

EXAMINING THE FEASIBILITY OF A RESILIENCE MENTAL HEALTH
APPLICATION IN ADOLESCENTS

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To my loving parents, Steve and Mitzi, and my sister, Susanna, for all of their support the last four years and throughout my entire life. To Dr. Jennifer Hughes and my dissertation committee for continuing to believe and push me when I needed additional guidance. I want to thank my fellow Center for Depression Research and Clinical Care co-workers for their help with multiple areas of my project. And finally, I want to thank my partner, Kendall, for her love and support these past few years. I could not have done this without you and am excited to be re-united soon.

EXAMINING THE FEASIBILITY OF A RESILIENCE MENTAL HEALTH
APPLICATION IN ADOLESCENTS

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Abstract

Background: Resilience is defined as the ability to rely on internal characteristics and external strengths to adapt in the face of adverse events. While universal resilience-enhancing programs are effective for adolescents, there is still a need for interventions that are easily accessible and specific to the individual. Phone applications are easy to use, tailored to the individual, and have shown positive effects for mental health outcomes. This study will determine if a resilience application is feasible and acceptable for adolescents, evaluating whether or not short-term use leads to changes in resilience.

Methods: For Study 1, Phase 1, individual interviews and focus groups were conducted with adolescents, parents, teachers, and clinicians to discuss possible incentives for using a mental health application, the benefits of using an application, and what concerns would arise from using an application. For Study 1, Phase 2, individual interviews and focus groups were conducted with adolescents, parents, teachers, and clinicians to gather feedback about the resilience application prototype. For Study 2, 40 adolescents used the application for 30 days to gather more information about feasibility, acceptability, and if there were significant positive changes with resilience and other secondary mental health outcomes.

Results: Multiple themes were identified through Study 1 individual interviews and focus groups, including application content, features, engagement, benefits, concerns, and improvement. Study 1, Phase 2 adolescents and adults reported the prototype was feasible and acceptable through the Computer System Usability Questionnaire ($M = 6.30$, $SD = 1.03$) and Mobile Application Rating Scale ($M = 4.08$, $SD = 0.61$). For Study 2, there were no significant differences for resilience and mental health outcomes after using the application for 30 days. Users appeared to prefer the depression module and survey sections, which provided mental health feedback.

Conclusion: Qualitative and quantitative data provide evidence that youth are interested in a resilience mental health application and found the current prototype to be feasible. Although there were no significant mental health changes for Study 2 users, clinical implications and future directions are discussed for mental health application research.

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List of Abbreviations

CSUQ- Computer System Usability Questionnaire

MARS- Mobile Application Rating Scale

Chapter I

Introduction

What is Resilience?

Adolescence is an important period for brain development, identity formation, and the development of autonomy. Emotional difficulties tend to increase during adolescence (Kieling et al., 2011). Approximately 10 to 20% of youth experience mental health problems, which can cause physical, emotional, or social impairment (Kieling et al., 2011). While many interventions focus on the reduction of psychological symptoms, few focus on prevention of mental illness and bolstering resilience (Skala & Bruckner, 2014).

Werner and Smith (2001) first used the term resilience to describe children whom experienced poverty and domestic violence to be able to “bounce back” and live stable lives as adults. Werner and Smith (2001) found initial protective factors (e.g. stable adult role model), which helped increase youth’s resilience in the presence of stressors. There are multiple definitions of resilience, but resilience is defined for this project as “the ability, when faced with stress or adversity to actively employ individual traits (internal factors) and wider social, community, and environmental supports (external factors) to return or maintain a positive state of mental health and functioning” (Dray et al., 2014). Internal factors include personality characteristics and personal strengths and external factors include ability to rely on family, friends, school, and community (Dray et al., 2017). Adolescents’ resilience increases when they utilize the combination of internal and external strengths to avoid negative outcomes in the presence of risks (Dray et al., 2014).

Previous models informed Dray and colleagues’ (2014) conceptualization of resilience. Lynch and Cicchetti (1998) developed an ecological-transactional model that supported a resilience framework. This framework emphasized specific levels of proximity in order from lowest to highest: society and culture, community settings, family environment, and the

individual (Lynch & Cicchetti, 1998). Lynch and Cicchetti (1998) placed higher emphasis on internal resilience factors, but they acknowledged the individual and environment are constantly influencing one another and could lead to changes within certain resilience domains. Gartland and colleagues (2011) built off the Lynch and Cicchetti (1998) model and labeled each of these internal and external domains as separate from one another. Gartland and colleagues (2011) agreed with Lynch and Cicchetti (1998) that these factors could impact each other. By valuing the importance of individual and external factors, resilience is characterized as a dynamic, multi-dimensional concept that can be changed throughout one's lifespan (Gartland et al., 2011). These internal and external factors have been targeted by resilience-enhancing programs (Dray et al., 2017; Fenwick-Smith et al., 2018).

Protective factors against poor mental health outcomes include adaptive coping skills, healthy relationships, help-seeking behaviors, and finding purpose in life (Hodgson et al., 1996). Studies have demonstrated that strengthening these protective factors can prevent the development of mental illness (Davydov et al., 2010). While some youth have more resilience in comparison to others, all adolescents would benefit from being taught adaptive coping strategies and skills (Catalano et al., 2004). There is evidence that universal resilience building approaches can improve mental health and prevent the necessity of interventions for acute mental health problems (Panter-Brick & Leckman, 2013). Resilience-enhancing interventions are needed to improve adolescents' quality of life and prevent the development of mental illness (Dray et al., 2014; Scoloveno, 2015).

Resilience-Enhancing Programs

Resilience enhancing programs have been described as mental health awareness programs that focus on social and emotional learning, mindfulness, or stress reduction (Fenwick-Smith et al., 2018). Diekstra (2008) reported successful programs use educational tools, are interactive, and can be delivered in an affirming environment. In a review of resilience-

enhancing programs, the majority of programs were shown to have positive intervention effects for depressive symptoms, internalizing problems, externalizing problems, and psychological distress (Dray et al., 2017). Within these studies, there were short-term overall effects for depression and anxiety, as well as long-term overall effects for internalizing problems (Dray et al., 2017). The majority of resilience enhancing programs followed a Cognitive Behavioral Therapy (CBT) orientation and demonstrated overall reductions for depression, anxiety, and psychological distress (Dray et al., 2017). Fenwick-Smith and colleagues (2018) discovered evidence that programs demonstrated improvements in protective factors, including an increase in coping skills and self-efficacy. Mental health promotion programs implemented at schools have shown wide-reaching positive changes in resilience (Dray et al., 2017; Fenwick-Smith et al., 2018).

One of the earliest programs was the Penn Resiliency Program, which is a 12-week CBT Program that emphasizes the importance of internal protective factors related to resilience (Gillham et al., 2008). The target age group is for 5th graders to 8th graders, but the program has been administered for up to 18-year-olds (Gillham et al., 2008). The Penn Resiliency Program is taught in schools and helps students learn about the connection between beliefs, feelings, and behaviors (Gillham et al., 2008). The program also introduces skills and techniques that emphasize assertiveness, negotiation, decision making, and relaxation (Gillham et al., 2008). Research indicated that the Penn Resiliency Program was efficacious in reducing short-term depressive symptoms (Gillham et al., 2008).

