

Dear Diary: Conducting Diary Studies with Participants with Visual Impairments

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Within this report we critically reflect on our experiences using a diary study used to understand the use of social networking sites (SNS) by persons with a visual impairment. We elaborate on the development of the data collection process and the challenges involved in retrieving the data from the participants. Feedback from the participants during post-study interviews revealed that most participants were indifferent to the methods for submitting the diary entries and did not find it a challenge. Most of the participants found the process to be a positive experience for self-awareness of their social media use while reporting little to no adverse effects of carrying out the study. Lastly, we provide reflections and lessons learned from the process.

INTRODUCTION

Social networking sites (SNSs) have become a widely adopted form of communication and social connection. The Pew Research Center, in a 2018 study, found that 69% of people are currently using SNSs (Hitlin, 2018), with the two most widely used systems being Facebook and YouTube (Perrin & Anderson, 2019). SNSs are used for a variety of reasons, including social interaction, information seeking, and passing time (Whiting & Williams, 2013). Moreover, the ability to network with people both locally and around the world allows users to establish professional networks and connect with potential employers (Nikolaou, 2014). While SNS are broadly used, for users who are blind or visually impaired using social networking sites can be a challenging experience (Brinkley & Tabrizi, 2017). Because SNS are designed to be largely visual, (Borrino, Furini, & Roccetti, 2009), the technology and content of these systems simply does not support how disabled users utilize the internet in many instances (Leahy & Ó Broin, 2009). Furthermore, screen readers and other forms of assistive technology are difficult to use when SNSs are not properly designed to support them (Pakdeechote & Tandayya, 2012). Therefore, it is essential to place a greater emphasis on making SNSs accessible for visually impaired users who some studies suggest have smaller real-world networks.

To better understand the usability of technology and the context of its use, field studies are a viable method of investigation (Lazar, Feng, & Hochheiser, 2017). Diary studies are one type of field study where the participant both produces and collects the data. Conducting diary studies involving participants with visual impairments, however, adds an additional layer of challenges potential; challenges which we argue have been insufficiently explored in the literature. This paper reports on our experience conducting a diary study involving blind or visually impaired participants to investigate their use of SNSs. To inform our discussion of the use of diary studies as a research methodology we survey prior work on diary studies generally with an emphasis on their use involving visually impaired participants. To aid others interested in using diary studies in investigating issues of interest to visually impaired persons, we provide an overview of our study design and data collection process followed by a discussion of lessons learned and best practices.

RELATED WORK

Diary Studies

A diary study is a field study method for collecting *in situ*, longitudinal data over a large sample (Baxter, Courage, & Caine, 2015). The data collected can include user behaviors, activities, and experiences over time. Diary studies differ from other field study methods in that the researchers are remote from the participants, and the participants are in control of the means for data collection (Carter & Mankoff, 2005). Diary studies are most useful when the researcher does not have to be present for data collection, when it is preferred to gather information over an extended period, and when it is ideal to avoid the potential of presentation effects where participants may behave differently in the presence of the researcher (Baxter et al., 2015; Carter & Mankoff, 2005). Diary studies can be either time-based, where data collection occurs at pre-determined time intervals or event based where submissions occur after an event (Bolger, Davis, & Rafaeli, 2003; Carter & Mankoff, 2005).

Diary Studies and Visually Impaired Users

In the human-computer interaction (HCI) community, diary studies are useful for gathering user needs as it relates to the design or redesign of technology. There is a small but growing body of research that illustrates the use of diary studies as research methodology involving participants with disabilities. Diary studies have been used to explore interactions between disabled and non-disabled persons in daily activities (Williams, Galbraith, Kane, & Hurst, 2014), as well exploring mobile phone use by persons with motor impairments (Naftali & Findlater, 2014). Diary studies have also been used to investigate issues pertaining to persons with visual impairments. A 2009 study by Kane, Jayant, Wobbrock, and Ladner (2009), for instance, examined the adoption and use of mobile devices by persons with visual and motor disabilities while a 2012 study explored the use of the VizWiz fashion mobile application and its use by visually impaired persons (Burton et al., 2012).

