A Case Study on User Experience Bootcamps with Teens to Co-Design Real-Time Online Safety Interventions

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We conducted User Experience (UX) Bootcamps with teens (ages 13-17) to teach them important UX design skills and industry standard tools. In the process, we asked teens to storyboard about their risky or uncomfortable experiences and design high-fidelity prototypes for online safety interventions that would help mitigate these negative experiences. In this case study, we present our methodology, feedback from teens, challenges, and lessons learned in conducting our UX Bootcamps for adolescent online safety. We recommend that future researchers who want to conduct similar research with teens to encourage group activities, balance teen autonomy with researcher assistance, and ensure teens' privacy and well-being. Finally, we provide useful guidelines for conducting virtual training and research studies with teens.

CCS CONCEPTS •**Human-centered computing~Human computer interaction (HCI)~HCI design and evaluation methods~User studies**

Additional Keywords and Phrases: Adolescent online safety, Co-design, User experience, Nudges

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1 INTRODUCTION

We aimed to co-design interventions or "nudges" [21] with adolescents (ages 13 -17) that can help provide guidance to teens on how to effectively manage their online safety. From connecting with friends and family on social media, to instant learning and entertainment, teens are almost always online [2]. This constant connectivity is beneficial to teens in many ways. Yet, many teens are vulnerable to risks online, such as online harassment, sexual solicitations, privacy breaches and exposure to explicit content [23], and often lack the guidance for resolving risky situations online [23]. The prevalence of these risks is acknowledged by social media platforms, that are increasing their efforts towards youth

online safety and wellbeing [24]. Consequently, adolescent online safety has been an important topic within the SIGCHI community and several research efforts have been devoted to understanding teens' online risk exposure and promoting their online safety [13–15].

While early adolescent online safety research primarily focused on designing parental controls [9] or mediative technology for preventing online risks [22], recent work suggests that teens want social media platforms to provide 'just-in-time' support and education when (not if) they encounter risky situations online [1]. Such just-in-time interventions, or "nudges", have been applied by researchers in various disciplines to support positive experiences and behaviors, e.g., health and lifestyle choices [20], reducing addictions [17], and environmental conservation [6]. In the context of technology and social media, nudges have been used to improve privacy and safety decisions for personal information disclosures [12], app and software installations [5], password strength [19], etc. Building upon prior work, nudges for adolescent online safety may prove to be an effective way to protect teens from risks online.

Yet, it is challenging to design effective nudges that directly cater to teens' online safety needs, without being overly paternalistic and restricting their online freedoms. One novel approach for overcoming this challenge is to involve youth in online safety research, such as leveraging co-design with teens [16]. Recent co-design research with youth has been successful in including teen voices and their unique perspectives to design preventions for online risks such as cyberbullying [3] and online sexual solicitations [18]. These studies exemplify the importance of involving teens in co-designing online safety solutions. However, a limitation of co-design research is that teens often lack the skills and training to act as equal partners in the design process [8]. Additionally, Badillo et al. found that co-design research with teens needs to be mutually beneficial; teens require motivation and incentives for their participation in research [4]. To address these points, we designed and conducted UX Bootcamps for teens to teach them important UX design skills and industry standard tools, so that they could create storyboards and high-fidelity, interactive prototypes for 'just-in-time' online safety interventions. In return, we asked teens to share and design for their personal experiences when using social media, especially those that made them feel uncomfortable or unsafe online. This novel "research apprentice" approach to research provided teens with the skills to be effective co-designers, incentivized participation in research, and resulted in youth-centered online safety designs.

In this case study, we present how we designed the UX Bootcamps and how they unfolded. Then, we make recommendations based on teens' feedback and provide reflections and lessons learned based on our own experience to inform future research employing similar co-design methods with teens.

