

Helping Autistic Young Adults Fight Privacy Violations: Designing a Gamified App

Jason Changxi Xing
Brigham Young University - Provo

Haley Page
Brigham Young University - Idaho

Kirsten Chapman
Brigham Young University - Provo

Xinru Page
Brigham Young University - Provo

Abstract

Autistic social media users experience more online privacy violations and resulting harms than the general population. Prior work suggests increasing digital literacy can help protect against such harms. We investigate the design of a self-paced mobile app that can be widely accessible to autistic social media users. In order to motivate users to actually learn these educational materials, we explore how to gamify the app. We conducted a participatory design session with 3 autistic adults to examine preferred gamification style and deployed a survey with 6 autistic adults to investigate the preferred user interface aesthetics, which is especially important to consider for this population. We found that participants preferred customizable games which do not cause cognitive overload. Aesthetically, participants preferred realistic and video game artistic styles.

1 Introduction and Background

Privacy harms are being experienced at a higher rate for autistic social media users than the general population [20, 26]. These harms can be attributed to a difference in how they interpret and use social media features of social media differently than the general population [20]. Such findings underscore the need for increasing their social media literacy.

For the general populations, one approach to privacy education that has proven effective is gamification [4, 7, 22]. Due to differences in learning styles, the gamification approaches ideal for neurotypical populations may not be the same as for autistic individuals.

Gamification is likely to facilitate social media safety education for autistic individuals as traditional methods may not meet their needs. First, their access to effective social services is limited, as these resources often have problems, such as insufficient expertise of the staff [15]. Secondly, autistic individuals commonly struggle with unemployment [6, 25], so they may not afford these services. Thirdly, as autistic adults have lower access to transportation [14], it is necessary to find ways to make privacy education accessible remotely. Moreover, autistic individuals may be less likely to be motivated by long-term self-determination (intrinsic motivation to improve oneself [3]) [11, 16] and make behavioral changes due to negative experiences [20, 26]. Therefore, gamification may be a beneficial way to provide short-term incentives to completing privacy education courses remotely. Stylistic attributes can also have a profound effect for autistic individuals. For instance, autistic individuals may find intense, overly bright colors overwhelming [17]. Insuring that our artistic style doesn't overwhelm our participants is important. As such, our research questions are: (1) How can we gamify a privacy education app in a way that appeals to autistic adults? (2) What would the ideal artistic style of this app be?

In order to answer these questions we conducted a participatory design session (N=3) and a survey (N=6) with autistic adults. Then, we qualitatively analyzed the results. Finally, we conclude with a discussion of how our results with autistic individuals align or differ from prior work which is mostly focused on a general audience.

2 Methods

During preliminary study, we ran a 16 week classroom privacy education intervention where autistic young adults in a residential program with level 2 support needs (n=7) were taught how to take more privacy preserving measures on social media. In each class, students were given a non-gamified assessment before and after learning the materials. At the end of class, students would then answer similar questions on the gamified platform Kahoot [8]. We found that students

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scored higher on gamified questions than non-gamified questions of similar content. In the last few classes, students were receiving 100% correct answers on the Kahoot. These findings further support the benefits of gamification in the context of privacy education for autistic adults, so we proceeded to evaluate gamification approaches during the class periods.

We ran a participatory design session (n=3, 3 female) to examine preferred gameplay and deployed a survey (n=6, 1 male, 5 female) to gauge preferred game aesthetics. Participants were all autistic young adults in a residential program with level 2 support needs (requires substantial support), age 18-22, without intellectual disabilities. All research was approved by the last author's Institutional Review Board as well as the review board of the residential facility where the study took place. These were administered during 50-minute class periods that were part of a series of social media safety classes. Participants were compensated with \$10 Amazon gift cards for each session.

Participatory design (RQ1) The participatory design session was composed of two activities: (1) having participants rate existing types of gameplay and (2) having participants brainstorm gameplay that would interest them. First, we described and showed several mobile games that represent 4 popular game genres. These genres were determined by reviewing the top 100 most popular games on the App Store and Google Play as well as including apps from prior work on autism and gamification [10]. World games involve building a world with the rewards such as points or currencies earned in the game [10]. Task games involve earning real money or treats from completing tasks such as chores [1, 18]. Learning games involve completing lessons or modules and earning points to unlock new tasks and badges [5, 9]. Decorating games involve earning currencies or points to spend on decorations for houses or pets [19, 21]. Participants were then asked to write down what they liked and disliked about each game, briefly discuss their opinions with each other, and vote individually on their top 3 favorite games. During the second part of the session, participants were asked to ideate and sketch their ideal gameplay of a gamified social-media-safety-education app. Participants then explained their ideas to us. Researchers performed a reflexive thematic analysis on the results and identified emerging themes across participants.