Diary studies have also been used to explore issues of usability and accessibility within the context of social networking sites (SNSs). In a study by Zhao, Wu, Reynolds, and Azenkot (2018) that involved six visually impaired participants, the use of photo sharing features of the Facebook mobile application was explored using diary study methodology. Participants were

asked to use an eight-question survey provided to them in order to document their experience over a seven-day period of time. Voykanska, Azenkot, Wu, and Leshed (2016) conducted a study on how blind screen reader users interact with visual content on SNSs. The authors found that strategies to overcome these issues included accessing social networking sites from other applications and getting help from sighted individuals (Voykanska et al., 2016).

Collectively, the aforementioned studies suggest that the use of diary studies as a research methodology may be effective in capturing the lived experiences of visually impaired persons with social networking sites. We argue that while these studies are reflective of the benefits of the diary study method there is a limited research which describes best practices in the use of diary study methodology in studies involving visually impaired participants specifically. We argue that insights from our experience may prove beneficial in assisting researchers interested in using diary studies generally but specifically in cases where participants may be blind or have significantly low vision.

METHOD

Research Question and Goal of the Study

To discuss the challenges of conducting diary studies involving visually impaired participants while suggesting best practices in this regard, we use as a case study a diary study which focused on the use of the Facebook social networking site (Facebook, n.d.), as either a website on a browser or a mobile application, by visually impaired persons. The purpose of the study is to investigate how visually impaired users use social networking sites (SNS), how it impacts their social well-being, and the obstacles they may encounter with one or more features of the SNS. We are also interested in the choice of devices they used to access SNSs and any assistive technology to aid in their access and use. Our primary research questions is: "How do people with visual impairments use social networking sites to stay connected with their social circle?"

Participants

We recruited participants with the assistance of a rehabilitation and training center supporting the visually impaired community in central South Carolina. Criteria for inclusion included having a visual acuity of at least 20/70 or worse in the better-seeing eye with conventional correction (e.g. glasses or contact lenses), having no motor restrictions that would prevent the use of a computer or mobile device, being 18 years of age or older, and an expressed use of the Facebook social networking site within the past six weeks. For the participants who we determined to be eligible, we explained the risks and benefits of the study, provided the information necessary to participate (e.g. time period, method of submitting diaries, etc.) and inquired about the preferred format and means of receiving the diary entry questions and preferred method for submitting them.

Sixteen visually impaired adults (nine men, seven women M age = 42 years, age range: 21-63) took part in the study. All but one of the participants indicated their degree of impairment as low vision while one participant identified as blind. Participant income ranged between \$11,500 and \$76,500. Table 1

presents the demographics of the participants as well as their preferred devices for using Facebook, assistive technologies, and diary format for the study. We compensated participants with a \$50 gift card, which we mailed out after the post-study interviews concluded.

Apparatus

Given that the participants were blind or have low vision, it's necessary for them to use a myriad of devices, including assistive technologies, to enable better use SNSs. Of the group, 15 used a mobile device, with 13 using a smartphone and eight using a tablet. Five participants indicated use of a personal computer (PC). Most (12) of the participants tended to use two or more of these devices. We did not restrict participants to use only the mobile application or web-based version of Facebook, however, 11 of the participants used the mobile application. While four of the participants solely used the web-based version of Facebook, participants who used more than one device for indicated that they used the mobile- web version on their tablets. Regarding use of assistive technologies in their social media use, ten participants indicated use of text-to-speech (TTS) applications such as VoiceOver and Talkback, and eight participants used either a zooming application such as ZoomText or their device's magnification feature (Table 1).

Diary Entry Submission and Collection

For a diary study, an important decision is determining the format of the diary entries for participants to submit. When conducting research involving participants who are blind or have low vision, the choice of formats may become limited. Electronic documents are one of the most common methods for diary entries. The availability of screen readers, magnifiers, and adaptive keyboards enable visually impaired participants to use applications such as Microsoft Word more proficiently. Short message service (SMS) or text messaging is also widely popular and generally accessible (Corrocher, 2013; Moura & Carvalho, 2010). Emails are a low cost and ubiquitous form of communication, making this format accessible by most people with internet access. Email also affords the option of sending attachments such as documents or websites links. Voice messages provide the opportunity of collecting not only the participant's message but also their emotional state at the time of the entry (Baxter et al., 2015).