2 UX BOOTCAMPS STUDY DESIGN

2.1 Study Overview

Our goal was to fully encapsulate teens' individual ideas along with collective views on effective ways to deal with unsafe online interactions. To do this, we conducted eight UX Bootcamps virtually via Zoom with 19 teens from the United States to provide interactive UX trainings and co-design real-time interventions with teens. The Bootcamp consisted of UX trainings and research activities conducted over a span of two days, with the end goal of designing prototypes for online safety nudges. The trainings covered several topics including adolescent online safety, UX design, storyboarding, and prototyping. Using the information and skills learned in the trainings, teens were guided to participate in three research activities: a) creating storyboards for risky online interactions, b) whiteboarding ideas for online safety solutions, and c) developing prototypes for real-time online safety interventions or nudges. Due to COVID-19, this study was conducted virtually via Zoom, using additional online tools; Canva, FigJam, and Figma for each of the

activities, respectively. Each activity was a combination of individual work, co-designing with researchers, and group discussions. Before the start of each Bootcamp, teens completed a preparation worksheet which provided guidelines to setup online tools and thought exercises about online safety to prepare them for the Bootcamp training. At the conclusion of each Bootcamp, teens were asked to complete an exit survey to provide feedback for the Bootcamp.

We conducted eight Bootcamps with N=19 teens, with two or more teens in each Bootcamp. We recruited teens by distributing flyers and Bootcamp information to schools and STEM organizations via emails, phone calls, and social media. Teens received certificates of completion for participating in the Bootcamp. In the sections below, we summarize the training and research activities for the Bootcamp. The activities for each Bootcamp were conducted over two days (on the weekend or after-school), with each session lasting 3.5 hours per day.

2.2 Training Activities

As part of the Bootcamp training, we introduced teens to the topics of online safety and user experience, and provided UX training for storyboarding and low/hi-fidelity prototyping. We summarize each of the training activities below.

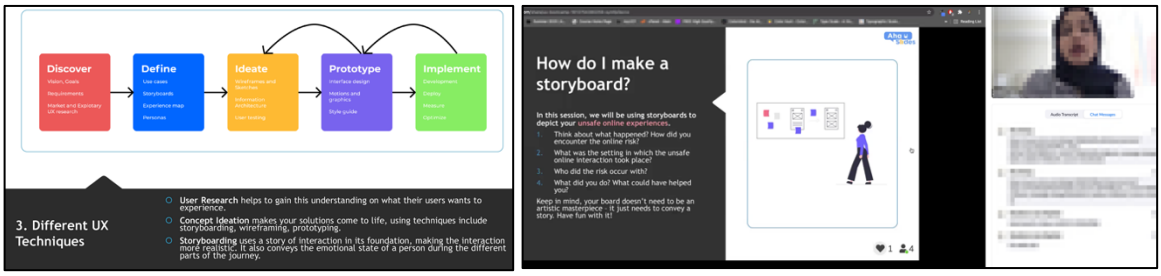

Figure 1: a) Introduction to UX, b) Storyboarding Training

2.2.1 Adolescent Online Safety and Risks

We began with introductions, followed by guidelines for the session informing teens to be respectful, protect the privacy and anonymity of other teens in session, and to have their audio/video turned on throughout the session. Next, we had an icebreaking activity, in which we asked teens to share the last movie or TV show they watched by adding their responses to interactive Aha slides [25], leading to a group discussion on shared interests and entertainment. We began the trainings with an introduction to adolescent online safety. We presented teens with recent news headlines regarding teens' online safety concerns, introduced them to relevant ongoing adolescent online safety research efforts addressing these concerns, and discussed methods that involve youth in research (e.g., participatory design). With this context in adolescent online safety, we asked teens a warm-up question about what they considered to be a risky or uncomfortable interaction online. Teens and researchers contributed to the discussion using the round robin method, and the researchers concluded the discussion by summarizing the group's ideas on online risks. For this part of the Bootcamp, we also provided the option for teens to enter their responses anonymously through interactive Aha slides [25]. We ended this section of the training by defining goals of the Bootcamp, which included, a) learning about UX methods, skills, and tools, and b) applying these skills to co-design safety features for risky or uncomfortable online interactions.