The FRIENDS program (Barrett et al., 2006) is a 10-week school-based universal anxiety and depression prevention program developed in Australia for 6th and 9th graders. The program aims to help children and adolescents learn problem-solving and coping skills to manage emotional distress and anxiety (Barrett et al., 2006). FRIENDS was presented as an acronym for the different skills children and adolescents would learn about (F = Feeling

worried, R = Relax and feel good, I = Inner helpful thoughts, E = Explore plans, N = Nice work, reward yourself, D = Don't forget to practice, S = Stay calm for life; Barrett et al., 2006). Sixth graders in the program reported significantly lower anxiety compared to the standard curriculum control group, but there were no changes in depressive symptoms across 6th and 9th grade cohorts (Barrett et al., 2006).

The Youth Aware of Mental Health Program (YAM) is a mental health awareness program developed in Sweden that focuses on risk and protective factors related to mental illness, specifically depression and anxiety (Wasserman et al., 2015). The program also provides knowledge about skills adolescents can use to handle adverse life events, stress, and depressive symptoms (Wasserman et al., 2015). The program targets 9th graders and has five 45 – 60-minute sessions that emphasizes adolescents playing an active part within the dilemmas and role plays. Session 1 is didactic based and provides psychoeducation about mental health, stress, and depression (Wasserman et al., 2015). Session 2 reviews dilemmas when adolescents focus on feelings, behavior, and perceived consequences (Wasserman et al., 2015). Sessions 3 and 4 involve role plays where adolescents act out dilemmas related to mental health (Wasserman et al., 2015). Session 5 is an overview of what was discussed within each class. (Wasserman et al., 2015). Research from studies across 10 European countries demonstrated evidence in the reduction of suicidal ideation and attempts after completion of the program when compared to results from the Question, Persuade, and Refer program (QPR), professional screening, and curriculum as usual groups (Wasserman et al., 2015).

While all of the aforementioned programs have demonstrated positive results, there are limitations that need to be addressed. Universal programs are most efficient in reaching children and adolescents, but Fenwick-Smith and colleagues (2018) emphasized possible concerns about implementing programs that might not benefit those who already have high

levels of resilience. Werner-Seidler and colleagues (2017) suggested targeting low and high levels of resilience in schools with a stepped-care approach. However, this would increase resources for training individuals to conduct the program and may take time away from other areas of the school's curriculum. Another method to potentially reach almost all children and adolescents would be to develop a resilience-enhancing program that is tailored to the individual, through a mental health phone application.

Technology Applications for Mental Health

Phone applications have demonstrated efficacy in positively impacting mental health, specifically adolescent anxiety and depression (Grist et al., 2017). The majority of studies have focused on mental health application feasibility, concluding that specific factors such as aesthetics, ease of usability, and components of the applications, are important in its adoption and use (Bakker et al., 2016, Kenny et al., 2016, & Grist et al., 2017). Specific applications that have focused on principles surrounding feasibility and usability have received positive ratings from adolescents (Kenny et al., 2015; Rickard et al., 2016). However, using mental health applications creates worries for both adolescents and adults.

With mental health applications for adolescents, parents and other adults have reported concerns about safety and privacy (East and Havard, 2015; Kenny et al., 2016). Seventy percent of people who use mental health applications reported importance of privacy and data encryption within application (Schuller et al., 2018). Most applications collect GPS information, video and daily usage, which can lead to privacy issues (Huckvale et al., 2015; Kramer & Fu, 2017). However, most mental health applications do not have any regulatory restrictions and do not address safety concerns (O'Loughlin et al., 2019). Application questions need to be developed to address potential safety concerns and to follow the American Psychiatric Association recommended guidelines regarding privacy and

confidentiality to limit users' personal information being disseminated outside of the application (Torous et al., 2018).

Outside of safety concerns, participants reported other barriers to using mental health applications. There have been discrepancies about adolescents' interest in using mental health applications (Grist et al., 2018). Studies have provided evidence that adolescents and young adults do not prefer use of mental health applications for treatment (Bradford et al., 2014; Wetterlin et al., 2014). One study provided evidence that adolescents reported challenges trusting the accuracy of information in applications and believed applications would not be as useful as in-person or face-to-face interventions (Grist et al., 2018).

When developing an application, it is important to include the consumers and stakeholders who are involved with evaluating the efficacy of the application. For adolescents, this includes teachers, parents, and clinicians. With applications centered around depression, clinicians reported positive feedback about effectiveness of these interventions (Kerst et al., 2019). While clinicians are involved in the process of developing mental health applications, Kenny and colleagues (2016) underscored the importance of including adolescents in the design, plan, and evaluation of mental health applications (Kenny et al., 2016). Asking questions about usability, design, and specific components, can provide beneficial information about what adolescents prefer within the application and what needs to be changed (Kenny et al., 2016). Adolescents and other stakeholders need to be included in the provision of feedback about what the mental health application should encompass. Questions should be administered to adolescents and stakeholders to address concerns about barriers to using mental health applications. Gathering individual and focus group interviews from all these different groups is necessary when designing a fundamentally sound mental health application.

Effectiveness of Applications

Recent meta-analyses have provided evidence that phone-based interventions which include self-monitoring components, tailoring to the individual, and focus on increasing social interaction, were significantly more effective than applications without those components (Morrison et al., 2012; Kenny et al., 2015, Turvey & Roberts, 2015; Bakker et al., 2016). Self-monitoring involves the ability to log and record symptoms or behaviors through the mental health application (Turvey & Roberts, 2015). This can assist users in tracking their mood and activity level over a longer period of time, to determine if there have been any changes (Turvey & Roberts, 2015). Utilizing self-monitoring components can provide users options to receive mobile phone or e-mail reminders, which adds to users' control over the experience (Morrison et al., 2012). Tailoring involves individualizing the experience for the user, based on behavioral or demographic information (Morrison et al., 2012). While it may be easier to tailor based on one variable, researchers have determined that utilizing more variables to individualize the users' experience may be more effective in eliciting positive change (Morrison et al., 2012). This can also lead to making an application more interactive and to the delivery of treatment material in a multitude of ways, which can be more engaging to the user (Schuller et al., 2014). There has been initial evidence that mobile application efficacy may be aided by increasing social engagement (Turvey & Roberts, 2015). While the goal of social interaction within applications is to have individuals engage with one another, having automatic dialogue components produced by avatars and discussing issues that matter to users can have beneficial effects on outcomes (Morrison et al., 2012). However, while recent studies have identified features related to application efficacy, there are still no consensus guidelines for the core set of features that applications should have (Wisniewski et al., 2019).

