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Co-Designing "Teenovate": An Intergenerational Online Safety Design Team

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CO-DESIGNING "TEENOVATE": AN INTERGENERATIONAL ONLINE

SAFETY DESIGN TEAM

by

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ABSTRACT

The Socio-Technical Interaction Research (STIR) Lab at UCF intends to create a new participatory design program, called "Teenovate," where teenagers and adults work together to design technologies that keep teens safe online. Previous participatory design projects, however, commonly focus on younger children under the age of 13. Teens differ significantly from young children in how they develop, socialize, and perceive the world. To inform the design of Teenovate, so that their unique needs are appropriately met, we conducted a participatory design study with 21 teens using polls, open-ended response questions, and subsequent group discussions. The teens were intrigued by the idea of participating in the Teenovate program as designers, with some expressing a desire to expand to co-researching. However, their established external obligations often took priority over their internal desires to participate in the program. Teens were also wary of working with and contributing ideas to adults, and wanted to ensure that their contributions were respected, listened to, and used to make an impact in online safety solutions. Based on these findings, we propose an approach to adolescent online safety participatory design research through Teenovate that places teens into the role of an end-to-end solution developer on dynamic project-based teams that result in a real-world impact. Our findings helped create a framework for the logistics of involving teens onto an adolescent co-design team.

AKNOWLEDGMENTS

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CHAPTER 1: INTRODUCTION

According to Pew Research [1], 95% of teens in the United States either own or have access to a smartphone, and 89% of teens use the internet to engage in online activities, including engaging with social media, at least several times a day. However, there is no general consensus among teens as to whether or not using social media has had a positive or negative impact on their lives. Approximately 45% of teens feel neither a positive nor negative effect from social media use and 24% feel negatively impacted; those who felt negatively impacted primarily reported causes like bullying, drama, peer pressure, and addiction [1]. Other research has similarly found that while they are online, teens may be exposed to risks that include but are not limited to: cyberbullying [2], [3], sexual solicitations [4], [5], and technology addiction [6]. Thus, a consensus in the literature is that there is a critical need for more socio-technical solutions that promote the online safety of adolescents.

Real-world technological solutions that attempt to protect teens from online risks do exist, but prior research has shown that they do not cater to teens developmental needs for autonomy and self-managing of risks [7]. Research has shown that by not catering to teens developmental needs, and instead being primarily focused on parental control [8], these applications are ineffective at best and harmful at their worst [7]. Furthermore, teens are rarely directly involved in the design and development of technologies meant for their online safety [8]. As such, several studies [7]–[9] advocate for teenagers to be better represented as stakeholders in the design of these online safety solutions. To address this call to action, the Socio-Technical Interaction Research (STIR) Lab is in the early stages of creating an intergenerational co-design team called "Teenovate."

Participatory design, or co-design, involves working directly with the end users of a system in any stage of the development process to meet their needs [10]. There are strong examples, such as University of Maryland and University of Washington's "KidsTeams" [11], of successful long-term partnerships between children and researchers in the participatory design of technologies for youth. Traditionally, however, young children (ages 7-11) rather than teenagers (ages 13-17), are involved in these participatory design research groups. In contrast, Teenovate intends to form a long-term partnership between teenagers, researchers, and other stakeholders to co-design online safety technologies. By doing this, our goal is to make teens primary stakeholders of teen-centric online safety solutions that are relevant and hold real-world application.

As a first step, this thesis leveraged inspiration from participatory design methods to directly involve adolescents (ages 13-17) in the planning and design of Teenovate to gain their insights and recommendations for the program. The purpose of this study was to understand how a teenager would want Teenovate to be created in such a way that best addresses their needs and interest as they relate to online safety and designing solutions. Furthermore, this research helped us understand how to best facilitate an environment that bridges the generational communication gap between teen and adult designers and enables teens to make a long-term commitment to the program. Through this research, we intended to examine the following research questions:

RQ1: *What are the logistical decisions teens prefer when creating a sustainable co-design program? And why?*

RQ2: *Why would teens be motivated to engage in a program for co-designing adolescent online safety technologies?*

RQ3: *What are the major challenges that create an entry barrier for teens to participate in this program?*

To answer these research questions, we recruited 21 teens (ages 13-17) to run an interview study inspired by participatory design study to determine how to best establish Teenovate within the University of Central Florida (UCF) and Orlando community. The participants were tasked with working with our team of researchers to respond to a series logistical questions about the structure of Teenovate. The group discussions that followed each question would then dig deeper into the teens' needs for the program, what Teenovate could provide to motivate them to join, and reasons why Teenovate would find it challenging to recruit teens to participate.

Our results determined that the participants had a strong desire to participate in the Teenovate program as co-designers and co-researchers backed by their intrinsic motivations to solve real problems that help society alongside material benefits and resume building experience. However, Teenovate would face a number of challenges before earning the commitment of teens, including competition with established external obligations that they felt required to prioritize over their internal desires to participate in the program. The teens' previous experiences with adults regarding online safety have also made them wary of collaborating with adults. They were optimistic a positive relationship could be built, if we ensured their contributions were respected, listened to, and utilized to make an impact in real-world online safety solutions. Through our analysis, we were able to create best practices for intergenerational co-design methods with adolescents and make the following unique contributions to research on adolescent online safety and participatory design:

- Insight into teenagers' perspective of online risks and the teens' interest in co-designing online safety solutions

- Techniques that lead to an efficient intergenerational design team with teen members

- Actionable program design recommendations that can be implemented in the development of Teenovate.

In the sections that follow, we first provide the background context necessary to understand the current state of adolescent online safety research and participatory design methods used with teens. We synthesize existing work on co-design of adolescent online safety technologies, examine the challenges of co-designing with teenagers, and outline the potential challenges of forming a sustainable participatory design team of teens. Next, we provide an overview of the methods chosen for this study and our motivation for choosing them. Finally, we outline how the participatory design artifacts, group interviews, and survey responses were analyzed and discuss what was found based on the results.

CHAPTER 2: BACKGROUND

In this section, we situate our study at the intersection of adolescent online safety research and participatory design. This background overview will examine contributions made within each respective field as well as studies that combine the two areas and result in design artifacts for adolescent online safety technologies.

<u>Participatory Design with Children</u>

Participatory design (PD or co-design) is a design research methodology that places technology users into various roles throughout the technology's design phases [12]. PD's initial limitation with young participants led to the development of Cooperative Inquiry (CI), an extension of participatory design techniques that places children designers as equal to adult designers [10]. Rather than limit children to the roles they had traditionally held as informants and testers of applications, CI stresses that children are capable of conceptualizing and analyzing ideas in any stage of the design process [12]. The adult designers in this partnership actively work to assist children designers to devise and express their ideas, so that these ideas can be molded into real solutions. The goal of a project using CI is to generate, share, iterate, and evaluate ideas from teams of adults and children in a manner that compensates the cultural and communicative differences between generations as well as differences in developmental ability [12].