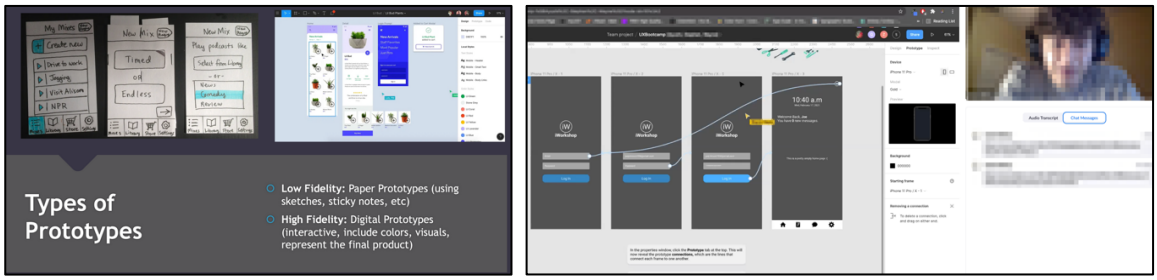

Figure 2: a) Introduction to Low/Hi-fidelity Prototyping, b) Figma Training

2.2.2 User Experience (UX) and Storyboarding

We started the UX training with a warm-up activity, in which we asked teens to compare two user interfaces for the login page of an app, select their favorite interface design, and provide reasoning for their choice. This start-up exercise helped teens to switch focus and start thinking from a design perspective. Next, we introduced teens to user experience concepts (Figure 1a), such as the definition and importance of user experience [10], the five stages in the design thinking process [7], and concept ideation techniques (such as storyboarding, wireframing, prototyping) [26]. During this section, we asked teens about unpleasant user experiences and had a group discussion on the importance of good design.

Building upon the introductory material, we narrowed the focus of the training to storyboarding. We familiarized teens with the process of creating storyboards and provided guidelines for creating a storyboard to depict a risky online experience (Figure 1b). Next, we demonstrated the tools and features provided by Canva [27], which is the online tool we used for the storyboarding research activity.

2.2.3 Low and Hi-Fidelity Prototyping

Our prototyping training started with introduction to low and hi-fidelity prototyping. We demonstrated the purpose of low fidelity prototypes and examples on how to effectively create them using a virtual whiteboard (Figure 2a). As part of this training, we provided instructions to use FigJam [28] to create their whiteboards to elaborate on their initial storyboard ideas. The low fidelity prototyping activity (described in section 2.2.2) served as a brainstorming and preparatory exercise for their final prototypes.

For the final prototyping training, we designed an interactive workshop embedded within Figma, which was the primary application used for this section. Figma [29] is a web-based prototyping tool widely used in the industry to design and brainstorm product ideas. The workshop was divided up into four sections, which we referred to as chapters or practices for learning purposes. Each chapter covered a different learning principle in Figma and was followed by a practice activity (Figure 2b). Each teen would pair up one of the researchers and follow along to learn about Figma. The four chapters covered information about Figma features and tools, creating user-friendly designs and pages, and connecting prototypes. The practice activities provided them with the opportunity to apply the tools learned and primed them for the final activity by practicing interface design. We also provided pre-made resources to teens such as chat bubbles, buttons, icons, etc., that they could reuse. By the end of this training, teens were familiar with Figma and prototyping, and demonstrated their abilities by simulating a conversation through the prototype.

2.3 Research Activities

Each of the training activities was accompanied with a research task involving co-design activities with teens for informing and designing interventions for online safety. In this section, we will summarize the design activities.

2.3.1 Designing Storyboards for Unsafe Online Interactions

After the training for UX and storyboarding, teens were asked to create their own storyboards based on a risky online interaction scenario. The scenario could be their personal experience, anonymized experience of friends, or a hypothetical scenario of a common online risk. Teens were provided with a storyboard template along with instructions for recreate the scene, visualize responses and reactions towards the risk, and demonstrate possible solutions. At the same time, teens were encouraged to be creative, use illustrations, and edit the template based on their scenario (Figure 3a). Throughout the process, teens were asked follow-up questions by researchers to understand their scenario and proposed solutions. Researchers worked with the teens to discuss ideas, resolve technical issues, and helped design the storyboard if needed. Teens had about 45 minutes to complete their storyboards. After they finished, each teen was asked to present their storyboard to the group. Other teens and researchers provided feedback and comments.