Specifically, mental health applications for adolescents have shown efficacy in reducing negative mental health outcomes (Grist et al., 2017). Use of Ibobly, an application aimed at

reducing depression in adolescents and young adults (Tighe et al., 2017) resulted in decreases in suicidal ideation, depression symptoms, and distress. Mobiletype (Reid et al., 2013) demonstrated an increase in coordination of care between adolescent patients and pediatricians. To date, there have been 13 mental health applications that have been extensively studied in adolescents (see Table 1). However, a meta-analysis stated more mental health applications need to be tested with adolescents to determine efficacy (Grist et al., 2017). From focus groups and prototype testing, it is important to produce an application that is feasible, efficacious, and safe. There is a need for a mental health application that incorporates these aspects and promotes the importance of resilience and coping with stress.

While there have been efficacious universal resilience programs and mental health applications, to our knowledge there have been no mental health applications that focus on bolstering resilience in adolescents. A mental health application would be beneficial to increase adolescents' resilience and would be tailored to benefit those who have low, medium, and high levels of resilience. Adolescents and adults have identified barriers to using mental health applications in the past, so there is a need to gather input from these consumers and stakeholders to guide in building such a mental health application. Conducting individual interviews and focus groups will assist in utilizing application components that adolescents find helpful and will address some of the concerns about using a mental health application. Study 1 and Study 2 will gather more information whether a mental health application focused on resilience is feasible (Study 1) and if using an application may help increase levels of resilience along with increasing other positive mental health outcomes (Study 2).

Chapter II

Hypotheses

Overview of Project

This project built upon a resilience application development initiative at the UT Southwestern Center for Depression Research and Clinical Care. The CDRC developed a resilience web-based application to be used by adolescents to enhance mental health literacy, teach coping skills, and increase resilience. The eventual goal of this project is to have paired content available for teachers to use in classroom settings, and for mental health professionals and pediatric physicians to use in healthcare settings. Through focus interviews, information was obtained about feasibility and acceptability of this resilience application. Topics such as likelihood of use, content, confidentiality, and safety, were addressed with groups of adolescents, parents, teachers, and clinicians who provided feedback through interviews and focus groups. An additional aim of this project was to obtain pre- and post-ratings of the Adolescent Resilience Questionnaire (ARQ), (Gartland et al., 2011) by adolescents using this application along with pre- and post-ratings of secondary mental health outcomes.

Aims for Study 1 are as follows:

Aim I: To utilize input from approximately 20 adolescents, 4 parents, 4 teachers, and 5 mental health professionals to develop and refine a resilience application for adolescents. In Phase 1, participants were asked approximately 10 questions with individual interviews and focus groups that inquired about: everyday application use, motivations (intrinsic and extrinsic) for adolescents to use a mental health application, knowledge of resilience, components of mental health applications that would be beneficial, and concerns about using a smartphone application. In Phase 2, participants were asked approximately 10 questions with individual interviews and focus groups that inquired about: general feedback related to

the application, whether or not they would use this application, questions about usability and feasibility, and concerns about the application.

Aim II: To evaluate the technical, user feasibility, and user acceptability of a resilience application designed for use by adolescents through the Computer System Usability Questionnaire (Lewis, 1995) and Mobile Application Rating Scale (Stoyanov et al., 2015). Data was gathered from 9 adolescents, 1 parent, 1 teacher, and 2 mental health professionals. As prototypes were launched, our research team obtained feedback from stakeholders to develop application that was useful and safe.

Hypothesis Ia: Adolescents, parents, teachers, and clinicians will report via Computer System Usability Questionnaire that the resilience application is feasible and acceptable. Acceptable scores would constitute ratings of 4 (“average”) or above on the Computer System Usability Scale, which items range from 1 to 7.

Hypothesis Ib: Adolescents, parents, teachers, and clinicians will report via the Mobile Application Rating Scale that the resilience application is feasible and acceptable. Acceptable scores would constitute ratings of 3 (“average”) or above on the Mobile Application Rating Scale, which items range from 1 to 5.

Aims for Study 2 are as follows:

Aim III: To pilot test the resilience application with 40 adolescents to examine the impact of application use on a measure of resilience, the Adolescent Resilience Questionnaire (ARQ; Gartland et al., 2011). The ARQ was administered prior to use of the resilience application and 1 day after participants stopped using the application with a window of 3 days.

Hypothesis IIa: Adolescents will demonstrate statistically significant increases in total score on the Adolescent Resilience Questionnaire after using the application for 30 days.

Hypothesis IIb: Adolescents will demonstrate statistically significant increases in individual factors score on the Adolescent Resilience Questionnaire after using the application for 30 days.

Aim IV: To determine if a resilience application led to changes in adolescents' general self-efficacy based on use of a measure of self-efficacy, the Generalized Self-Efficacy Scale (GSE; Schwarzer & Jerusalem, 1995). The GSE was administered 1 day prior to use of resilience application and 1 day after participants stopped using the application with a window of 3 days.

Hypothesis III: Adolescents will demonstrate statistically significant increases in total score on the Generalized Self-Efficacy Scale after using the application for 30 days.

Aim V: To determine if a resilience application led to changes in adolescents' overall happiness on a measure of general happiness, the Subjective Happiness Scale (SHS; Lyubomirsky & Lepper, 1999). The SHS was administered 1 day prior to use of resilience application and 1 day after participants stopped using the application with a window of 3 days.

Hypothesis IV: Adolescents will demonstrate statistically significant increases in total score on the Subjective Happiness Scale after using the application for 30 days.

Aim VI: To determine if a resilience application led to changes in adolescents' ability to identify their emotions on a measure of emotional awareness, the Emotional Awareness Questionnaire (EAQ; Rieffe et al., 2008). The EAQ was administered 1 day prior to use of resilience application and 1 day after participants stop using the application with a window of 3 days.

Hypothesis V: Adolescents will demonstrate statistically significant increases in total score on the Emotional Awareness Questionnaire after using the application for 30 days.

Aim VII: To determine if a resilience application led to a change in adolescents' ability to use adaptive coping skills and decrease in use of maladaptive coping skills on a measure of coping ability, the BRIEF COPE (Carver, 1997). The BRIEF COPE was administered a day prior to use of the resilience application and 1 day after participants stop using with a window of 3 days.

Hypothesis VIa: Adolescents will demonstrate statistically significant increases in adaptive coping on the BRIEF COPE after using the application for 30 days.

Hypothesis VIb: Adolescents will demonstrate statistically significant decreases in maladaptive coping on the BRIEF COPE after using the application for 30 days.

Aim VIII: To determine if a resilience application led to adolescents' perceptions of social support on a measure of interpersonal support, the Interpersonal Support Evaluation (ISEL; Cohen et al., 1985). The ISEL was administered 1 day prior to use of resilience application and 1 day after participants stop using the application with a window of 3 days.

Hypothesis VII: Adolescents will demonstrate statistically significant increases in total score on the ISEL after using the application for 30 days.

Aim IX: To evaluate the technical, user feasibility, and user acceptability of a resilience application designed for use by adolescents after they used the application for 30 days.

