to participate might depend on participants' race and cultural background, this matter can also impact the parents' photo-documenting habit. Although it was not possible to examine the impact of racial and cultural differences on project participation and photographers during the project's duration, this could be explored as a future study.

7.3 Limitations

COVID-19 Pandemic

Following the global COVID-19 pandemic, in March 2020, as cases of community transmission were confirmed, all of Canada's provinces and territories declared states of emergency. This study began with in-person exchange of hardware, but quickly pivoted to curbside technology exchange in order to resume our research. To reduce the possibility of COVID-19 transmission, researchers took procedures in compliance with provincial and Carleton university public health recommendations. Fortunately, since the study involved a travelogue design and was intended to be completed at home, the rest of the study design was not impacted by the pandemic.

However, one notable impact the pandemic had on our study was the context in which the photos were taken. Since parents and caregivers were often required to remain home with their children during school closures, and since many places where parents

might often take their children (e.g., museums, libraries, outdoor public festivals) were closed during the run of our study, the resultant photographs were largely taken indoors during sessions of at home play. Because the Spectacles are sunglasses and are quite tinted, their use indoors did not feel natural, even somewhat comical, by the parents and strange, and they became more conspicuous in this setting, which amused their children. Now that many parts of Ontario, Canada, and the world are opening, a repeat of this study would help to give us more ecologically valid data about how our participant group might use such technology.

The Longitudinal Study:

Conducting longitudinal research has many benefits, but it also has certain challenges that must be considered. For instance, one of the difficulties may be that some volunteers could drop out of the research at any time and leave the research without completing it. This is called "Panel attrition" is the term used to describe the loss of respondents in each stage of the research panel (Gravlee et al., 2009). The death of the participants, the participant's unwillingness to engage in the following phases, and the researcher's inability to track the sample member because of the respondent's geographical movement, according to (Laurie, 2008), are the most likely reasons or causes of panel attrition.

In this six-week longitudinal study, I reached out to parents, and 16 volunteers responded, but only two of them dropped out of the research. One participant left the study because they noted that using the Spectacle was too complicated, and they did not want to continue with the process. Another participant did not respond to the travelogue

after a few weeks. The researcher tried to get in touch with the participant several times, but they did not reply afterwards. To prevent panel attrition, oversampling, creating the required connection with participants, and gathering extra contact data during the baseline measurement period are all suggestions made by (Gravlee et al., 2009) and (Laurie, 2008) to prevent panel attrition. The researcher tried to use snowball sampling and shoulder tapping to increase the rate of responses from parents concerning preventing panel attrition.

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Appendices

Appendix A Step-by-step Instruction

Step by step instruction - Spectacles

This is a quick guide on how to set up the Spectacles, charge them, take pictures and videos with them. Before starting you might have to charge the Spectacles. Make sure the Spectacles battery is **at least 10% charged**.

Set Up

1. Download the latest version of the Snapchat app for iOS or Android.
2. Turn your phone's Bluetooth on.
3. If you are on an Android phone, turn on 'Location Services'.
4. Open Snapchat and tap the Profile button in the top-left corner.
5. Tap the ⚙icon in the top-right corner and then tap the 'Spectacles' tab.
6. Press and hold the button on the Spectacles for 7 seconds.
7. Wait and keep the Spectacles near your phone.
8. Enter a name for the Spectacles to be identified as.
9. Wait to see the Spectacles appear in the Accessories List, and then tap the Spectacles' name. This adds Spectacles to your phone's Bluetooth list.
10. Wait to see the "**Pairing Successful**" confirmation message.
11. Update the Spectacles to the latest version.
    a. Swipe up to Memories from the snapchat camera on your phone and tap on the Spectacles button in the top-right corner
    b. Tap on the Spectacles under 'MY SPECTACLES'
    c. Tap on 'Updates' under 'UPDATES'

Taking Photos

Press and hold the button on Spectacles to take a photo Snap until you see an inner LED flash twice. This will let you know the Spectacles took a photo Snap.
The LEDs on the outside of the frame will let your surroundings know when you have taken a photo.

Taking Videos

Press the button on Spectacles once to record a 10-second video Snap.
While wearing Spectacles, you should see an inner LED appear after pressing the button. They will blink twice when they are done recording.
To keep recording, just press the button again to record for 10 more seconds. You can press it once more to record for 30 seconds total.
To stop recording, just press and hold the button for about two seconds.
The LEDs on the outside of the frame will let your surrounding know when you are recording.