Forms of Cooperative Inquiry have found success in established research programs, especially in the field of technology development. KidsTeam is a program within the Human-Computer Interaction Lab (HCIL) at the University of Maryland [11]. Its purpose is to create a

space where adult and children designers between the ages of 7 and 12 can work together to co-design technologies [11]. The team utilizes CI, as well as a number of other co-design techniques, to aid in the development of a long-term relationship with the kids and bridge the communication gap between the generations. Some of the techniques utilized to generate design ideas include Bags of Stuff, Big Paper, and Storyboarding [13].The resulting designs are intended to be actionable, interesting to children, and attend to children's needs including the need for learning and play [11].

Participatory Design with Adolescents

Since CI techniques were initially designed to bridge the capabilities between adult designers and children designers, some questions have been raised as to how appropriate these methodologies are for adolescents. These studies have asked what techniques should be used, in what contexts or settings should these studies take place, how do teens adopt technology, and how to adult designers should work to understand teen culture [14]. One alternate reality game development team found Bags-of-Stuff, a participatory design technique that enables participants to create low tech prototypes using various craft materials [13], in its unedited form to be too open-ended to result in meaningful designs from adolescents [15]. Another research team proposed videography as one alternative way to engage teens through creative tools they are more familiar with [16]. Matters of online safety are well researched regarding teens, however the majority of online safety participatory design studies are with young children.

Researchers at the University of Maryland identified several challenges of establishing a new co-design team with a non-traditional age group [17]. In this case, they brought together a

group of older children between the ages of 10 and 13 to participate in co-designing the web interface for the International Children's Digital Library (ICDL) to better support late elementary children's experience on the website. They found that a loose structure, distractions, a lack of focus on team bonding, a lack of listening to teammates, and an inability to remove the power imbalance between adults and older children hindered the design process significantly [17]. In terms of the setting, the researchers realized their cramped lab did not provide a kid-friendly experience for this age group. They also discovered that the older children's exposure to the school environment caused them to focus heavily on "the right answers" and what was "not possible," unlike the unhindered imagination of the younger children [17]. By making modifications to particular CI techniques, dedicating time for team building, and eliminating power differences, they were able to create a working interface and the children generally reflected they had a positive experience [17]. While the study above did not address the challenges one may face when forming a co-design team of teenagers, their lessons learned provide an excellent roadmap for which we can build on.

For instance, one area that this intergenerational team did not address in its initial formation included the logistical considerations that would solve the problems that were identified. Recruitment practices, for example, were not experimented upon as they chose word of mouth to be their main method of finding kids to join [17]. This is particularly important, as traditionally, participatory design has required the long-term availability of its participants to attend a series of design sessions so that the team can focus on one particular stage in the development process at a time. Availability, however, is a trait often found in privileged populations with parents that can take the time to regularly transport their children to and from

design sessions, Walsh discovered, and the design team found it necessary to deviate from traditional session structure to accommodate disadvantaged populations, such as adapting the manner consent was obtained due to the fact that majority of parents among disadvantaged populations were not even available to sign consent forms in person [18]. This exemplifies why it is crucial to understand how needs differ between different demographics of research participants, and how crafting new techniques to cater to those needs results in increased participation from that demographic.

<u>Participatory Design of Online Safety Technologies with Adolescents</u>

The direct involvement of adolescents in developing online safety technologies, however, remain largely under-studied due to participatory design traditionally being used predominantly for working with younger children. For instance, a few studies [19], [20] exemplify the use of CI techniques with children of the standard age group (7-12 years-old) to develop new ideas to consider when addressing adolescent online safety issues. One such study had children redesign parental mobile monitoring applications and found that while they accepted limited forms of monitoring features, they also wanted more tools that helped them self-manage risk [19]. Another study looking at how children believed online technologies, specifically those like TikTok that are popular among young children, could help them in "stranger danger" situations came to conclude that similar mix of both parental control and self-management tools were preferred for this age group [20]. Based on the findings from these studies, design insights for online safety solutions gained working with young children are not always applicable to a teen

audience due to teens having different developmental behaviors to accommodate [14]. Therefore, it is important that actual teenagers are included in the conversation.

Nonetheless, very few researchers have recruited teenagers as participatory design participants in general, let alone for research on the topic of online safety. One of the few studies on the subject highlighted the importance of working with this population directly through the discovery of novel and developmentally appropriate anti-cyberbullying solutions like equipping teens with the necessary tools to handle the situation themselves, get support if needed, and self-regulate negative behaviors [20]. Given this synthesis of the related work, in the next section, we delineate the unique contributions of our work.

Research Contributions

Though some research has worked directly with teens to identify solutions that address specific risks like cyberbullying [20], there exists a gap in adolescent online safety research that properly identifies actionable solutions addressing a variety of other online risks in a manner that does not detract from adolescent's development nor take away from the beneficial aspects of online activity [9]. Teenovate, an intergenerational design program inspired by KidsTeam, will be a way to make necessary additions to this research area. While there is research on how to form new intergenerational design teams, there is little information on a structure best suitable for teenage members.

CHAPTER 3: METHODS

This section provides an overview of the study followed by a description of the

procedures for conducting study sessions and recruiting participants. This section concludes with

a breakdown of how the data was prepared and analyzed.

Overview of Interview Study

This study, inspired by participatory design, puts teens in the role of co-designers of the

Teenovate program. We wanted teens to have an equal say in key decisions about the program's

creation to ensure the program met their needs alongside the needs of researchers and goals of

the STIR lab. When deciding on the methodology of this study, we had to consider the unique

task of designing the intangible factors that make up a youth program. Participatory design is a

methodology that has allowed researchers to work alongside adolescents as equal partners to

design technologies that meet the needs of its young user demographic. This study lacked a

technological design artifact as the desired end goal, which made it difficult to utilize

participatory design techniques to design a youth program. Therefore, we chose to create an

online interactive group interview session inspired by participatory design that places researchers

and teen participants in the role of equal stakeholders of the Teenovate program. Both parties had

the design task of discussing their shared and opposing opinions about how the program should

function if they were to consider participating in Teenovate either by voting for their preferred

options or providing short answer responses to each question asked.

Session Procedures

The study consisted of 6 sessions with a total of 21 teens between the ages of 13 and 17 years old. Each session was conducted with up to 4 of the 21 teens, and each teen participated in exactly 1 session. The procedures utilized were identical between all sessions. Each session also had the same 3 researchers act as both facilitators of the study and study participants alongside the teens; therefore, there were up to 7 people participating in each session. We obtained parental consent as well as verbal assent from all teen participants prior to the beginning of the study. The study was approved by UCF's Institutional Review Board.

The study took place entirely online through the conferencing platform Zoom [21]and each session lasted approximately 2 hours. Both the teen participants and researchers were tasked each session with answering questions that helped facilitate: 1) discussing participants' online safety experiences and insights, 2) discussing participatory design using design artifacts from prior adolescent online studies, and 3) discussing the creation of the Teenovate program. The activities were facilitated with the assistance of the tool AhaSlides [22], an online interactive slideshow that allows an audience to submit their responses to questions in a variety of formats. After completing these activities, the teens completed a demographic and feedback survey regarding their experience in the study. We used the recording tool provided by Zoom to record the screen and audio of the session from the perspective of a researcher. These recordings were saved and later transcribed verbatim for data analysis.