Hypothesis VIIIa: Adolescents will report via Computer System Usability Questionnaire that the resilience application is feasible and acceptable after using it for 30 days. Acceptable scores would constitute ratings of 4 ("average") or above on the Computer System Usability Scale, which items range from 1 to 7.

Hypothesis VIIIb: Adolescents will report via the Mobile Application Rating Scale that the resilience application is feasible and acceptable after using it for 30 days. Acceptable scores would constitute ratings of 3 ("average") or above on the Mobile App Rating Scale, which items range from 1 to 5.

Aim X: To gather passive data through use to determine how many adolescents used the entire application, what sections of the application the adolescents preferred, and if there was a preference for specific modules

Chapter III

Method

Overview of Application

The goal of this project was to develop a mental health application for adolescents that enhances mental health literacy, teaches coping skills, and increases resilience. The mental health application targets adolescents between the ages 12 – 18. The eventual goal of this project is to have paired content available for teachers to use in classroom settings, and for mental health professionals and pediatricians to use in healthcare settings. In our current school-based depression prevention efforts, adolescents have given feedback that they would be interested in videos or activities that cover the ideas of mood, stress, and how to navigate social relationships (Hughes, personal communication).

Each module follows a stepwise approach that includes: What is it?, What does it look like?, Where do I rate?, How do I change it?, and How can I practice? The depression module teaches adolescents about the difference between sadness and depression. The module places emphasis on the symptoms adolescents would experience if they were depressed. Adolescents are able to rate depressive symptoms with a simple questionnaire (PHQ-9) to obtain a total score regarding their depression severity (from none to severe). Adolescents learn about specific strategies that can be helpful when depressed (e.g. Do an activity they enjoy) and can incorporate these strategies in the practice section (e.g. Do specific activity for certain number of minutes; rate mood before and after).

The stress module places emphasis on what stress consists of for an adolescent. The module introduces psychoeducation about negative stress, positive stress, and recognizing when stress can lead to increased difficulties and anxiety. The module provides important information about various ways stress presents in the body. Adolescents are able to rate anxiety symptoms with a simple questionnaire (GAD-7) to obtain a total score regarding

anxiety severity (from none to severe). Similar to the mood module, adolescents can learn ways to decrease their stress (e.g. Practicing relaxation) and can focus on this in the practice section (e.g. Taking a warm shower or bath).

The lifestyle module discusses the importance of self-care and the impact it can have on quality of life. The module focuses on physical activity, nutrition, sleep, and mindfulness. Adolescents can rate themselves across these areas to see if they are in a healthy range or if changes need to be made. Adolescents can learn about strategies to help improve quality of life across these areas (e.g. Nutrition- think of food alternatives- turkey burger instead of regular burger) and can incorporate some of these changes in the practice section (e.g. Nutrition- Listing times of mindful vs. mindless eating).

Study 1 Participants

For Study 1, participants were recruited through existing programs at the UT Southwestern Center for Depression Research and Clinical Care (CDRC). Inclusion criteria for adolescents included the following: ages 12-18, English-speaking, parent or legal guardian must be able to provide written consent, the adolescent must be able to provide written informed assent, and the adolescent has a mobile phone. Inclusion criteria for parents, teachers, and clinicians included the following: English-speaking, and having a mobile phone. Exclusion criteria included the following: children under 12 year of age and adults over 18 years of age, non-English-speaking, and without a mobile phone.

Study 2 Participants

For Study 2, participants were recruited through existing programs at the CDRC to pilot-test the application and determine if there were changes in resilience after using the application for 30 days. Inclusion criteria and exclusion criteria for adolescents were the same as above for Study 1.

Study 1 Design

For Study 1, I conducted one-on-one interviews along with focus groups in two phases. Individual interviews for qualitative approaches can provide the “why” people feel or answered in a certain way that cannot always be captured in quantitative approaches (Bernard, 2006). Focus groups can be important as an adjunct to individual interviews due to the interactive component of having multiple people in the room and can generate new ideas that might not be captured within individual interviews (Bernard, 2006).

Phase I: First, in Phase 1, interviews and focus groups were conducted to guide development of content for the mental health application. I conducted 5 one-on-one interviews with adolescents, 3 one-on-one interviews with parents, 3 one-on-one interviews with teachers, and 3 one-on-one interviews with clinicians. Interviews followed a semi-structured design, using a guide covering topics such as: incentives to use a mental health application, possible benefits, and concerns about using this application. The guide was exploratory, but also incorporated key themes and concepts (e.g. mental health objective of the application) the researchers determined *a priori* to be important for development of the application.

Our interview sample was comprised of: adolescents that participate in the RAD longitudinal study parents of adolescents who participate in one of the longitudinal studies; teachers of classrooms who have participated in the YAM program; and clinicians who have experience working with adolescents. Each individual interview ranged from 20 to 50 minutes. Adolescents who participated in individual interviews were independently sampled and did not participate in focus groups to limit repetition of information and limit selection bias if some adolescents only participated in one portion of the study.

For focus groups, a member of my research team and I conducted 1 focus group with adolescents. This group had 6 adolescent participants. The focus group questions were similar to those utilized in individual interviews. The focus group interview lasted

approximately 60 minutes and used a semi-structured format to cover these topics: incentives to use this application, benefits from the application, and concerns about using this application with an interactive discussion between group members. Similar to the individual interviews, exploratory and confirmatory questions were utilized to help redefine or solidify the mental health application that was being developed.

Phase 2: In Phase 2, interviews and focus groups were conducted to ask adolescents, parents, teachers, and clinicians about the feasibility of the application once part of a prototype was launched. Given the iterative process of the resilience application development, an updated prototype (Prototype 2.0) was completed during Study 1, Phase 2. Prototype 1.0 was used for the individual interviews, and Prototype 2.0 was used for the focus group. Changes from Prototype 1.0 to Prototype 2.0 included the removal of the “Rate Your Mood” function (platform incompatibility), change in depression module game (content and graphic updates), and improved smartphone adaptability. As mentioned above in Phase 1, I conducted 5 one-on-one interviews with adolescents, 1 one-on-one interview with a parent, 1 one-on-one interview with a teacher, and 2 one-on-one interviews with clinicians. Each individual interview lasted 25-50 minutes and involved letting the participant play first version of the application (Prototype 1.0) for at least 15 minutes on a tablet (iPad). Adolescents who participated in individual interviews were independently sampled and were not able to participate in focus groups. As congruent with Phase 1, the individual interviews were semi-structured and included more confirmatory questions in relation to the prototype that individuals had access to. All questions were included to help further redefine or solidify the application that was being developed before it was tested for initial efficacy. Topics covered included: usability of the application, aesthetic qualities of the application, and what would you change about the application.