2.3.2 Whiteboarding Ideas in a Low Fidelity Prototype

Building upon the storyboards, teens were asked to use the low fidelity prototyping method to brainstorm details of their proposed online safety solution for dealing with the risky scenario described in the storyboard (Figure 3b). Teens were provided with phone screen templates, resources and examples to assist with the whiteboarding activity. Researchers asked probing questions to help teens brainstorm their ideas for online safety features, and helped teens organize and structure the different elements and flow of their safety design. Teens had about 60 minutes for the whiteboarding activity. After they finished, each teen was asked to present their whiteboard ideas to the group which helped identify the limitations of their ideas, and get suggestions for improvement.

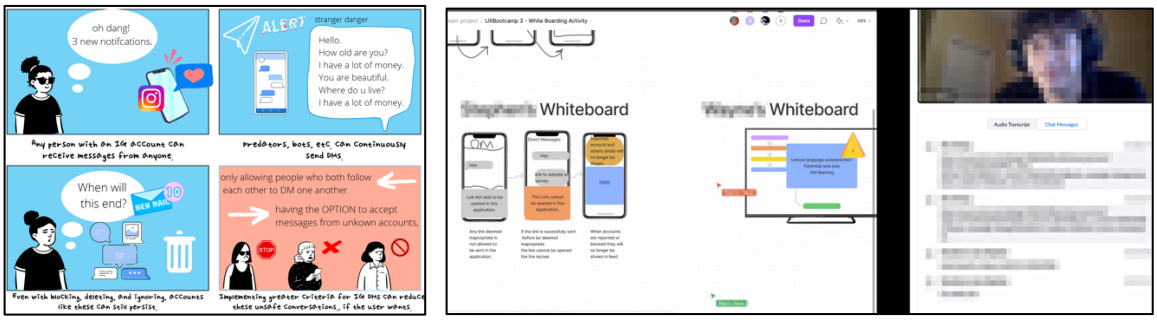

Figure 3: a) Teen's storyboard design of an unsafe online interaction, b) Teens' low-fidelity prototypes for online safety nudges

2.3.3 High Fidelity Prototyping for Adolescent Online Safety Nudges

The final activity was the high-fidelity prototyping for online safety nudges specific to their risky scenario presented in the storyboard (Figure 4) shows a teen creating their online safety nudge in Figma). This final project was done in breakout rooms where each teen was paired with a researcher for assistance. Teens had approximately 1 hour and 30 minutes to complete their final activity. Throughout the design process, researchers helped teens brainstorm ideas, implement prototype components and co-design complex objects. Once the individual prototypes for online safety were completed, the group reconvened in the main room in Zoom. Figure 4 shows two teens' prototype designs in Figma.

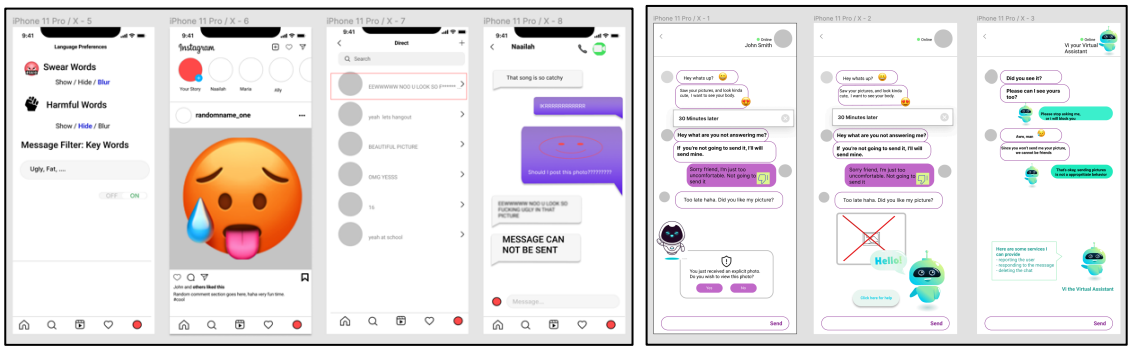

Figure 4: Teens' final prototyping activity to design online safety nudges

Finally, teens presented their prototypes in an interactive demo. During presentations, they shared their screen and walked the researchers and other teens through their prototype. While presenting, teens were prompted to explain their unsafe online interaction, their prototyped solution to that online risk, and how it would impact adolescent online safety. After each teen walked through their prototype, researchers opened the floor to the group for asking questions or sharing comments regarding that prototype. We ended the Bootcamp by summarizing the nudge designs presented and appreciating teens for their contribution to online safety.