Online Safety Discussion

After an icebreaker to introduce one another, the study begins with a 30-minute discussion of three questions on the topic of adolescent online safety. These questions (e.g., "What are some of the things that adults get wrong when it comes to teens and online safety?") were presented on AhaSlides as open response questions that both the researchers and the teens could anonymously submit one or more responses to. Each submission appeared on the slide below the question for all participants to see. After enough submissions, the researchers would ask follow-up questions that sparked discussions about the responses on the slides. Beginning the study with a discussion of online safety allowed us to get a glimpse at the teens' perspective and knowledge surrounding online safety issues.

STIR Lab and Participatory Design Discussion

The next task, following a presentation about the STIR Lab and participatory design, was a 15-minute exercise where the participants reviewed a previous participatory design project the lab participated in. The project was with KidsTeam, a participatory design program at the University of Maryland for kids between the ages of 7 and 11. In the exercise, we presented to the teens one of the two "stranger danger" scenarios for which the KidsTeam kids designed features within Musical.ly (now TikTok) to assist in resolving the scenario. We then had the teens briefly take up the same role as the KidsTeam kids and worked with them to design a few features that could help resolve the scenario. We utilized mock-up screens of the mobile app and asked the teens to draw their ideas on the mock-ups using the whiteboard tool in Zoom.

Afterwards, we reviewed what the teens liked and disliked about the solutions generated by the KidsTeam kids and discussed differences between designing with teens versus younger children. In doing so, we were able to explain the purpose of participatory design through hands-on learning while also proposing the STIR Lab's goal for the Teenovate program.

Designing the Teenovate Program

The remaining hour of the study was spent designing the Teenovate program. Similar to the initial activity, both the researchers and teen participants answered a series of questions about the program, some of which are shown in Table 1 below. Some of the questions were open response and others asked the teens to vote for one or more preselected options. The session concluded after the teens gave their final suggestions for the program and completed the feedback survey.

Table 1. Sample Questions to Design the Teenovate Program

Sample Questions to Design the Teenovate Program
Who should be included in each of the teams?
Where should we hold the design sessions?
Which semester should we hold design sessions?
How frequently would you want design sessions to occur?
How long should each design session be?
Why would you want to participate in this program?
I would want a $_____ gift card for each session I participated in.
How should we go about recruiting teens for the program?
What challenges should we expect when starting this program?

Qualitative Data Analysis Approach

After participants left the conference call at the end of a session, the participating

researchers met to debrief and document the initial findings that resulted from the session. We

collected audio and video recordings of each session and transcribed them with the assistance of

transcription software. We first conducted a content analysis of the data by summarizing the

participants responses to each question. The text of the session was transferred over to

spreadsheets, and three members of the research team began drafting an initial coding. The

coders met weekly to iterate over the codes with feedback from one another. Afterwards, we

completed axial coding by organizing the codes generated across the questions asked during each

session into themes, which were then finalized after feedback from all authors. The final

codebook, shown in Table 2, consists of categories that explore the logistics of running the

Teenovate program based on needs described by the teen participants and followed by themes

resulting from the motivations that drove teens to want to participate and the challenges that

would prevent them from doing so.

The statistics for each logistical category were calculated by counting the teens

anonymous votes to each question. All participants were allowed to vote for more than one

option, so the percentage of each is calculated with a denominator of N=21. Alternatively, the

statistics for each theme were calculated by counting the teen's anonymous open response

submissions to each question and counting a verbal comment made by a teen during the

discussion of these responses. All participants were also allowed to submit more than one

response to these questions. Therefore, the count of each code is each instance found from an

anonymous response or a teen's verbal response, and the percentage of each theme is the sum of

all the counts of all codes related to the theme divided by the sum of all the counts of all codes related to the research question. All submissions from the researcher are excluded from these statistics.

In order to answer our first research question, we conducted a content analysis based on the teen's direct responses to the questions to design the structure of the Teenovate program. The first category describes *who should participate* in the Teenovate program, or more accurately who, if anyone besides teens and researchers, should be added as members of the Teenovate program. Teens would only work with *parents*, *teachers*, or *friends* as long as they were also stakeholders of the particular online safety solution being designed. For example, the teens wanted parents to be on the team if they were working on a parental control app. The second category describes *where the Teenovate program should meet* if it were currently in operation. Teens were comfortable meeting at the *University of Central Florida (UCF)*, but also believed that other decentralized locations such as a *local community center*, *online meeting rooms*, or a *local college campus* would be most accessible to teens not near UCF. The third category describes *when the Teenovate program should meet* if it were currently in operation. This category is a summarization of three questions: 1) the semester dates the program should run, 2) the frequency the participants would get together for design session meetings, and 3) the duration of these meetings. The teens agreed that Teenovate should run bi-weekly, 2-hour meetings during the summer semesters. The last category describes *how much teens should be compensated* for participating in Teenovate, where teens suggested a $20 gift card would be appropriate compensation, though non-monetary forms of compensation were discovered to be preferred alternatives during group discussions.

Table 2. Final Codebook for Content Analysis

RQs	Categories	Responses	Codes
Logistical Needs (RQ1)	Who Should Participate	Teens, researchers, other users, and developers	Teens, Researchers, Parents, Teachers, Friends, Family / Siblings, Other
	Where Should Teenovate Meet	At UCF or a decentralized location like a community center	UCF, Local Community Center, Online / Zoom, Local College Campus, Teens' High School, Other
	When Should Teenovate Meet	During the summer for 2 hours bi-weekly	Summer Semester, Bi-weekly, 2 Hours
	How Much Should Teens be Compensated	$20 per design session or college incentives	$20, $10 or less, $15, More than $20, Extrinsic (College Incentives, Rewards)

RQs	Themes	Exemplar Quotations	Codes
Motivations to Participate (RQ2)	Intrinsic Motivations Outweigh Extrinsic Rewards (40%)	*"I have an intrinsic motivation to participate in the program because it allows me to feel like part of the solution."*	Intrinsic (Be the Solution, Helping Others, Self-Fulfillment), Extrinsic (College Incentives, Rewards)
	Adults Get It Wrong (30%)	*"Parents should talk to teens themselves instead of taking away technology or blocking sites, because the teen's attitude is not changed, only the technology."*	Problems Caused by Adults, Misconceptions of Teen Activities, Underestimate Teen Autonomy
	Making Solutions with Real World Impact (30%)	*"Because they [tech companies and developers] would also be helpful and contributing ideas and stuff like that and making sure that the ideas could actually be implemented"*	Real World Implementation, Working with the Right People, Quality Contributions
Challenges to Participate (RQ3)	Teens are Skeptical of Others (40%)	*"Commitment will be your largest obstacle for sure. People not showing up, communicating, etc."*	Distrust Adults, Teens Lack Commitment, Preserving Privacy
	Teens are Too Busy (36%)	*"There could be a lot of scheduling conflicts with teens, especially during the school year"*	Scheduling Conflicts, Free Time
	Teens are Adamant About Being Treated as Equals (24%)	*"You want to like make them feel that you're not necessarily with like a teacher who's going to be strict…"*	Empowering Environment, Perceived Prerequisites, Interest Beyond Design