For the focus group, our research team recruited 4 adolescents and the group was led by two team members. Adolescents who participated in focus groups were independently sampled and were not able to participate in individual interviews. The focus group interview lasted approximately 60 minutes, which involved asking group members to explore an updated version of the application (Prototype 2.0) on their phone for at least 15 minutes. I used a semi-structured format which covered these topics: usability of the application, aesthetic qualities of the application, and what would you change about the application with an interactive discussion between group members. Similar to the individual interviews, exploratory and confirmatory questions were utilized to help further refine or consolidate the application that was being developed before it was tested for initial efficacy.

Participants were given \$25 for participation in focus groups and \$50 for participation with individual interviews. Participants also completed two questionnaires (Computer System Usability Questionnaire; Lewis 1995, Mobile Application Rating Scale, Stoyanov et al., 2015) which obtained quantitative data about participants' thoughts surrounding feasibility and acceptability of the application.

The questions and initial research design for Phase 1 and Phase 2 are presented in Appendix 1. Images used during Study 1, Phase 2 interviews are included in Appendix 2. All interviews were recorded in order to be transcribed. Once transcribed, interviews were coded by two members of the study team with the assistance of a qualitative expert. The software NVivo 10.0 (QSR Australia) was used to organize all coded material that was accessible for analysis.

Study 2 Design

Study 2: For Study 2, after gathering qualitative feedback, our research team recruited 40 adolescents to use the application for one month. Participants were recruited from the CDRC longitudinal studies to use the application. Adolescents completed measurements that

measure levels of resilience (Adolescent Resilience Questionnaire, Gartland et al., 2011), self-efficacy (Generalized Self-Efficacy Scale (Schwarzer & Jerusalem, 1995), happiness (General Happiness Scale, Lyubomirsky & Lepper, 1999), emotional awareness (Emotional Awareness Questionnaire, Rieffe et al., 2008), coping skills (BRIEF COPE, Carver, 1997), and perceived social support (Interpersonal Social Support, Cohen et al., 1985). Adolescents were given weekly reminders through email to use the application with the hope of increasing their engagement as this has shown to be effective within the Mobile Mood Diary (Matthew & Doherty, 2011). Adolescents completed these questionnaires before and 1 day after using the application for one month, with 3-day windows to complete post-study questionnaires. Adolescents were provided total compensation of \$50 for using this application over a 30-day duration and completing the pre-and-post questionnaires.

Study 1 Measures

Feasibility and Acceptability

Copies of all measures are in Appendix 3. Feasibility and acceptability for Study 1, Phase 2 was measured by the Computer System Usability Questionnaire (Lewis, 1995) and the Mobile Application Rating Scale (Stoyanov et al., 2015). The Computer System Usability Questionnaire has 19 items asking about usability of the application from a scale of 1(strongly disagree) to 7(strongly agree). Higher scores indicate greater acceptability and feasibility. Lewis and colleagues (1995) demonstrated excellent internal consistency ($\alpha = 0.95$).

The Mobile Application Rating Scale (Stoyanov et al., 2015) has 29 items with six sections of questions that focus on engagement, functionality, aesthetics, distribution of information, likelihood to use application, and impact of application within the community. Questions range on a Likert scale from 1 – 5. Higher scores indicate greater acceptability and

feasibility. Stoyanov and colleagues (2015) provided initial evidence for excellent internal consistency ($\alpha = 0.90$).

Study 2 Measures

Feasibility and Acceptability

Participants will be given the Computer System Usability Questionnaire and Mobile Application Rating Scale after using the application for 30 days.

Resilience

Resilience was measured by the Adolescent Resilience Questionnaire (Gartland et al., 2011). This 88-item self-report measure assesses individual resilience, support from friends, parents, teachers, and resources available throughout their neighborhood. Questions are rated on a scale from 1(Almost Never) to 5(Almost Always). Total scores for the ARQ range from 88– 440. Total scores for the ARQ Individual Composite range from 40 – 200 and consist of the ARQ Individual subscales (Confidence, Emotion Insight, Negative Cognition, Social Skills, Empathy) . Higher scores indicate greater resilience. The Adolescent Resilience Questionnaire has 5 domains: individual, family relationships, peer relationships, support at school, and support in the community (Gartland et al., 2011). Across these 5 domains, internal consistency ranged from good ($\alpha = 0.7$) to excellent ($\alpha = 0.9$) in a sample of high school students (Gartland et al., 2011).

Self-Efficacy

Self-efficacy was measured by the Generalized Self-Efficacy Scale (Schwarzer & Jerusalem, 1995). This 10-item self-report assesses individuals' self-efficacy on a four-point scale ranging from 1(Not at all True) to 4(Exactly True). Total scores for the GSE range from 10 – 40. Higher scores indicate greater self-efficacy. In a study with university students in Poland, the Generalized Self-Efficacy Scale had excellent internal consistency ($\alpha = 0.9$; Luszczynska & Schwarzer, 2005).

Subjective Happiness

Subjective happiness was measured by the General Happiness Scale (GHS; Lyubomirsky & Lepper, 1999). This 4-item self-report assesses individuals' happiness on a daily basis ranging on a Likert scale of 1 to 7. Total scores for the GHS range from 4 – 28. Higher scores indicate increased general happiness. Internal consistency was acceptable ($\alpha = 0.81$) in a high school sample (Lyubomirsky & Lepper, 1999).

Emotional Awareness

Emotional awareness was measured by the Emotion Awareness Questionnaire (EAQ; Rieffe et al., 2008). This 30-item self-report assesses an individual's awareness of how they are feeling in given situations. For each item, there are 3 answer choices (not true, sometimes true, and always true). Total scores for the EAQ range from 30 – 90. Higher scores indicate increased levels of self-awareness of emotions. For middle school and high school adolescents, internal reliability was acceptable ($\alpha = 0.74 – 0.77$; Rieffe et al., 2008).

Coping Skills

Coping skills was measured by the BRIEF COPE (Carver, 1997). This 28-item self-report assesses an individual's ability to utilize different coping skills within their environment. For each item, scale ranges from 1(have not been doing this) to 4(being doing this a lot). Total scores for the BRIEF COPE adaptive coping skills range from 18 - 72. Higher scores indicate increased utilization of adaptive coping skills. Total scores for the BRIEF COPE maladaptive coping skills range from 10 – 40. Higher scores indicate increased utilization of maladaptive coping skills. For an adolescent sample, Coyle and Vera (2013) found an internal consistency of 0.85.

Interpersonal Support

Perception of interpersonal support was measured by the Interpersonal Support Evaluation (Cohen et al., 1985). This 12-item self-report assesses an individual's subjective

perception of support from others within their environment. For each item, scale ranges from 1(definitely false) to 4(definitely true). Total scores for the ISEL range from 12 – 48. Higher scores indicate high perception of social support. There has been support for reliability and validity of the measure within a college sample (Brookings & Bolton, 1988)

Chapter IV

Qualitative and Quantitative Analyses

Study 1:

Aim I: To utilize input from adolescents, parents, teachers, and mental health professionals to develop and refine a resilience application for adolescents.