3 LESSONS LEARNED

In this section, we summarize the challenges faced in conducting the Bootcamps, ways to overcome these challenges, and recommendations for future researchers employing similar research methods.

3.1 Setting Teens Up for Success

In our initial Bootcamps, teens seemed unprepared for the design activities and group discussions. Firstly, teens needed time to think about and contribute to activities and group discussions related to risky online interactions. They often required thinking time to present the most important risk experiences that they could comfortably design for. Secondly, teens needed time for onboarding onto and transitioning between the different tools for the UX activities. While using these tools, some teens were more technologically advanced, whereas others had a steeper learning curve and needed more assistance. This individual assistance was even more important for a few teens who only joined the bootcamp on Day 2 and needed to catch up on all Day 1 activities.

To overcome these challenges, we designed a Bootcamp preparation worksheet after the first few Bootcamps to ensure that teens are prepared and onboarded early in the process. This preparation sheet included a checklist of tasks to complete before the Bootcamp, along with instructions for signing up and onboarding on the different tools. Moreover, it included thought exercises to help teens have some initial ideas on research activities and discussions regarding risky online interactions. This Bootcamp preparation worksheet also helped overcome their different technical abilities to some extent, by familiarizing everyone with the tools beforehand. Further, researchers provided flexibility with timings and individual assistance to teens in breakout rooms as needed (e.g., those who joined late). Additionally, to make the context switching between the different activities and tools easier, we added warm-up tasks at the start of each new activity. For example, we added a short interactive game to compare two different interface designs before starting the UX trainings, which prepared teens to start thinking from a user-centered lens for the upcoming UX activities. Based on

our learnings, we recommend researchers employing educational research methods with teens to consider pre-Bootcamp activities, or preparation material that can help teens be successful. Lastly, it is essential to acknowledge teens' different backgrounds, ages, and abilities, and overcome differences by providing resources to help them be on an equal footing.

3.2 Ensuring Teen Autonomy, Privacy, and Well-being

Based on recommendations from previous research [11], our goal was to balance teen autonomy with researcher assistance in the co-design process. However, striking this balance was a learning process for the researchers. Based on our experience, teens need silent working time at the start of each activity to formulate their ideas and make progress with their designs independently. At the same time, teens should be reminded that researchers are present to help, and each teen should have a "go-to" researcher for assistance. Once teens have their initial ideas demonstrated, researchers should intervene and ask probing questions to understand their designs. Researchers should act as thoughtful partners, offering suggestions as questions or choices, leaving the final authority with the teens. Using this process, teens were able to own their solutions, along with iterating upon their work through the teen-researcher partnership.

Moreover, teens, as minors, are a vulnerable population requiring special considerations when involving them in research related to online risks. The need for such considerations became more evident in the bootcamp as teens were in a group setting, which resulted in privacy concerns about sharing personal experiences. Therefore, we identified ways to protect teens' privacy and ensure their well-being when discussing unsafe online interactions in a group setting. At the start of the session, we included explicit guidelines to protect the privacy and anonymity of all other teens in the Bootcamp. We also provided the option for teens to respond anonymously through interactive slides in some parts of the Bootcamp which involved discussion unsafe online interactions. Teens were also reminded about using the Zoom chat feature to privately respond to researchers if they felt uncomfortable sharing their experiences in a group. Moreover, when depicting risky scenarios through storyboarding, teens were given the option to present a hypothetical, but realistic scenario, if they were not comfortable sharing their own experience. We also set up breakout rooms during parts of the design activities and observed some teens to be more open with researchers in one-on-one interactions as opposed to group discussions. Although most teens were able to contribute openly throughout the Bootcamp, we recommend these measures as they ensured autonomy, privacy, and comfort for teens.

3.3 Overcoming the Challenges of Remote Research

Due to COVID-19, this Bootcamp was conducted virtually which came with several challenges. From poor internet connectivity and audio/video issues, to access and editing problems with the online design tools, teens often had technical issues during the Bootcamp. Initially, the research team improvised solutions to resolve these technical issues. Soon, we realized the need for a more systematic way to deal with the recurring technical issues and developed a troubleshooting guide. This troubleshooting guide was an internal resource for the team and specified steps to take for logistical problems, as well as the assigned team members for each task. Though a small effort, this troubleshooting guide streamlined the process and helped resolve issues much faster.