A second content analysis was conducted to develop themes based on what teens described as their motivations for participating in the program. We found that the teen's *intrinsic motivations to participate outweighed extrinsic rewards* like *gift cards* or *college incentives* like *volunteer hours*. The teens desire to *be the solution* and become a major contributor to efforts that attempt to resolve what they believed was a relevant complex societal issue and *help others* who had in the past or may in the future encounter dangerous situations while online. Teens also found *self-fulfillment* from the experience as its own reward as they would gain new knowledge or a way to express their ideas. The second theme that emerged was a drive to correct what *adults get wrong* about solutions to reduce online safety risks, since teens perceive attempts by adults to *cause more problems* due to *adults' misconceptions of teen activities* while online and how often *adults underestimate teen autonomy* as in resolving dangerous online encounters. The third theme that emerged was a desire to *make solutions with real world impact*. To ensure this, teens wanted to work with the right people, or stakeholders relevant to the solution being designed, to ensure Teenovate's members make *quality contributions* to the design process, and to partner with those that can verify the ideas were viable for *real world implementation*.

Regarding the third research question, when teens were asked what challenges they expected Teenovate would encounter getting teens to participate, we found that teens would be *too busy to participate*. Teens would struggle to choose to be in Teenovate once it caused *scheduling conflicts* with school and prior extracurriculars unless meetings were held during what teens identified as their *free time*. Teens are also *adamant about being treated as equals* by stressing that Teenovate should take extra steps to ensure it is an *empowering environment* that values everyone's ideas and makes it easy to build bonds with the researchers, teens, and other

adults in the program. They also *perceived prerequisites* like technical skills and design knowledge that prevented them from feeling like they would be equal contributors on the team. They wanted to ensure they could pursue an *interest beyond the design stages* of adolescent online safety technologies like research, prototyping, and development. The third theme we discovered was that *teens were skeptical of others* who might be involved in Teenovate. They had a general *distrust of adults* and specifically distrusted the researchers' ability to *preserve teens' privacy* regarding what teens may disclose during design sessions. Teens were also skeptical of other teens who they believed would be *less committed* if they joined for the wrong reasons and thus less productive members that would cause the quality of the team's work to suffer.

Recruitment

The recruitment process, once Institutional Review Board (IRB) approval was obtained, began with an email outreach campaign to various youth-serving organizations throughout the state of Florida between March 2020 to August 2020. We presented these organizations with our recruitment flyer and answered any further questions via phone call. The organizations then presented the recruitment flyer to their parents and youth members. Once a parent consented to their child's participation in the study, two polls were emailed to the teen. The first poll allowed the teen to schedule a 15-minute phone call with a researcher. During the call, we obtained the teen's verbal assent to participate, ensured the teen could connect to Zoom and AhaSlides, and familiarized the teen with the tools on each platform. The second poll allowed the teen to select all the days within that week they were available to participate in the study. They were able to

proceed with their participation in the study once three other teens indicated they were available that same day, and the four teens would be emailed a link to a zoom call for that date. Otherwise, they were rolled over into the next week. The findings synthesized from each of the scheduled study sessions are presented below.

CHAPTER 4: RESULTS

In this section, we provide a summary of the study's participant demographic followed by the major findings that arose from the study and then our emerging themes. When presenting findings from qualitative data, the themes that emerged from data analysis are illustrated through participant quotes. The quotes are attributed to the speaker using the participant's ID followed by the corresponding gender and age. Findings are also illustrated through the anonymous statements submitted by the teen participants and the design artifacts created when discussing participatory design. Minor clear spelling errors within anonymous text responses were corrected for the presentation of this type of data. These statements cannot be attributed to a particular teen; therefore, they will be tagged as anonymous with the session number of their origin (e.g. "anonymous S1", "anonymous S2").

Participant Demographics

We recruited 21 participants between the ages of 13 to 17 years old for this study. Over half of the teens were either 14 or 16 years old (57%, N=12) and over half were also male (57%, N=12) with the remaining teens identifying as female. Participants identified themselves as Asian (29%), Hispanic/Latino (24%), White/Caucasian (19%), Black/African American (19%), More Than One Ethnicity (10%), or did not select any identity (10%). Table 3 shows the demographic information summarized along with participant IDs and the session each participated in.

Table 3. Participant Demographics

Session	Identifier	Age	Gender	Ethnicity	Would Join Teenovate
S1	1A	16	Male	Black / African American	Yes
	1B	14	Male	-	Yes
	1C	14	Female	-	Yes
	1D	16	Female	Black / African American	Yes
S2	2A	13	Male	Hispanic / Latino	Yes
	2B	16	Male	White / Caucasian	Yes
S3	3A	15	Female	Asian	Yes
	3B	14	Female	Black / African American	Yes
	3C	16	Male	Asian	Yes
	3D	15	Female	Hispanic / Latino	Yes
S4	4A	15	Female	Asian	Yes
	4B	14	Female	Asian	Yes
	4C	17	Female	Asian	Yes
S5	5A	16	Male	Black / African American	Yes
	5B	17	Male	White / Caucasian & Hispanic / Latino	Yes
	5C	15	Male	Hispanic / Latino	Yes
	5D	17	Male	White / Caucasian	Yes
S6	6A	17	Female	Asian	Yes
	6B	14	Male	White / Caucasian	Yes
	6C	14	Male	White / Caucasian	Yes
	6D	14	Male	White / Caucasian & Hispanic / Latino	Yes

Logistics of Teenovate

This section will present each category that describes how Teenovate should be structured to meet the needs of teens and researchers while fulfilling the goals of the STIR Lab to create a long-term program for co-designing adolescent online safety solutions.

Regarding *who should participate* in the program alongside teens (90%, N=19) and researchers (86%, N=18), some participants believed that parents (71%, N=15) had a place on the design teams. The reasons the participants gave for wanting to involve parents on the team were that they, like teens, were seen as users of some online safety technologies, and therefore could contribute opinions and experiences that teens could not. Opposition to including parents on the design teams focused on a lack of teens' privacy should they want to disclose sensitive information they would not want their parents to know about. A few participants wanted teachers (52%, N=11) on the teams for similar reasons. Friends were not as popular (43%, N=9) due to fears that familiar individuals would create groupthink, but still desirable since familiar faces would make the space more comfortable.

When determining *where Teenovate should meet* to hold design sessions, most participants voted to hold them at the University of Central Florida (90%, N=19), however many of the other options were close contenders. The second most popular choice was to hold the sessions at a local community center (81%, N=17) along with other locations such as online web conferencing tools (76%, N=16) and local college campuses other than UCF (52%, N=11). These choices were preferred due to their accessibility, especially due to the potential to host Teenovate at multiple sites like other multichapter youth organizations like the Boys and Girls Club based on whichever location was closest to the teen. To decide *when Teenovate should*

meet, the participants had to determine the semester meeting dates would be selected, the frequency of these meetings, and how long these meetings should last. There was near unanimous agreement among teens that design sessions should take place during the summer (100%, N=21) occurring Bi-weekly (90%, N=19) and lasting 2 Hours (100%, N=21).