Analyses: Four independent raters and one qualitative expert were involved with transcribing and coding the audio recordings into the NVivo software. An interview guide was created to reflect themes that had been referenced in previous mental health application research (Kenny et al., 2016). Kenny and colleagues (2016) identified multiple themes after targeted youth focus groups for their mental health application (CopeSmart). Their themes helped form our interview questions and initial coding list (Kenny et al., 2016). A deductive coding list was developed from the interview guide with assistance from a qualitative expert and agreement from the research team through consensus discussion. Team members who served as independent raters first participated in a co-rating exercise for a set of two test-set transcripts. Discrepancies amongst team members about codes were highlighted and reviewed by the team to reach a consensus. After reviewing test-set of two transcripts, inductive codes were added (i.e. social interaction and time) based on team member agreement. Each individual interview and focus group transcript was reviewed by two independent raters. Once calibration had been achieved, two members of the study team coded each transcript and met to ensure consistency in coding. The software NVivo 10.0 (QSR Australia) was used to organize all coded material in a manner that is easily accessible for analysis. This process was done for both Study 1, Phase 1 and Study 1, Phase 2.

For Study 1, Phase 1, the final coding list included resilience, engagement, confidentiality, concern, ease, features, benefits, experience, enjoyment, interest, content, self-conscious, unique, social interaction, time, and *in vivo* or striking direct quote (which

were subsequently reviewed for relevance). For Study 1, Phase 2, the final coding list included resilience, like, dislike, engagement, confidentiality, concern, ease, features, benefits, experience, content, teen vlogger, doctor, improvement, frequency of use, recommendations, unique, and *in vivo* or striking direct quote (which were subsequently reviewed for relevance). Only codes that were agreed upon were included in the final analysis.

Aim II: To evaluate the technical, user feasibility, and user acceptability of a resilience application designed for use by adolescents through the Computer System Usability Questionnaire (Lewis, 1995) and Mobile Application Rating Scale (Stoyanov et al., 2015).

Hypothesis Ia: Adolescents, parents, teachers, and clinicians will report via Computer System Usability Questionnaire that the resilience application is feasible and acceptable. Acceptable scores would constitute ratings of 4 (“average”) or above on the Computer System Usability Scale, which items range from 1 to 7.

Analyses: Obtained means (and standard deviations) for feasibility and acceptability through the Computer System Usability Questionnaire. Scores above 4 provide evidence that resilience application is feasible and acceptable

Hypothesis Ib: Adolescents, parents, teachers, and clinicians will report via the Mobile Application Rating Scale that the resilience application is feasible and acceptable. Acceptable scores would constitute ratings of 3 (“average”) or above on the Mobile App Rating Scale, which items range from 1 to 5.

Analyses: Obtained means (and standard deviations) for feasibility and acceptability through Mobile Application Rating Scale. Scores above 3 will provide evidence that resilience application is feasible and acceptable.

Study 2:

This is a small pilot study which aimed to obtain the preliminary data needed to design a larger-scale evaluation of the resilience application. Therefore, the main emphasis was on establishing feasibility and obtaining preliminary results and effects sizes for the primary intervention goals related to the resilience application. We recognized the need for caution in using small pilot study results to guide sample size selection and that the value of pilot studies is primarily in the knowledge acquired regarding how best to design a later stage randomized controlled trial (Kraemer et al., 2006). The research team obtained means (and standard deviations) of the Computer System Usability Questionnaire and Mobile Application Rating Scale to determine feasibility and acceptability of using the application.

However, in an effort to guide sample size selection for the pilot, we examined the literature for guidance. Previous meta-analysis provided evidence that sample size of 30 participants was appropriate for a feasibility study examining continuous variables (Billingham et al., 2013). A separate study indicated that for pilot studies, confidence levels could be reduced to as low as 75% instead of the standard 95% (Lee et al., 2014). Viechtbauer and colleagues (2015) provided evidence that sample size for feasibility studies should be determined based on confidence interval and probability of detecting unforeseen problems within the study sample. However, there were certain barriers to conducting a power analysis for this feasibility study. There is limited research using the ARQ at two time points. One study demonstrated evidence that 30-40 points on the ARQ total scale separated adolescents who fell in the 50th and 75th percentile. (Guilera et al., 2015). In addition, there is minimal guidance about how much change to expect with a mental health application over a 30-day period. Bush and colleagues (2017) conducted a randomized control trial for their mental health application, Virtual Hope Box, in US veterans. These researchers predicted that for changes in self-efficacy levels over 3 weeks of using a mental health application, there would be an effect size greater than .5 (Bush et al., 2017). That study included 46 participants

in treatment group and 52 participants in the treatment as usual group (Bush et al., 2017). Using similar metrics for effect size ($>.5$), significance level ($\alpha=0.05$), and power (0.8), obtaining similar results would require about 34 participants, which was lower than the 40 recruited participants for our study.

Aim III: To pilot test the resilience application with 40 adolescents to examine the impact of application use on a measure of resilience, the Adolescent Resilience Questionnaire (ARQ; Gartland et al., 2011). The ARQ was administered 1 day prior to use of the resilience application and 1 day after participants stopped using the application with a window of 3 days.

Hypothesis IIa: Adolescents will demonstrate statistically significant increases in total score on the Adolescent Resilience Questionnaire after using the application for 30 days.

Hypothesis IIb: Adolescent will demonstrate statistically significant increases in individual factors score on the Adolescent Resilience Questionnaire after using the application for 30 days.

Analyses: P-P plots were conducted to test the assumption of normality for all the dependent t-tests. For hypothesis IIa and IIb, dependent samples t-tests were conducted to determine if there are any changes in resilience for adolescents before and after they use the application. For continuous measures, we used dependent t-tests, using appropriate transformation or substituting non-parametric methods as necessary to deal with distributional issues such as skewness or outliers. For hypothesis IIa and IIb, means (and standard deviations) of the Adolescence Resilience Questionnaire were reported. The dependent samples t-test were used to determine if there was evidence to support hypothesis IIa and IIb. There have been few studies to explore changes to resilience via the Adolescent Resilience Questionnaire. One study demonstrated evidence that an increase in resilience from the 50th to the 75th percentile would require a change in the range of 30-40 points over

the total scale (Guilera et al., 2015). Therefore, while statistically significant results for resilience were determined by change between pre and post scores, our research team determined the difference to be clinically significant if there was an increase of at least 30 points in total score. While this study was not comparing the application to another type of treatment, a statistically and clinically significant increase in resilience scores would demonstrate initial efficacy for the application.

Aim IV: To determine if a resilience application led to changes in adolescents' general self-efficacy based on use of a measure of self-efficacy, the Generalized Self-Efficacy Scale (GSE; Schwarzer & Jerusalem, 1995).

Hypothesis III: Adolescents will demonstrate statistically significant increases in total score on the Generalized Self-Efficacy Scale after using the application for 30 days.

Analyses: For Hypothesis III, a dependent samples t-test was conducted to determine if there is a statistically significant change in self-efficacy. For hypothesis III means (and standard deviations) of the Generalized Self-Efficacy Scale were reported. The dependent samples t-test determined if there was evidence to support hypothesis III.