Charging Spectacles

Double tap the right side to check the battery life of the Spectacles. You can also swipe up to Memories in the Snapchat app to see the Spectacles' charge level.
Charge the Spectacles by plugging the charging cable directly to them and a USB power source.
The Spectacles can also be charged on the go in the charging case (up to four times). Use the charging cable to recharge the charging case.

Importing Snaps

Snaps taken with Spectacles can only import to the Snapchat account they are paired with. Snaps will import into the 'STORIES' tab in Memories.

Before importing Snaps from Spectacles, be sure to:

1. Make sure that the Spectacles have more than 10% battery life.
2. Turn on the phone's Bluetooth and Wi-Fi.
3. Have the Spectacles close to the phone.

iOS: Open Snapchat, swipe up to Memories, and tap on the 'STORIES' to start importing Snaps. Once in the 'STORIES' tab. Tap the 'Import' button on the right of the thumbnails.

- If you are using iOS 11, you will be asked to join the Spectacles' Wi-Fi within Snapchat. Tap 'Join' to connect to Spectacles' Wi-Fi and start importing.
- If you are using iOS 10, you will need to follow the instructions on-screen to connect to Spectacles' Wi-Fi.
    - Exit the Snapchat app and go to your device's settings.
    - Tap on 'Wi-Fi' and connect to Spectacles' Wi-Fi.
    - Go back to Snapchat, and go to Memories to see the import progress.

Android: Wi-Fi Direct allows the Spectacles to import Snaps automatically. Just open Snapchat, swipe up to go to Memories, and tap on the 'STORIES' tab to see the thumbnails of the Snaps. Importing should start automatically.

Automatically Import to Both Memories & Camera Roll

1. Swipe up to Memories and tap on the Spectacles button in the top-right
2. Tap on your Spectacles under 'MY SPECTACLES'
3. Tap on 'Save To...' under 'IMPORTING'
4. Select 'Memories & Camera Roll'

Resources and Helpful Links:

Setting up:	https://support.spectacles.com/hc/en-us/articles/360000407246
Taking Snaps:	https://support.spectacles.com/hc/en-us/articles/360000412923
Charging:	https://support.spectacles.com/hc/en-us/articles/360000413583
Importing:	https://support.spectacles.com/hc/en-us/articles/360000413106

Appendix B Intake Survey Questions

Intake Survey

(demographics)

carleton.include.lab@gmail.com (not shared) Switch accounts

1) Participant number

Your answer

2) Age

Your answer

3) Gender:

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

4) Number of Children

Choose

5) Ages of Children:

Your answer

6) What technologies do you currently use to capture photos of your children or family activities (check all that apply):

- [ ] Mobile phone camera
- [ ] Digital point-and-shoot camera
- [ ] DSLR/SLR camera
- [ ] Camcorder
- [ ] Wearable camera (e.g., GoPro)
- [ ] Other:

7) If you selected "mobile phone camera", are there any specific contexts in which you prefer to use or not use your mobile phone to take photos of your family?

Your answer

8) Where do you share or display these photos? (e.g., print and display in a frame, post to social media, etc.)

Your answer

9) Please briefly describe which social media platforms (if any) you use to share photos of your children.

Your answer

10) In considering your response to the previous question, please also reflect on if the kinds of photos your post of your family vary by social media platform.

Your answer

Submit

Clear form

Never submit passwords through Google Forms.

Appendix C Ethics Approval

Carleton University

Office of Research Ethics
4500 ARISE Building | 1125 Colonel By Drive
Ottawa, Ontario K1S 5B6
613-520-2600 Ext: 2517
ethics@carleton.ca

CERTIFICATION OF INSTITUTIONAL ETHICS CLEARANCE

The Carleton University Research Ethics Board-A (CUREB-A) has granted ethics clearance for changes to protocol to the research project described below and research may now proceed.

CUREB-A is constituted and operates in compliance with the *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans* (TCPS2).