The last category discussed was *how much teens should be compensated* each design session. Teens appeared to refrain from asking for too much money, with most stating that a $20 gift card (62%, N=13) was appropriate, stating it was worth the amount of gas it took to transport themselves or similar to what they would receive at a job for that duration. Others were fine with a gift card worth $10 or less (39%, N=7), a $15 gift card (29%, N=6) or a gift card worth more than $20 (24%, N=5) They preferred either an Amazon gift card or a Visa gift card, since either allowed them the most variety to purchase what they wanted on their own time. The participants upon discussion, however, appeared to prefer non-monetary rewards like volunteer hours (81% N=17) as a potential alternative.

<u>Motivations to Participate in Teenovate</u>

This section will present our findings as related to our participants' motivations for participating in the Teenovate program and the challenges they anticipate Teenovate would have to confront when starting the program. Most of the teens' motivations (40% of responses) focused on what teens could personally gain from participating in the program, however the remaining comments indicated that the participants were motivated to correct what adults got wrong about reducing online safety risks (30% of responses) and a desire for the solutions they made to have a real-world impact (30% of responses)

Intrinsic Motivations Outweigh Extrinsic Rewards

We were able to categorize the teens reported motivations for joining the program as either an intrinsic motivation or an extrinsic motivation. With this categorization, we found intrinsic motivations made up 58%, or the majority, of the teen's comments. The most common intrinsic motivation the participants described was wanting to *be the solution* (47% of responses) by making major contributions to a societal issue. They had a desire to take "*part in something that would change or fix an issue I see which is that of online safety*," (anonymous S5) with some citing a more specific desire like "*making a difference in parental control technology*," (anonymous S4). They specifically valued not just seeing improvements to online safety but *being* the ones to make these improvements by feeling "*like part of the solution*" (anonymous S6). A portion of the teens were intrinsically motivated by the goal of *helping others* (29% of responses) who have been impacted by a dangerous or uncomfortable encounter online.

"The amount of people who have been affected by online, like online scams or whatever, and whose lives have been ruined because of it, you know, helping kids not have their lives ruined," – 4B (14-year-old Female)

Teens final intrinsic motivation for participating was a sense of *self-fulfillment* (24% of responses) because they felt the experience itself would be beneficial to expand their knowledge and "see what the design process is like," (anonymous S2) or to express themselves through their design ideas and critiques to improve online safety measures. They even wanted to learn more about how user-centered research is conducted and the process of developing a piece of technology, either because they were interested in pursuing research when they go to college or to simply "*try something new*" (anonymous S2).

The remaining 42% of responses provided extrinsic motivations for participating in Teenovate. Very few (12% of responses) gave *rewards* such as a "*gift card*," (anonymous S4) in exchange for their participation in research. Instead, more teens preferred the various *college related incentives* Teenovate could provide (88% of responses). For this reason, volunteer hours became a major extrinsic draw to participate. Teens stated they could use these volunteer hours to fulfill college scholarship requirements like the Bright Futures Scholarship provided to students within Florida, or to fulfill obligations as members of extra-curricular clubs like the Boys Scouts. It is very important to these teens to be able to have these extra-curriculars added to their college resume. Teenovate, even without the incentive of volunteer hours, had the potential to be a unique and impactful activity to add to their resume. Part of the reason few participants favored rewards like gift cards was because teens saw intrinsic motivations to participate as more meaningful, and thus more valuable, than extrinsic ones.

"I think when you associate like, like monetary compensation with it, you kind of are communicating that this is like, kind of like a job, you know, in a way. It's like, like, in exchange for your time, I'm paying you like that-- that's the reason. That your motivation is money, in a way, you're kind of communicating that. But I think if you say like, like, no like compensation, then you're communicating that this is like, because you want to do it. And that's the only reason why, like any of you are here is because you genuinely care about this issue, or you want to learn, or you want to have some type of like, I guess, academic experience, you know what I mean." – 3C (16-year-old Male)

Adults Get it Wrong

In addition to what teens could gain from Teenovate, the participants were also motivated to remedy what adults get wrong when they implement solutions that attempt to reduce online safety risks. The most common sentiment among the teen participants was that adults' resolutions for issues of online safety either did not solve the underlying problem or *caused more problems* for the teen (36% of responses). For instance, the way adults communicated with teens about online safety was not "*in a manner that is relatable or that an adolescent would respond to*," (anonymous S3). Other times, the technical solutions that adults employed to reduce online safety risks were ineffective. Regarding these technologies, one teen wrote "*Some forms of protection haven't been maintained or updated for modern threats because they have some contract or monopoly on their customers*," (anonymous S2).

Another part of what adults get wrong about adolescent online safety, the teens informed us, was failing to correct their misunderstandings regarding teens and how they engage with the internet. Many of their comments (32% of responses) were that adults had *misconceptions about the types of activities teens engaged in* while online. They felt adults often assumed any activity on social media was inherently dangerous, rather than a means for teens to interact with the world. As one teen responded *"...teens sometimes just want to know what is going on around the world (the news or social media) or maybe be more connected with their friends*," (anonymous S3).

Others indicated adults "*underestimate teens and believe that teens aren't responsible on the internet*," (S6). These teens felt that *adults did not understand the extent of a teen's ability* (32% of responses) to handle the risks they encounter while online. One teen hoped parents

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would "*trust us more because we know what we are doing*," (anonymous S1) since they felt parents saw teens as either too irresponsible to not engage in dangerous activities or too unaware of the risks that come with being online. A few of the remaining teen's responses remarked that adults in their life did not have the technical literacy to understand how the teen engaged with the internet.

<center>*Making Solutions with Real-World Impact*</center>

Teens final motivation for participating in Teenovate was a desire for the work they do to be *implemented in the real world* and used by real people, which is why one teen, having selected the 'other' option for the types of people that should be involved in Teenovate, suggested involving tech companies directly with the teams. "*Because they [tech companies and developers] would also be helpful and contributing ideas and stuff like that and making sure that the ideas could actually be implemented,*" – 5A (16-year-old Male) However, other instances of teens wanting their solutions to be implemented in the real-world occurred during the study. They said they wouldn't want to participate at all if they could not see their work being utilized in some way.

"*If the program turns into like a joke, for, like, helping people. And yeah, if it just becomes a joke, you know? …Yes. Yeah, like this doesn't go to work.*" – 5C (15-year-old Male)

The participants, when determining who should be a part of each cohort within Teenovate, wanted to ensure they were *working with the right people* (32% of responses) in order to get the most impactful design. The teens recognized parents as significant stakeholders of adolescent online safety technologies and thus desired them as members of the design teams

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in these situations, such as if the team were to design parental control apps where parents play an active role within the solution's core function. They did not, however, always feel parents were stakeholders in every online safety solution, as mentioned by one participant who said:

"*I think that it depends on sort of the designs that are being created. So like, if we're making something like a parental control app, it would be important for parents to be included in the conversation or in design of that.*" – 1D (16-year-old Female)

The teens also felt that the experience and opinions of a variety of parents, rather than just their own, would be very helpful when designing solutions. A few teens voted for the inclusion of teachers within the cohorts for similar reasons, such as "*their experience with the highly restrictive monitoring systems that a lot of schools use,*" – 6A (17-year-old Female) or "*instances where there's cyber bullying,*" – 3D (15-year-old Female). However, several other teens pushed back believing teachers did not have useful experience to draw from, one stating that "*it's more of the administration telling the teachers to read off a script of online safety, rather than being genuinely concerned about the issues,*" – 1B (14-year-old Male). Another teen who voted 'other' wanted to work with those who had experience with the online risk the team was trying to design for.