In addition to technical challenges, the virtual environment also brought up difficulties in engaging and building rapport with teens. Some teens joined the bootcamp from their car while traveling, without the equipment to take part in activities. A few others joined from public spaces or crowded rooms with family members, where they had difficulties turning their audio and/or video on. At times, this resulted in no responses from teens when researchers asked a question. Their struggle with engagement may also be due to fear of being heard or judged when talking about their personal online experiences in front of other people. Although we could not overcome this challenge entirely, we

encouraged teens to join from a quiet space to be able to comfortably interact during the session. Further, we discussed shared interests and hobbies with teens to increase their comfort level and observed that this helped them became more communicative with time. We encourage future researchers to find common ground with their participants and build relationships, which can help overcome hesitation in speaking up.

Lastly, we faced challenges with recruiting participants in a remote setting. Our initial efforts primarily included distributing flyers and Bootcamp information to schools and STEM organizations via emails and phone calls. Although recruited some teens through this method, we noticed that a significant number of teens learned about our Bootcamp from friends and family. Therefore, we revised our recruitment material to have more teen-centric language and transitioned to promote the bootcamp on Slack and Discord channels which helped attract more teens. Moreover, we focused on clearly communicating the value provided by the Bootcamp trainings and the incentive of getting UX certificates. Though we did not provide monetary compensation, we learned that using the right channels to reach out to teens, and highlighting the benefits of participation, intrinsically motivates teens to take part in such research efforts.

4 BOOTCAMP FEEDBACK FROM TEENS

4.1 Feedback Survey Overview

Thirteen teens completed the feedback survey. They were asked a combination of Likert scale and open-ended questions about the logistics, tools, training materials, and activities of the Bootcamp. Teens were also asked general suggestions for improvement, and specific feedback for tools and activities, along with demographic information. Although teens provided mostly positive feedback and had a general sense of satisfaction with the Bootcamp, they made some important recommendations for improvement, which we highlight below.

4.2 Focusing on Hands-On Training, Familiar Tools, and Individual Help

Most teens (N=10) found all the UX tools to be somewhat easy or very easy to use and confirmed their ability to easily express their ideas and designs using Canva, FigJam and Figma. Teens valued the fundamental importance of the UX skills taught as preliminary steps in the design process. Most teens (N=9) felt that the information provided was relevant and essential to the follow-up research activities, with prototyping on Figma being the most beneficial skill (N=6).

"I found that going through the whole progress from storyboarding to whiteboarding to prototyping was very important, and I would have definitely availed different results if I had not gone through this process." – P4 (15-year-old, Female)

However, some teens (N=4) considered the general knowledge on user experience to be slightly helpful, but not necessary information for the Bootcamp. These teens seemed to value specific knowledge on the tools and hands-on UX activities more than the general background provided on each topic (e.g., introduction to UX). Additionally, a few teens (N=3) expressed difficulties with using FigJam and Figma and suggested more individual help for these tools. The contrasting opinions may be due to teens' different ages, technical abilities, and their varying needs for guidance. In a few bootcamps, we had one younger teen (13-year-old) participate with multiple older teens, which may explain this gap where the older teens did not require additional help or information. Future researchers can group teens based on their age or organize separate sessions for younger teens that can cater to their differing needs.

4.3 Improving Time Management and Teen Engagement in a Virtual Format

Most teens found the registration and consent process of the virtual Bootcamp to be easy (N=12) and did not report facing any issues. When asked about the virtual format of the Bootcamp, majority of the teens (N=8) felt satisfied with the remote setup and tools, with no desire for the Bootcamp to be in person. While most of the teens (N=9) were satisfied with the virtual format and reported the pace of the Bootcamp to be appropriate (i.e., not too fast or slow), some teens suggested improved time management.