Ethics Clearance ID: Project # 110635

Project Team Members: **Dr. Victoria McArthur (Primary Investigator)**
Maryam Sadeghian (Research Assistant)

Project Title: **First-Person Parent: Investigating Wearable Technologies for Parents of Small Children**

Funding Source (if applicable):

Effective: February 11, 2022 **Expires:** May 30, 2022

This certification is subject to the following conditions:

1. Clearance is granted only for the research and purposes described in the application.
2. Any modification to the approved research must be submitted to CUREB-A via a Change to Protocol Form. All changes must be cleared prior to the continuance of the research.
3. An Annual Status Report for the renewal or closure of ethics clearance must be submitted and cleared by the renewal date listed above. Failure to submit the Annual Status Report will result in the closure of the file. If funding is associated, funds will be frozen.
4. During the course of the study, if you encounter an adverse event, material incidental finding, protocol deviation or other unanticipated problem, you must complete and submit a Report of Adverse Events and Unanticipated Problems Form.
5. It is the responsibility of the student to notify their supervisor of any adverse events, changes to their application or requests to renew/close the protocol.

6. Failure to conduct the research in accordance with the principles of the *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans* may result in the suspension or termination of the research project.

Special requirements for COVID-19:

If this study involves in-person research interactions with human participants, whether on- or off-campus, the following rules apply:

1. Upon receiving clearance from CUREB, please seek the approval of the relevant Dean for your research. Provide a copy of your CUREB clearance to the Dean for their records. See Principles and Procedures for On-campus Research at Carleton University and note that this document applies both to on- and off-campus research that involves human participants. Please contact your Dean's Office for more information about obtaining their approval.

2. Provide a copy of the Dean's approval to the Office of Research Ethics prior to starting any in-person research activities.

3. If the Dean's approval requires any significant change(s) to any element of the study, you must notify the Office of Research Ethics of such change(s).

Failure to conduct the research in accordance with the principles of the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans 2nd edition and the Carleton University Policies and Procedures for the Ethical Conduct of Research may result in the suspension or termination of the research project.

Upon reasonable request, it is the policy of CUREB, for cleared protocols, to release the name of the PI, the title of the project, and the date of clearance and any renewal(s).

Please email the Research Compliance Coordinators at ethics@carleton.ca if you have any questions.

CLEARED BY: **Date: February 11, 2022**

[redacted]

Bernadette Campbell, PhD, Chair, CUREB-A

[redacted]

Kathryne Dupré, PhD, Vice-Chair, CUREB-A

Appendix D Participant Recruitment Invitation

Appendix D.1 Participant Recruitment Text

Carleton UNIVERSITY
Canada's Capital University

Participants' Recruitment on Social Media

Title: First-Person Parent: Investigating Wearable Technologies for Parents of Small Children Research

Hi Friends,
I hope you are doing well and having a great week 🙂

I am working on a project for my thesis, and I am looking for participants for my study. In this study, I explore the potential use of a semi-conspicuous wearable camera for parents and caregivers as an unobtrusive tool for capturing images and videos of their children. For this purpose, I need to ask some parents to work with the device that I have and send me feedback. I wondered if you know anyone who has children (under 18) and might be interested in this research.

The link below is the consent form, and you can learn more about the project:
https://docs.google.com/forms/d/e/1FAIpQLSdT_bBL_XDatGBSOivYjxXgfqe1n2Cl7nme-3r3A1y0gmn9QA/closedform

I would appreciate it if you let me know if you are interested or you have anyone in mind in Ottawa who might be interested in participating in this study.

Thank you for your help and support:)

Warm regards,
Maryam Sadeghian
maryamsadeghian@cmail.carleton.ca

Supervisors contact information:
Victoria McArthur
Victoria.McArthur@carleton.ca

Include Lab Researcher Contact Info:
carleton.include.lab@gmail.com

Page **1** of **1**

Appendix D.2 Poster on Carleton Facebook Group

Hi Friends,
I hope you are doing well and having a great week 🙂

I am working on a project for my thesis, and I am looking for participants for my study. In this study, I explore the potential use of a semi-conspicuous wearable camera for parents and caregivers as an unobtrusive tool for capturing images and videos of their children. For this purpose, I need to ask some parents to work with the device that I have and send me feedback.

I wondered if you know anyone who has children (under 18) and might be interested in this research.

The link below is the consent form, and you can learn more about the project:
https://docs.google.com/.../1FAIpQLSdT_bBL.../viewform...

I would appreciate it if you let me know if you are interested or you have anyone in mind in Ottawa who might be interested in participating in this study.