"*People that have been harassed or have had certain cases where they didn't feel safe, maybe fix that issue. Because they may think differently than somebody who hasn't gone through what they went through.*" – 5C (15-year-old Male)

The teens not only described how Teenovate should respect its teen members, but also how Teenovate should support the work these teens would do. As previously stated, the teen participants were motivated to be a contributor of a project or solution that improved adolescent

online safety. However, the way teens wanted to structure Teenovate and design these solutions also indicated a desire to make sure their contributions were *quality contributions* (30% of responses). They wanted to contribute until the completion of the design, if possible. For example, when asked about the maximum number of design sessions Teens were willing to participate in, some teens (29%, N=6) were willing to work on a design for 10-15 design sessions or had no limit to the number of design sessions they were willing to be a part of.

"I don't personally think there is a maximum because I know like projects take a long time. And if you need more, you should get more because you need like a good product. I don't have a maximum personally..." – 3A (15-year-old Female)

While most teens voted to hold design sessions during the summer semesters, when asked if they would prefer a session that began in the summer and ended in the middle of the fall semester, most teens seem amenable to this alternative. The teens explained that this schedule would both feel long enough for them to make a significant design contribution, and end in time for them to be able to focus on their other activities which would become more demanding towards the end of the year. When voting to hold bi-weekly design sessions, some of these teens felt that hosting sessions this close together would allow them to retain what occurred from a previous session "*so it won't feel disjointed,*" – 4C (17-year-old Female) and so the quality of their work in the upcoming session would not suffer. Similar statements were made in favor of the duration of each design session being two hours, since teens felt that this was long enough to make good progress, but short enough to prevent the session from being too exhausting.

"Three is cutting a little close because at a certain point, it's going to seem like its drama droning on. And that's just not going to be very productive for brainstorming and stuff like that.

But I think the two hours would be really, really good. Especially if you're doing the bi-weekly or monthly." – 5A (16-year-old Male)

Challenges to Participate in Teenovate

This section will present our findings as related to the challenges that teens anticipate Teenovate would have to confront when starting the program. Most of the participants comments were skeptical of other members within Teenovate (40% of responses), whether it be perceptions that teens would be less committed and thus be more difficult to work with others or the perception that adults could not be trusted to listen to teens' ideas. The teens also described having very busy lives (36% of responses) and struggled to determine if they were capable of committing the amount of time we were asking of them. Finally, teens stressed that they needed to be treated as equals within the program (24% of responses), otherwise they would struggle to feel the program was worth their time.

Teens Are Adamant About Being Treated as Equals

Part of creating a worthwhile experience for teens is addressing the two other challenges that Teenovate had to overcome. The teens were adamant about being treated as equals by those they collaborated with within the program and made a number of suggestions to the structure of the program to ensure they received this treatment. The largest concern they had was a belief that Teenovate would struggle to create an *empowering environment* where teens could freely voice their opinions and ideas (52% of responses). They expected the program to facilitate a safe space for teens to say what they think. However, they felt Teenovate would fail to do so if teens did not

feel comfortable socializing with one another. To remedy this, teens wanted to be respected as mature individuals that adults could feel comfortable having casual conversations with.

"The first is, treat them like adults. You know, don't…treat teens like…they're kids. You know what I mean, don't like, I guess, don't try to simplify things or talk down to them. …I think a lot people do it like, like they-- they don't do it on purpose. They….come across as like, alright, you know, you're-- you're here and we're here, you know what I mean" – 3C (15-year-old Male)

"…you're not necessarily with like a teacher who's going to be strict and kind of-- kind of makes you feel like you have to act a certain way, and you have to behave, you know, like, very well. Make them feel like oh, we'll laugh at your jokes, you know. We'll-- we'll hang out." – 3D (15 years old Female)

Teens also had concerns that their ideas might not be heard within the space, whether it be due the group being too large to meaningfully contribute their individual thoughts, or their own struggles to speak up in group social situations. One anonymous response captured this feeling, expressing "*listen, just listen kids have a hard time being heard*" (anonymous S4). The preferred locations and environments that were a "*comfortable area where you can speak freely, then you're able to share more information with the researchers and all the participants*," –6D (14-year-old Male). They also provided their own suggestions through feedback on our design session, saying that techniques we employed like *"round robin where we would go like, we could hear everybody…introduced themselves,"* – 6A (17-year-old Female) were good formats for preventing others from feeling left out.

"…I liked how you guys made us feel that we can be honest; that there's like no right or wrong answer…sometimes they don't want to speak because they don't want to sound stupid, if

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they said the wrong answer. So in a sense, make them feel like, oh, we'll take whatever you have, you know. There's like you said, there's no right or wrong answer.." – 3D (15 years old Female)

In addition to these concerns, other participants stated that *perceived prerequisites* and other knowledge barriers would prevent teens from feeling confident joining and contributing to design sessions (32% of responses). Teens felt that they did not know enough about what kind of contributions researchers would want from teen participants, and they worried about being too confused about the design process to be able to generate good ideas. One teen suggested a similar, perhaps more in-depth mock scenario to help individuals that lack technical expertise generate design ideas:

"Maybe you could set up like a mock conversation that happens in real time. That shows an example like, of these bad situations that you're trying to design out… Well, when you were showing that the musical.ly conversation, maybe you could create like a presentation that goes step by step maybe what happens or an example of what happened during that." – 2B (16-year-old Male)

The final way teens desired to be treated as equals was a desire to work in Teenovate *beyond design* (16% of responses). Teens bring their own goals and objectives to the table when making designs. Most of the participants felt that online safety was an important issue, with some having explored the topic in greater detail through their own interest in coding and cybersecurity.

"Like I've kind of been not an advocate, but a promoter of online privacy and having the right to know what information you're getting collected on and stuff like that, that ties in heavily

with safety…So, it's something I've always been cautious of and promoted that online privacy, literacy and stuff like that is very important." – 5A (16-year-old Male)

Therefore, a select few teens saw the opportunity as a way to not only learn about how technologies are designed, but also as a means to explore how research is conducted, how technologies are developed, and participate in prototyping. Two teens explicitly expressed interest in doing research, while others expressed an interest in learning more about research as they explore paths within college.