Procedure

A pilot study was conducted with three of the participants the week prior to assess the viability of the data capture and entry submission process. The main study commenced shortly after determining the pilot results were satisfactory. Data collection lasted for seven continuous days. There were no required minimum daily entries; we did not ask participants to increase or decrease their use of Facebook beyond their use prior to the study. Messenger, the social messaging application extension for Facebook, also counted as using social media and therefore required a diary entry. We sent out reminders for submitting entries on the first and last days of the collection period. Entries were submitted to the research team by text messaging, email, and voice messages. A Google Voice number was set up for

Table 1. Participant demographics, diary formats, and social networking site use

ID	Age	Vision Loss	Diary Format	Device(s) Used	Facebook Version	Assist. Tech Used
1	44	Blindness	Email	Phone, Tablet	Mobile App	VoiceOver, ZoomText
2	22	Low Vision	Word Document, Text Message	Phone, PC	Mobile App, Web-based (PC)	ZoomText, Zoom Feature (Phone)
3	37	Low Vision	Email	Phone, Tablet	Mobile App	VoiceOver
4	49	Low Vision	Email, Text Message	Phone, Tablet	Mobile App	VoiceOver
5	56	Low Vision	Text Message	Phone, Tablet, PC	Mobile App	TalkBack
6	63	Low Vision	Email	Phone, Tablet	Mobile App, Web-Based (Tablet)	VoiceOver
7	33	Low Vision	Email, Text Message	Phone	Mobile App	VoiceOver
8	62	Low Vision	Email	PC	Web-based	Magnification/Large Screen
9	48	Low Vision	Email	Phone, Tablet	Web-based	VoiceOver
10	21	Low Vision		Phone	Mobile App	VoiceOver
11	43	Low Vision	Audio Message	Tablet	Web-based	Zoom Feature
12	36	Low Vision	Email	Phone, PC	Web-based	ZoomText
13	26	Low Vision	Email	Phone, PC	Mobile App (Phone), Web-based (PC)	Magnification
14	40	Low Vision	Text Message	Phone, PC	Mobile App (Phone), Web-based (PC)	ZoomText, Magnification, TalkBack
15	35	Low Vision	Text Message	Phone	Mobile App	VoiceOver
16	55	Low Vision	Text Message	Phone, Tablet	Mobile App (Phone), Web-based (PC)	Magnification, VoiceOver

the participants to send text and voice messages. At the end of the collection period, individual phone interviews, which lasted for approximately 30 minutes, were scheduled with each participant to learn more about their social networking habits and their thoughts on the diary entry process. We recorded every interview with consent from the participants.

RESULTS

We asked participants to share their thoughts on the process of generating diary entries after every social media use and the level of difficulty involved. All participants indicated that creating and submitting the entries was not difficult, and there were minimal issues during the collection process. When asked about their preferred methods for creating entries, some participants used their phones to text their entries while others used a word processing application such as Microsoft Word or Google Docs. One participant used pen and paper to write their responses in a notebook and then wrote their notes in an email for submission, and one participant sent voice messages using their phone. We asked participants about any potential positives in creating diary entries of their social media. Seven participants indicated several positives for creating diary entries. They indicated that it helped them reflect on their social media usage, frequency, and the kinds of activities they do when using it:

“oh well, actually I think it was kind of positive because uhm it kind of let me know what I was actually using uh Facebook and Messenger for. I didn’t really think about it before” (P9)

One participant mentioned that it helped them realize how much they “enjoy keeping entries like a journal” (P16). Participant P13 admitted that need to write diary entries reduced their social media use. Participant P14 liked the plethora of different options for sending diary entries, stating that they preferred not to send emails.