Contact info: maryam.sadeghian@carleton.ca

Thank you for your help and support:)

Warm regards,
Maryam

First-Person Parent: Investigating Wearable Technologies for Parents of Small Children Research Consent Form

Carleton University Project Clearance #: 110635 Date of Clearance: May 23, 2019

You are invited to take part in a research project because you are a parent of one or more minor children who use mobile technologies to capture and share pictures of your family. The information in this form is intended to help you understand what we are asking of you so that you can decide whether you agree to participate in this study. Your participation in this study is voluntary, and a decision not to participate will not be used against you in any way. As you read this form and decide whether to participate, please ask all the questions you might have, take whatever time you need, and consult with others as you wish.

DOCS.GOOGLE.COM
First-Person Parent: Investigating Wearable Technologies for Parents of Small Children Research...

Appendix E Electronic Consent Form

Appendix E.1 Electronic Consent Form Page - 1

First-Person Parent: Investigating Wearable Technologies for Parents of Small Children Research Consent Form

Carleton University Project Clearance #: 110635 Date of Clearance: May 23, 2019

You are invited to take part in a research project because you are a parent of one or more minor children who use mobile technologies to capture and share pictures of your family. The information in this form is intended to help you understand what we are asking of you so that you can decide whether you agree to participate in this study. Your participation in this study is voluntary, and a decision not to participate will not be used against you in any way. As you read this form and decide whether to participate, please ask all the questions you might have, take whatever time you need, and consult with others as you wish.

carleton.include.lab@gmail.com Switch accounts

*Required

Email *

Your email address

What is the purpose of the study?

In this study, we will investigate the impact of wearable cameras as a less disruptive option for capturing and sharing interactions between parents and their children. In particular, we are interested in the impact of using wearable cameras (instead of a mobile phone) on the kinds of photos parents capture/share of their children and if wearables can take the place of mobile use during parent-child play.

What will I be asked to do?

If you agree to take part in the study, we will ask you to:

• Take a quick survey that tells us a little more about you, your family, and how you use technologies to capture and share photos of your family. This first meeting will happen virtually via Zoom with a member of the research team, and no recordings will be made (either audio or video), and it will take approximately 20 minutes. It will also include instruction on how to use the Spectacles and access the weekly travelogues (survey)

• Use a pair of Snapchat Spectacles for 6 weeks in addition to other technologies you may own to capture photos of your family (travelogues should take about 10 – 15 minutes to complete each week).

• Complete a weekly travelogue, describing some of your favorite photos you took that week with the Spectacles.

• Upon completion of the study, you will return your pair of Spectacles to the research team and receive a $50 Amazon gift card. This final meeting will be contactless and you will be asked to leave the pair of Spectacles on the porch when the researcher arrives. Due to the Covid restrictions, you and the researcher have to wear a mask during this meeting.

Risks and Inconveniences:

Because this study involves the curbside exchange of hardware, there is some risk that you may be infected with the COVID-19 virus during study participation. Researchers will take precautions in accordance with provincial, federal, Carleton University, and other public health guidelines to minimize the risk of transmission of COVID-19. However, persons who are older, or who have certain medical conditions, and others, have been shown either to be at greater risk of contracting COVID-19 or to suffer more serious effects from the virus.

Possible Benefits:

You may not receive any direct benefit from your participation in this study. However, your participation may allow researchers to better understand how families use technologies to capture and share family photos and will help us design better technologies that take into account the unique needs and concerns of families.

Compensation/Incentives:

Upon completion of the study, you will receive a $50 Amazon gift card. No waiver of your rights
By signing this form, you are not waiving any rights or releasing the researchers from any liability.

Withdrawing from the study:

If you withdraw your consent during the course of the study, all information collected from you before your withdrawal will be discarded. Please note that after you complete the study you will not be able to withdraw your information.

Confidentiality:

We will treat your personal information as confidential, although absolute privacy cannot be guaranteed. No information that discloses your identity will be released or published without your specific consent. Research records may be accessed by the Carleton University Research Ethics Board in order to ensure continuing ethics compliance.
All data will be kept confidential unless release is required by law (e.g. child abuse, harm to self or others). Your data will be stored and protected on a Google server but maybe disclosed via a court order or data breach.
The results of this study may be published or presented at an academic conference or meeting, but the data will be presented so that it will not be possible to identify any participants unless you give your express consent.
You will be assigned a pseudonym so that your identity will not be directly associated with the data you have provided. All data, including coded information, will be kept in a password-protected file on a secure computer. Any images that are included in publications or presentations will be properly anonymized (all faces appearing in photos, as well as license plates or any other identifying information will be blurred or blocked to protect your privacy and ensure anonymity).