"I think there's a lot of people that have an interest in the type of research that you're doing anyway…people feel…big and important when they are like participating in like collegiate level research, and not just…being like a test subject, but actually involved in, like development …they're starting on their…career path in a certain respect." – 3C (16-year-old Male)

Too Busy to Participate

The second most anticipated challenge, making up 36% of responses, centered around one major theme; teens were too busy to participate in Teenovate. Teens were concerned that *scheduling conflicts* (68% of responses) would prevent them from being program participants, "*especially during the school year,*" (anonymous S3). During this time, teens are juggling various extra-curricular activities they have already dedicated their time to after school. While many teens expressed a strong desire to participate in the program, they often found themselves at odds when considering the demands of these other extra-curriculars activities, which they tended to perceive as more valuable than participation in the Teenovate program, especially in the case of older teens who were pursuing extracurriculars with college applications in mind.

"I wouldn't mind doing it during the school year because you guys can kinda really spread out. And I wouldn't mind like missing a few practices I mean, generally just like for me sports. ...I have to pick between them which I really don't like to do, but I think like this is a really good opportunity, so I wouldn't mind like missing a few practices for it. But then again, I know like not everyone's going to think that way. So I feel like summer's more applicable to like a lot of people..." – 3A (15-year-old Female)

Teens responded that they would be willing to participate in their *free time* (32% of responses) as long as the program was worth consuming a limited resource in their lives. Teens' free time would already be consumed by summer vacation plans, weekend plans, homework, and time spent completing college applications for those in their junior and senior year. Therefore, the program had to be worth the amount of time they would be setting aside to participate. Since it still may be difficult to find free time that all participants could agree upon, a few teens suggested providing flexible scheduling options so that teens could choose the times they were free that worked best for them.

"For me what you've done with like this meeting giving us a lot of options, like different times and different dates that that was really nice because I got to see which days didn't conflict with other previously scheduled appointments." – 6A (17-year-old Female)

Teens Are Skeptical of Others

The final major theme we found was that teens may be skeptical towards other team members due to previous disappointing experiences with adults and with teens. Teens were most skeptical of other teens (48% of responses) believing that *teens would not be interested enough*

to make a long-term commitment to "*consistently come out to the program sessions*," (anonymous S4) and make meaningful contributions, thus hindering progress within design sessions. They were especially suspicious of other teens' motivations for joining the program, as they believed some extrinsic motivations were counterproductive to creating a long-term commitment, such as "*people being there, who are just there because their parents made them*," (anonymous S6). They perceived these teens as being more likely to "*drop out in the middle*," (anonymous S3), irregularly attend, or refuse to contribute to creating a design despite being present.

"*Offer the hours, maybe the community service hours, and the money and the money per session that could overcome a lot of people but then again, you don't want people just going in there for the money and the service hours and not putting their whole mind to it.*" – 5C (15-year-old Male)

Additionally, teens had a general *distrust towards adults* (40% of responses) and believed adults "*think that you know, teenagers can't be trusted, so why should I trust them?*" – 4B (14-year-old Female). They did not feel they could trust adults to make their ideas feel valued and listened to, expressing "*listen, just listen kids have a hard time being heard*" (anonymous S4). The participants even distrusted the researcher's intentions with their ideas and design contributions, with one teen saying:

"*...Like if some of the technology we make here is going to be used against us. Like if parents were to use it on us, like the monitoring thing, like I might not be comfortable with having my parent monitor my DMs. So if that's going to be used against me in the future, I'd rather just not design it.*" – 4C (17-year-old Female)

Finally, skepticism was cast once more towards the researchers because participants feared we would not *preserve teens' privacy* (12% of responses). A few teens feared their "*parents will find out what they say*," (anonymous S4) within the design sessions which could result in "*many kids being involved in it at first, like because privacy and they don't want parents involved and stuff*," – 5C (15-year-old Male). This was especially a concern when discussing the possibility of having parents as members of the design teams. A few teens believed a possible solution was to involve parents who had no relationship to any of the teens present at the design sessions.

CHAPTER 5: DISCUSSION

In this section, we discuss how the findings from the study answer our research questions. From our results, we found that a number of challenges and reservations significantly hinder teens from participating in the Teenovate program, and we examine how to remove these challenges through the teens' motivations. Then, we propose recommendations on how to expand the role of teens in participatory design teams, where they join not just an educational program as passive research participants, but as active contributors and researchers to a collection of project-based teams that work on real world solutions to their completion. Finally, we give guidelines for the structure of Teenovate and conducting long term participatory design research with adolescents.

Logistical Considerations for Teenovate

In order to address the logistical needs expressed by the teen participants, we propose Teenovate contain small project-based teams within the broader program that focus on a particular solution or scenario regarding online safety. These teams would be made up of a combination of adolescents, adult researchers, and other relevant adult figures depending on the risk scenario or solution the team has been formed to tackle. The purpose of these project-based teams is to address a similar need for a sense of ownership over a project found in older children [17]. Teenovate's project teams utilizes this observation to give teens ownership of a specific online safety solution that teens within the group want to create, shifting the focus of Teenovate away from an educational program that adolescents attend to be participants in, but a team that

teens can be the leaders of. Additionally, this allows the teens to have a say in the membership of the team removing some of the skepticism teens have about working with others. Teens can have a say in which populations would best contribute their experience to inform the design of their solution. Teens could even be selective about partnering with individuals who are less teacher-like or better listeners [17]. Incorporating a team matching process within Teenovate would allow teens to be selective about who they choose to work with and even what online safety topics they would want to work on. The advantage these smaller teams would provide is that they allow its members the flexibility to schedule design meetings based on the availability of those few individuals they are working closely with rather than have a larger group struggle to regularly attend a fixed schedule. The teams would be free to schedule their design sessions within these boundaries based on the anticipated workload of the project.

Within the broader program of Teenovate, program wide team building activities and social activities should be regularly scheduled to not only help the cohorts foster their own bonds with their members, but to create a greater sense of community that unifies their co-current efforts. The very first of these activities that participants should experience is a series of daily sessions to facilitate bonding and become quickly acclimated with the design process, thus providing the formative team building required to facilitate productive long-term collaboration [17] and removing barriers of perceived prerequisites to doing design.

<u>Working with Teens as End-to-End Solution Developers</u>

The results of this study have caused us to redefine Teenovate as a program that recruits teens to work with researchers and other stakeholders to co-design online safety technologies,

retains highly motivated teens to participate in other aspects of solution creation, such as co-research, prototyping and solution development on online safety topics, while using project-based teams that work towards driving the efforts of teens in these roles to making a real-world impact. Thus, teens are no longer simply co-designers and participants in research. Teenovate intends to make teens end-to-end solution developers that are empowered to be involved within the design process from idea conception to the implementation of a developed product. By making teens end-to-end solution developers, we can address some of these unique characteristics of working with teen co-designers.

Making Teenovate Worthwhile for Teens

Teenovate would be able to address the hurdle of making Teenovate worthwhile to teens by providing ways for teens to fulfill their obligations while participating in the program. The teen participants favored college-based incentives over any other external reward. Therefore, Teenovate should use these college based incentives to attract potential co-designers by offering volunteer hours the teens will be able to dedicate towards college scholarships, mentorship from undergraduate, graduate, PhD students, or even partnerships with university admissions offices to provide guidance for a teen's future in college, as well as any other creative measures that link college bound preparation and other school related measures to the teen's participation in the program. Mentorship from researchers and other students within the lab would double as both a college incentive, but also a way for teens to bond with the researchers and thus take further steps to overcome the hurdle of earning their trust. Compounded with these incentives, we would need to form partnerships with companies to maintain teens' trust by delivering on the promise

that Teenovate would allow teens to have a real-world direct impact. One potential way we can approach this partnership is by presenting certain projects with corporate partners as internships, thus conveying to teens that the project from its conception will make do on the promise to involve developers from the very beginning and becoming another way to build trust with teens.