Regarding drawbacks for creating diary entries, only three participants reported any potential issues. Participant P4 mentioned that it could be challenging to use the pen and paper method to create entries when having low vision. Participant P5 mentioned transcription accuracy issues with VoiceOver:

“Sometimes the uh voiceover feature picks up on outside noise or uh it uh does not uh correctly write what you’ve spoken because of perhaps, announcement issues, if you don’t announce certain words just right ... a person who’s uh visually impaired such as myself, that can be very frustrating at times.” (P5)

Participants P11 indicated the volume of questions they had to answer for the entry; they felt many of the questions did not apply to them and did not answer them. When asked about improvements to the diary entry process, participant P5 indicated the desire for improvements to speech-to-text software broadly.

DISCUSSION

We report on what we believe are lessons learned from the diary study process.

Load Balancing of Data Capture for Participants

When working with participants with visual disabilities, an important consideration is the burden of responsibility on the participants for capturing and providing data. In a diary study, the responsibility of collecting data falls entirely on the participants. We carefully considered how much cognitive effort it would place on the participants, on top of working through their visual impairment, to create diary entries for seven continuous days. Therefore, we took the responsibility of collecting screening and demographic information from the participants through a pre-study phone call. As a general practice with any research involving participants with a disability, carefully consider and evaluate the amount of work to be allotted to them and how it may affect the quality of the data returned.

Consistent and Flexible

When conducting a diary study with visually impaired participants, communication should be both consistent and flexible. Given that persons with visual disabilities use different devices and assistive technologies appropriate for their degree of vision loss, their preference for communication may vary. In our study, some participants preferred phone calls, others preferred text messaging, and some preferred the use of email. Having the flexibility for participants to contact the research team is

paramount to their comfort and assurance of being able to ask questions or provide feedback. For our study, we used Google Voice with a phone number to serve as the main contact number for participants to reach us. We also decided to have one person to serve as the liaison between the team and the participants to establish familiarity and consistency for the participants. From our experience, this level of consistency and flexibility made communication between the research team and the participants issue-free and accessible

Options for Diary Entry Creations and Submissions

A crucial factor in the successful execution of the study was the number of options provided to participants for creating and submitting diary entries. We enabled participants to submit entries as email messages, digital documents, voice messages, and text messages. Having multiple mediums for entry creation and submission is critical as visually impaired users have varying levels of vision loss, which may determine what technologies they may use to serve their intended purpose best.

Diary Entry Materials Format

Depending on the type of diary study and the information required from participants, researchers may provide a prompt for them to use to help guide what data they provide for their entries. In the case of our study, we provided participants a document with questions for them to answer for their entries. An important consideration was the format of the instructions and how to transmit them. During the initial pre-study phone call, we asked participants their preference of format and method of delivery. All but one participant preferred the instructions in a Microsoft Word file and to have them sent by email. A single participant (P4) preferred the instructions be sent by text message.

Findings from the post-study interviews revealed that participants were disinclined to answer many of the questions from the prompt. When asked why, participants replied that many of the questions did not apply to them, either due to the lack of fit to their social media usage behavior or lack of clarity, in such a case, we learned that we should better frame our instructions to be more direct and reduce ambiguity in its intent. Also, we note that a common risk in using a diary study methodology, because the data collection falls on the participants that they may not report all data out of concern of embarrassment or confidentiality (Baxter et al., 2015).

Submission Frequency

An area which could have been improved upon is the frequency of submissions. Since the number of entries correlates with the frequency of using an SNS, participants who do not use SNSs often may potentially forget to submit a diary entry. A few participants admitted during the post-study interviews that there would be more entries submitted if they had remembered to do them immediately afterward. It is a common aspect of diary studies in general, not just when working with participants with visual impairments.

CONCLUSION

The current paper provided an overview and reflections of a diary study conducted to investigate how persons who are blind or have low vision use SNSs. From the diary entries and post-study interviews, we learned about how they use social media, what assistive technologies they use to aid their use, and their opinions of the process for creating and submitting diary entries. Overall, participants found the process to be relatively straightforward thanks to the multitude of methods to create and send entries to us. Most participants believed the diary entry component was helpful in their self-awareness of their habitual use of SNSs. Aside from a few negative issues, most participants found the experience to be a positive one.

Lastly, we offered a few lessons learned from the experience and best practices for carrying out diary studies with participants with visual impairments. The current paper contributes towards guidelines for conducting user studies with people with disabilities from a practical perspective.

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