Data Retention:

After the study is completed, your de-identified data will be retained for future research use.

Operation data, such as meeting and performance data, will be stored and protected by Zoom on servers located in [the geographic location relevant to you as identified by Zoom], but maybe disclosed via a court order or data breach. (Note: The researcher may need to contact the company to learn the server location, or can also check here: https://support.zoom.us/hc/en-us/articles/360042411451-Selecting-data-center-regions-for-hosted-meetings-and-webinars).

New information during the study:

In the event that any changes could affect your decision to continue participating in this study, you will be promptly informed.

Ethics review:

This project was reviewed and cleared by the Carleton University Research Ethics Board A. If you have any ethical concerns with the study, please contact Dr. Bernadette Campbell, Chair, Carleton University Research Ethics Board (by phone at 613-520-2600 ext. 4085 or by email at ethics@carleton.ca.

Name and Contact Information of Researchers:

Dr. Victoria McArthur, Carleton University, School of Journalism and Communication, Faculty of Public Affairs
Tel.: 613-520-2600 ext. 2520
Email: victoria.mcarthur@carleton.ca

Maryam Sadeghian, School of Computer Science, Carleton University Tel.: 4372472508
Email: maryamsadeghian@cmail.carleton.ca

Are you interested in participating in this study? *

- ◯ Yes
- ◯ No

Next

Clear form

Appendix E.2 Electronic Consent Form - Page 2

First-Person Parent: Investigating Wearable Technologies for Parents of Small Children Research Consent Form

carleton.include.lab@gmail.com Switch accounts

*Required

Statement of consent

Please accept all of this statements if you are interested to participate in this study:

I voluntarily agree to participate in this study. *

- Yes
- No

I agree to allow the research team to include anonymized photos taken with the Spectacles (submitted to the travelogue) in publications or research presentations *

- Yes
- No

I consent to include images of my minor children in this study. I understand that pictures will only be available to the research team and will be anonymized if they will appear in a journal or conference paper. For children aged 7 and older, I will obtain assent orally and inform the research team immediately if any of my children aged 7 and older wish to have their images excluded from the study data. *

- Yes
- No

Back Next Clear form

Appendix F Weekly Travelogue

Travelogue (Week one)

For the next 6 weeks you will be asked to incorporate the Snapchat Spectacles into your regular photo-taking activities. In particular, we are interested in how you use the Spectacles to document aspects of your life as a parent. Each week, you will be asked to select at least 3 pictures taken with the spectacles, submit them, and provide a brief description of the photo.

carleton.include.lab@gmail.com Switch accounts

The name and photo associated with your Google Account will be recorded when you upload files and submit this form. Your email address is not part of your response.

*Required

Participant number *

Your answer

Picture 1

Add File

In the space provided, please describe: 1. Your experience using the Spectacles vs. the other technologies you usually use to photograph your family. How did your kids behave when taking photos with the spectacles vs. other technologies? *

Your answer

2. Who is wearing the spectacles (you, your partner, your child, someone else?) *

Your answer

3. Did you share the photo with others on social media. *

- Yes
- No
- Maybe

Picture 2

Add File

In the space provided, please describe: 1. Your experience using the Spectacles vs. the other technologies you usually use to photograph your family. How did your kids behave when taking photos with the spectacles vs. other technologies? *

Your answer

2. Who is wearing the spectacles (you, your partner, your child, someone else?) *

Your answer

3. Did you share the photo with others on social media. *

- Yes
- No
- Maybe

Picture 3

Add File

In the space provided, please describe: 1. Your experience using the Spectacles vs. the other technologies you usually use to photograph your family. How did your kids behave when taking photos with the spectacles vs. other technologies? *

Your answer

2. Who is wearing the spectacles (you, your partner, your child, someone else?) *

Your answer

3. Did you share the photo with others on social media. *

- Yes
- No
- Maybe

Submit

Clear form