Aim V: To determine if a resilience application led to changes in adolescents' overall happiness on a measure of general happiness, the Subjective Happiness Scale (SHS; Lyubomirsky & Lepper, 1999).

Hypothesis IV: Adolescents will demonstrate statistically significant increases in total score on the Subjective Happiness Scale after using the application for 30 days.

Analyses: For Hypothesis IV, a dependent samples t-test was conducted to determine if there was a statistically significant change in overall happiness. The dependent samples t-test determined if there was evidence to support hypotheses IV.

Aim VI: To determine if a resilience application will lead to changes in adolescents' ability to identify their emotions on a measure of emotional awareness, the Emotional Awareness Questionnaire (EAQ; Rieffe et al., 2008).

Hypothesis V: Adolescents will demonstrate statistically significant increases in total score on the Emotional Awareness Questionnaire after using the application for 30 days.

Analyses: For Hypothesis V, a dependent samples t-test was conducted to determine if there was a statistically significant change in adolescents' ability to identify their emotions. The dependent samples t-test determined if there was evidence to support hypotheses V.

Aim VII: To determine if a resilience application will lead to a change in adolescents' ability to use adaptive coping skills and decrease in use of maladaptive coping skills on a measure of coping ability, the BRIEF COPE (Carver, 1997).

Hypothesis VIa: Adolescents will demonstrate statistically significant increases in adaptive coping on the BRIEF COPE after using the application for 30 days.

Analyses: For Hypothesis VIa, a dependent samples t-test was conducted to determine if there was a statistically significant change in ability to use adaptive coping skills. The dependent samples t-test determined if there was evidence to support hypotheses VIa.

Hypothesis VIb: Adolescents will demonstrate statistically significant decreases in maladaptive coping on the BRIEF COPE after using the application for 30 days.

Analyses: For Hypothesis VIb, a dependent samples t-test was conducted to determine if there was a statistically significant change in usage of maladaptive coping skills. The dependent samples t-test determined if there was evidence to support hypotheses VIb.

Aim VIII: To determine if a resilience application will lead to adolescents' perceptions of social support on a measure of interpersonal support, the Interpersonal Support Evaluation (ISEL; Cohen et al., 1985).

Hypothesis VII: Adolescents will demonstrate statistically significant increases in total score on the ISEL after using the application for 30 days.

Analyses: For Hypothesis VII, a dependent samples t-test was conducted to determine if there was a statistically significant change in perceived social support. The dependent samples t-test determined if there was evidence to support hypotheses VII.

Aim IX: To evaluate the technical, user feasibility, and user acceptability of a resilience application designed for use by adolescents after using application for 30 days.

Hypothesis VIIIa: Adolescents will report via Computer System Usability Questionnaire that the resilience application is feasible and acceptable after using it for 30 days. Acceptable scores would constitute ratings of 4 (“average”) or above on the Computer System Usability Scale, which items range from 1 to 7.

Analyses: Obtained means (and standard deviations) for feasibility and acceptability through the Computer System Usability Questionnaire. Scores above 4 provide evidence that resilience application is feasible and acceptable.

Hypothesis VIIIb: Adolescents will report via the Mobile Application Rating Scale that the resilience application is feasible and acceptable after using it for 30 days. Acceptable scores would constitute ratings of 3 (“average”) or above on the Mobile App Rating Scale, which items range from 1 to 5.

Analyses: Obtained means (and standard deviations) for feasibility and acceptability through Mobile Application Rating Scale. Scores above 3 provide evidence that resilience application is feasible and acceptable.

Aim X: To gather passive data through use to determine how many adolescents used the entire application, what sections of the application the adolescents preferred, and if there is a preference for specific modules.

Analyses: Obtained frequencies for the number of users who viewed the entire application, the sections users viewed, and completion of specific modules

Chapter V

Results

Study 1, Phase 1 Themes

Demographics for Study 1, Phase 1 adolescent individual participants (n=5) are presented in Table 2, adult participants (n=9) are presented in Table 3, and adolescent focus group participants (n = 4) are in Table 4. Consort Diagrams for Study 1, Phase 1 adolescent individual participants, adolescent focus group participants, and adult individual interviews are in Figures 1, 2, and 3. The summary of Study 1, Phase 1 qualitative data from the individual interviews and the focus group is presented below. Themes identified during Study 1, Phase 1 individual interviews include: Interest, Content, Features, Engagement, Ease, Benefits, Enjoyment, Concerns, Confidentiality, Self-Conscious, and Most Important Thing. Adolescent individual interviewee quotes are presented in Table 9. Adolescent focus group quotes are presented in Table 10. Adult individual interview quotes are presented in Table 11.

Interest

Adolescent individual interviewees described being interested in using a mental health application. One interview participant described decreases in mental health stigma would allow adolescents to be more open to using mental health applications (1-A). Another interview participant stated they would be interested in using a mental health application to learn more about the role of the brain in processing emotions (2-A).

The majority of adolescent focus group participants agreed with each other and stated they would be interested in using a mental health application. However, some adolescents were more cautious and expressed less interest if the application was only providing information in comparison to incorporating interactive activities (1-AFG)

There were some disagreements among adult participants about youth interest level in using a mental health application. Parent and teacher interviewees thought adolescents would be excited to learn about their mental health through an application (1-P, 1-T). In comparison, pediatric clinicians were skeptical about youth interest and cited experiences when adolescents reported only using mental health applications for a brief period of time (1-C, 2-C).

Content

Most adolescent individual interviewees reported difficulties brainstorming what content would be important in the absence of a prototype. Youth agreed that having adolescents similar in age sharing their mental health experiences would be helpful compared to only listening to videos about the symptoms of depression (1-A, 2-A). One adolescent revealed wanting to learn more about how someone's diet could impact their mental health (3-A). While most interview participants understood the necessity of informative videos, one adolescent emphasized that the mental health application should focus on surveys and self-care strategies (4-A).

Some adolescent focus group participants reported wanting the application to discuss navigating complex situations, but the majority of focus group interviewees agreed that having the application focus on strategies to decrease stress should be included (1-AFG). Focus group participants emphasized the importance of having adolescents discuss their mental health experiences compared to having a generic narrator (2-AFG). One focus group participant described the importance of including coping skills adolescents could use within and outside of the application (3-AFG).

Adult participants found it challenging to think of content without having a prototype, but some interviewees discussed the importance of having adolescents learn self-care tips and how to navigate complex situations (1-P, 1-C).

Features

Individual interview adolescents were unable to achieve consensus feature preferences. However, multiple interview participants wanted less visual text and more images (1-A, 2-A). Others emphasized the value of including different features that connected specific aspects of the application (3-A, 4-A).