Survey (RQ2) The survey contained 34 multiple-choice questions. Participants were shown images of game backgrounds and characters in 4 different styles: cute, realistic, video game (pixelated), and abstract. We chose these four art styles due to their popularity. From a search of literature and top mobile games in app stores, we found that the two most popular game styles are realistic and artistic. There is little variation in terms of realistic style games, but there are many variations of more artistic styles. We found that the most popular artistic style games are cute, video game (pixelated), and abstract [23, 24]. Images used in this survey were generated through Dall-E.

Participants were asked to choose their favorite style and if they liked or disliked each individual background and character. Second and third author analyzed responses by comparing the number of participants who chose each style as their favorites and examining the like to dislike ratios and counts of each character and background.

3 Results and Discussion

Results The three types of gameplay that received the most "like" votes were interior design, virtual pet and badge collection¹. Interior design had the most comments that suggested it would be effective for gamification¹ and only 1 negative comment, "need a better reward system"². The ability of controlling an animal simulation in the virtual pet type of games was also liked by 2 participants¹, but two of them considered certain elements of the game "creepy"². Badge collection was "rewarding", "helpful" and "productive"¹, but its text heavy and educational content were disliked by two participants for being "time consuming" and "boring"². During discussion, participants repeatedly emphasized their frustration towards any discouraging or difficult gameplay. In the survey study, when asked about their favorite background style overall, 4 out of 6 participants chose the Video Game Style². Yet, when asked about if they like each background individually, both Realistic and Video Game backgrounds were favored². In terms of characters, we found significantly more variation in what each person liked.¹

Discussion Our participants' aversion to difficult and time-consuming gameplay aligns with Lee et al.'s recommendation of gameplay that does not cause cognitive overload for this population [12]. Participants preferred apps with vivid visual designs and disliked apps that they found boring. Similarly, prior work has found that autistic individuals prefer vibrant visual interface [10, 12, 13]. In the future, researchers should keep the game less difficult and more visually attractive.

However, our findings conflict with Lee et al.'s conclusion that open-world gameplay is not suitable for autistic individuals [12]. During game rating of the participatory design, two participants expressed interests in open-world and customizable gameplay¹ and mentioned that they played animal crossing, an open-world game. During ideation, another participant sketched a game of "progressing through an open world and earn points". A common rationale for such preference of autistic people is their needs for freedom of choice [2]. Moreover, one participant did not like the competition in Learning Games², one of which uses a leaderboard. This finding contradicts with prior designs for general population that encourage competition with leaderboards [7, 22].

Gamified education has been proven successful in improving privacy behaviors such as password skills [4]. We found that participants preferred less complicated but customizable gameplay, which has been validated by the efficacy testing of prior work in the realm of gamified privacy education [4].

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A Appendix - Participatory Design and Survey Materials

	Participant 1	Participant 2	Participant 3
Game 1	Customized World	Open World	Progression
Game 2	Great reward system	Obtain money	Saving money
Game 3	Good way to earn money	Obtain items and treats from points	Getting food and money
Game 4	I am a visual learner so I like apps that use pictures	Earn points and badges (Heard of this before)	Improves my skills and brain
Game 5	it is rewarding to earn badges	Earning badges, a potential learning app	Helpful and productive
Game 6	I like controlling the sims	Creativity, earn money	There is a cat
Game 7	Those games are addictive	Creativity, interior design	Everything

Table 1: The answers of the 3 participants to what they liked about each of the 7 games during participatory design (voted apps are marked red)

	Participant 1	Participant 2	Participant 3
Game 1		Time consuming	Looks very boring
Game 2			I am not actually saving real money because I am not actually playing
Game 3		Time consuming	Not actually getting food and money
Game 4		Time consuming and competition	Looks very boring
Game 5		Time consuming and competition	Too many words, So much to learn, Too long, Seems boring
Game 6	Some of the games are too creepy for me to handle	Creepy (microphone needs to be off)	Looks very pointless
Game 7		No money for self	Like all of it!!!

Table 2: The answers of the 3 participants to what they didn't like about each of the 7 games during participatory design (voted apps are marked red)



Figure 1: Examples of the 4 character styles that we ask the participants to select from in the survey

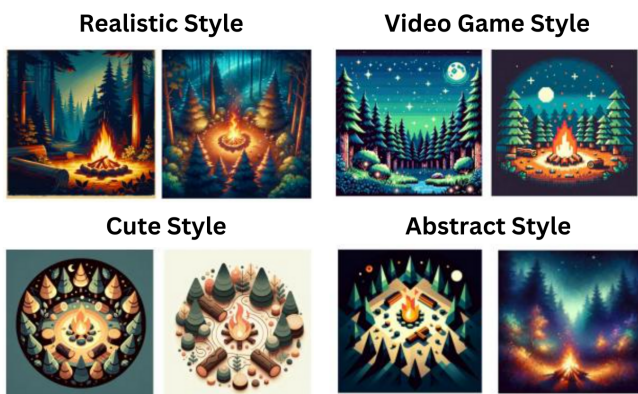


Figure 2: Examples of the 4 background styles that we ask the participants to select from in the survey