Limitations and Future Work

While our study identifies the preferences and needs of teens when designing the Teenovate program, all of the participants were located within the state of Florida. Therefore specific logistical preferences are the result of the teen's geographical relation to the University of Central Florida and the STIR lab as well as the calendars of their respective school districts. Furthermore, the STIR lab's original intent for Teenovate was for it to be a program built exclusively to create design patterns for online safety solutions. Adolescent online safety often tackles sensitive situations, such as sexual encounters [4]. This can create a new layer of considerations for design team structure that incorporates ways to work with teens on these sensitive subjects that both the teen and their parents believe respects their needs and keeps their privacy in mind [23]. Therefore, since many of these findings relate heavily to the subject of online safety, we can only make limited generalizations about the structure of intergenerational design teams that may not apply to other teams and similar programs that do work outside of this subject. This study is also limited as it focuses on how to theoretically set up the program to be successful. A follow up to this study after the development of Teenovate would be needed to determine whether the teens reported preferences accurately reflected what members report as contributions to the program's success.

Future work should overcome the limitations of this study by applying and comparing the findings of this study to their own research group's geographical locations. Additionally, research must be done that explores new participatory design methodologies with adolescents beyond CI to be developmentally appropriate for teens, since several studies have shown that CI techniques require modification to work with older co-designers [13], [15], [17]. Project teams are designed to give teens a sense of ownership over their solution, however, more research needs to be done to determine how co-design can be conducted on a project-based and more applied basis. Finally, future research should seek to explore the ways in which teens can be incorporated in the creation of online safety solutions beyond the design stages, including co-research, prototyping, and solution development. Future research could even extend beyond the scope of online safety to generalize how to incorporate these stages for projects beyond online safety. This extension could also include research on an exploration of teens' project interests beyond creating online safety solutions or a comparison of how teens would want to work with adults.

CHAPTER 6: CONCLUSION

This thesis explores how to structure Teenovate, a co-design team program focused on the design of online safety solutions for adolescents, so that teens are motivated to participate and find it easy to do so by addressing any challenges to participation. Traditionally, co-design programs that utilize cooperative inquiry to work with children have predominantly worked with those between the ages of 7 and 11. Developmental differences between children and teens that result in not only differences when co-designing with teens but also differences in the needs of teens as users of online safety solutions make it necessary to work with teens directly to represent their unique needs when designing the Teenovate program. We conducted an online interactive interview study where a small team of researchers worked with groups of teens to answer a series of questions regarding Teenovate's structure to figure out the logistical details of the program that make it feasible for teens to make a long-term commitment to the program. A content analysis was conducted on the resulting transcripts from the study resulting in a final codebook organized to answer the research questions regarding Teenovate's logistics, teens motivations to participate, and challenges to participation.

Through our research, we discovered that teens have a substantial desire to participate in Teenovate, with a majority of their motivations being driven by an intrinsic desire to be a key contributor to a solution for a complex problem in society. Teens are also motivated to fix what adults get wrong about online safety, since the misconceptions adults hold about teens' activities while online, paired with a tendency by adults to underestimate teens' autonomy to resolve the online risks they face result in risk reduction solutions implemented by adults that according to teens cause more problems than they fix. This factors into teens wanting to make solutions with

real-world impact or being provided some reassurance that their work can in the future be implemented into a real-world product. They believe that by working with the right people throughout the design process, such as other adult users of the solution or developers and being supported by Teenovate to make quality design contributions, they will create designs that are more suitable for real-world implementation.

A desire to participate does not necessarily correlate to commitment. Teens described that their busy schedules would make it difficult to make a full long-term commitment to the program. Additionally, teens were skeptical of a partnership with researchers and other adults due to their previous experiences with adults who often misunderstood their attempts to address online safety risks. Teens were even skeptical of a partnership with other teens, where they felt that a team whose members lacked the commitment to produce something worthwhile was not a team they wanted to participate in. Therefore teens were adamant about being treated as equals by all members within Teenovate by stressing the environment should be one that empowers everyone, regardless of their technical experience, and allows them to get involved in areas beyond design.

Based on these findings, Teenovate would have to incorporate a number of ways to make Teenovate worthwhile to teens and easy to be a part of, including placing them in control of who they work with, what they work on, and when they work. Plus, teamwork building will be an important part of making sure teams are able to overcome hindrances to productivity and distrust. Additionally, college incentive systems should be built into the foundation of the program to compensate teens in a way that services some of the external obligations teens would choose to fulfill rather than participate in the program. We also conclude with an approach to

adolescent online safety participatory design research through Teenovate that places teens into

the role of end-to-end solution developers on dynamic project-based teams that work on design,

research, development, and testing to result in solutions with real-world impact.

APPENDIX: IRB APPROVAL LETTER

UNIVERSITY OF CENTRAL FLORIDA

APPROVAL

March 4, 2020

Dear Neeraj Chatlani:

On 3/4/2020, the IRB reviewed the following submission:

Type of Review:	Initial Study
Title:	Co-Designing "Teenovate:" An Intergenerational Online Safety Design Team
Investigator:	Neeraj Chatlani
IRB ID:	STUDY00001520
Funding:	Name: Natl Science Fdn (NSF), Grant Office ID: 0000007437, Funding Source ID: 1066191
Grant ID:	0000007437;
IND, IDE, or HDE:	None
Documents Reviewed:	• Teenovate Recruitment Flyer.pdf, Category: Recruitment Materials; • Teenovate_Email_Notifications_Script.docx, Category: Other; • Teenovate_Email_Recuitment_Script.docx, Category: Recruitment Materials; • Teenovate_Feedback_Survey.docx, Category: Survey / Questionnaire; • Teenovate_IRB_HRP-502b-ParentForChild.pdf, Category: Consent Form; • Teenovate_IRB_HRP-502b-TeenAssent.pdf, Category: Consent Form; • Teenovate_IRB_HRP-503.docx, Category: IRB Protocol; • Teenovate_Phone_Recruitment_Script.docx, Category: Recruitment Materials; • Teenovate_Session_Script_with_Interview_Questions.docx, Category: Interview / Focus Questions; • Teenovate_Story_Prompts.docx, Category: Other;

The IRB approved the protocol from 3/4/2020.

In conducting this protocol, you are required to follow the requirements listed in the Investigator Manual (HRP-103), which can be found by navigating to the IRB

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Library within the IRB system. Guidance on submitting Modifications and a Continuing Review or Administrative Check-in are detailed in the manual. When you have completed your research, please submit a Study Closure request so that IRB records will be accurate.

If you have any questions, please contact the UCF IRB at 407-823-2901 or irb@ucf.edu. Please include your project title and IRB number in all correspondence with this office.

Sincerely,

Adrienne Showman
Designated Reviewer

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