A few teens thought the Bootcamp was somewhat fast paced (N=3), with some teens (N=2) suggesting longer breaks in between activities that can help them unwind and avoid Zoom fatigue. Others (N=3) provided specific recommendations for increasing time for prototype development and learning Figma. Overall, teens wanted researchers to manage time in a way that they can maximize learning and overcome challenges with advanced tools (e.g., Figma), without being exhausted in the process. This recommendation mainly came from participants (N=2) who had lost time during the bootcamp due to technical issues or joining late, indicating that researchers should plan extra time and assign individual help for participants to catch up, if needed.

Additionally, most teens were satisfied with their engagement with the researchers in a virtual format (N=12). However, some teens (N=3) felt a bit disconnected with other teens participating in the Bootcamp.

"I think that students participating in the Bootcamp should work together a lot more" – P3 (16-year-old, Male)

They expressed a desire for more interaction and group-based activities with the other teens to build connections and to better discuss ideas and solutions with the other teens. Although the bootcamp provided several opportunities for group discussions and engagement amongst teens (e.g., brainstorming, Q/As, presentations) during each activity, teens felt disconnected due to their individual design artifacts. Therefore, future bootcamps should consider moving beyond group discussions to activities that allow teens to work together on the design.

4.4 Advice and Impact on Personal Online Safety

All teens (N=13) felt that the Bootcamp achieved the goal of providing UX skills and trainings along with designing features for adolescent online safety. In addition, their feedback suggested that the Bootcamp helped them think critically and understand real-life issues that teens face online. Along with understanding the importance of online safety, teens realized the importance of youth-centered design and the enormous impact that their ideas could have.

"Based on the features that i saw from my peers… simple changes to very large apps that would have a large impact on online safety. It showcased how when given the skills youth can create solutions." - P4 (15-year-old, Female)

At the same time, a few teens (N=2) expected the Bootcamp to directly impact their personal online safety and were disappointed when it did not. They suggested a form of general education with the presence of a subject-matter expert or presentation of actionable steps for online safety.

"I feel that little was done to help me protect my online safety in the world" -P7 (14-year-old, Male)

This suggestion further highlighted the need to provide online safety education and benefits to teens as part of the research. Along with that, setting clearer expectations may help teens better understand what the research offers.

Despite the overall emphasis on the importance of online safety and the impact of the designed solutions in the bootcamp, teens needed more clarity on how their designs may be implemented or used in the future. Therefore, conducting long-term participatory design programs or follow-up co-design sessions for testing their implemented ideas may help teens better assess the impact of their designs.

Overall, based on our findings, we provide the following guidelines for conducting co-design bootcamps and/or remote research with teens:

- **Overcome Differences:** Provide preparation material (e.g., worksheet or checklist) that can help all teens be familiar with the co-design tools and help overcome differences in their technical abilities. Arrange separate sessions or groups for younger teens (13–14-year-olds) who may need more time and guidance.
- **Prepare for Trouble:** Anticipate all possible technical and logistical issues. Then, create a troubleshooting guide that provides actionable steps for researchers to resolve each of those problems quickly.
- **Build Rapport:** Invest time and effort in finding common ground and shared interests with teens. Teens will share more openly about their experiences, ideas, and concerns once they develop a connection with the researcher.
- **Support Privacy:** Provide options for teens to participate in the activities and group discussions about unsafe online interactions without revealing private information (e.g., anonymous responses, privately messaging researchers, sharing hypothetical risky scenarios).
- **Ensure Autonomy:** Allow silent working time at the start of each activity for teens to independently formulate their ideas and designs. At the same time, ensure researcher presence, support, and contribution during co-design.
- **Promote Well-being:** Provide multiple or longer breaks for teens to accommodate personal needs, get breaks from screen time, and avoid burnout. During the activities, check in with teens often to ensure they are not under pressure and provide flexibility with time based on their needs.
- **Communicate Impact:** Clarify the end-goal and associated impact of the co-design research for teens to understand their contribution.
- **Encourage Group Work:** Design research activities that combine individual and group tasks, that allow teens to work together and build relationships with other teens.

5 CONCLUSION

Although we faced challenges in conducting these Bootcamps, our work presents a novel research method, combining educational trainings with the co-design of online safety interventions with teens in a way that is beneficial to them. We believe that the feedback from teens, combined with the researchers' recommendations provide valuable lessons for future research using this method. Finally, our end goal is to leverage the online safety designs from this Bootcamp to implement and evaluate effective adolescent online safety interventions.

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