Adolescent focus group participants agreed that easy navigation around the application was important. One adolescent proposed the idea of a search bar to jump from page to page within the application (1-AFG). Youth referenced the importance of educational videos but focus group participants reported games would be an engaging aspect of mental health applications. Multiple adolescents wanted the incorporation of a strategy game with rewards for users and started brainstorming different ideas (2-AFG, 3-AFG). One focus group participant added that mental health application games would be different compared to versions youth usually play, but small activities could be helpful (4-AFG). The focus group participants also agreed that the design and colors within the application would be vital to increase adolescent' interest (5-AFG, 6-AFG). One adolescent added that certain features should be avoided when making an application. Otherwise, youth would not be as interested if the design is outdated (7-AFG).

Some of the adult participants highlighted the importance of incorporating features that would keep youth excited about the application (1-T, 1-C). Two teachers emphasized the importance of having people within the application who resembled adolescents. One teacher reported that would be an upgrade over listening to adults provide information youth already know (2-T, 3-T).

Engagement

Most adolescent individual interview participants were not interested in didactic content unless it could be delivered in engaging formats. Youth wanted designers to make the

application appealing and interactive. Adolescents added making the application engaging would increase youth usage over an extended period of time (1-A, 2-A). One adolescent stated a mental health application should require multiple features to keep adolescents engaged and excited (3-A).

Some of the adult participants agreed with adolescents that the application needs to be interactive and appealing. Otherwise, they were concerned that youth would only use this mental health application for a short period of time (1-C, 1-T).

Ease

Adolescent interview participants expressed the desire to have the application be simplistic. They noted that if the application was complex or too challenging to use, youth would stop using the application (1-A). One of the interview participants reported making the application easy to use would increase youth interest (2-A).

Benefits

While the majority of adolescent interview participants described the idea of a mental health application as appealing, some individuals expressed greater expectations, noting that the application would need to provide positive benefits or changes in their everyday life. Adolescents suggested that applications, which failed to demonstrate explicit benefit risked youth losing interest quickly. Participants suggested two possible direct benefits from mental health applications: helping to decrease stress and being able to track changes in mood (1-A, 2-A).

Adolescent focus group participants agreed that they all have stress from schoolwork and that the application could be helpful when feeling anxious about homework (1-AFG, 2-AFG, 3-AFG). In congruence with reducing stress, one adolescent referenced that the application could also help with adolescents' overall attitude (4-AFG). One focus group

participant mentioned that incorporating humor would make youth more interested in using the application (5-AFG).

Enjoyment

Some adolescent individual interview participants stated the application not only had to provide direct benefits, but it had to be something they could enjoy (1-A). Another adolescent agreed that the application cannot focus solely on educational videos. The application has to keep youth engaged and make them laugh when they use it (2-A).

Concerns

Although adolescent individual interviewees highlighted many positive attributes of a mental health application, they also identified some concerns. Interview participants revealed that applications, which require tracking multiple areas are troublesome (1-A, 2-A).

While adolescent focus group participants were optimistic about the application, there were certain aspects that would make them hesitant to use a mental health application. One adolescent was concerned if the application was asking for an excessive amount of information (1-AFG). Another adolescent was concerned about parents who would become worried if they noticed their child was using a mental health application (2-AFG). Some of the focus group participants were concerned if the application did improve their mental health. If the application did not provide any benefits, one adolescent said youth would delete it immediately (3-AFG).

Although some of the adult interviewees were not concerned about adolescents using a mental health application, other participants discussed potential drawbacks. One parent stated being worried adolescents would be judged by their peers for using a mental health application (1-P). One teacher encouraged social interaction within the application, but also expressed concerns if someone was using the application and not being supportive through chat functions (1-T). One clinician reported being concerned that having another application

on an adolescent's phone would promote social isolation in comparison to going outside and interacting with people (1-C).

Confidentiality

While the majority of the adolescent interview participants were not as concerned about confidentiality, some of the adolescents were worried about their personal information being hacked within the application (1-A). One adolescent mentioned the application could protect individuals' privacy by having youth register with a username instead of their own name (2-A).

Focus group adolescents agreed with individual interview participants and were worried if the application required personal information, which could potentially get hacked. One adolescent provided a method to help protect youth privacy (1-AFG).

The majority of adult interview participants were concerned about youth privacy given that electronic information can be hacked (1-C). One parent wondered what the protocol would be if an adolescent reported they were feeling suicidal on the application (1-P).

Self-Conscious

While the majority of adolescent interview participants were not worried about their peers seeing them use a mental health application, one adolescent reported being concerned depending on the application's content (1-A).

Most of the high school focus group participants were not worried about other adolescents seeing them use a mental health application, but one middle school participant was worried about being bullied if peers saw him using an application. One of the high school participants responded and acknowledged the perception across grade levels would differ (1-AFG).

Most Important Thing

All participants were asked about the most important thing designers should focus on when constructing this mental health application. The majority of adolescent interview participants highlighted the importance of making the application interactive so youth would continue to use it (1-A, 2-A). Some of the other interviewees discussed the importance of having specific content within the mental health application. One adolescent emphasized that having space to write down how youth were feeling would encourage youth to continue using the application (3-A). Another adolescent discussed the importance of covering depression, specifically as a consequence of bullying (4-A).

All of the focus group participants were in agreement that graphics were more important than the mental health content within the application (1-AFG, 2-AFG).

Two of the parent participants discussed that the design of the application needed to be appealing to youth. While that was important, one parent emphasized that the application should not be too complex (1-P). Another parent encouraged designers to make the application adolescent-centered and focus on what would make youth interested (2-P). Two of the teacher participants encouraged designers to include resources adolescents could utilize. One teacher discussed bolstering what adolescents already possess as strengths (1-T). While another teacher believed the application could be helpful, this teacher stated the application could serve as a bridge to resources for adolescents who need more support (2-T). Clinician participants were most concerned about adolescent engagement related to previous experience incorporating mental health applications within therapy. One clinician discussed that the application has to be enjoyable or youth will stop using it (1-C). Another clinician warned that asking adolescents to log too much information within the application would present another barrier for youth to use it (2-C).

Study 1, Phase 2 Themes

Demographics for Study 1, Phase 2 adolescent participants (n=5) are presented in Table 5, adult participants (n=4) are presented in Table 6, and adolescent focus group participants (n = 4) in Table 7. Consort Diagrams for Study 1, Phase 2 adolescent individual participants, adolescent focus group participants, and adult individual interviews are in Figures 4, 5, and 6. The summary of Study 1, Phase 2 qualitative data from the individual interviews and the focus group is presented below. Themes identified during Study 1, Phase 2 individual interviews include: First Impressions, Features (Main Logo, Home Page, Submenus, Graphics, Game), Engagement, Content, Teen Vlogger, Doctor, Concerns, Improvement, Most Important Thing to Improve, Frequency of Use, and Recommendations. Adolescent individual interviewee quotes are presented in Table 12. Adolescent focus group quotes are presented in Table 13. Adult individual interview quotes are presented in Table 14.

First Impressions

After reviewing the application, the majority of adolescent interview participants expressed positive first impressions. Multiple adolescents reported that they enjoyed the overall design of the application (1-A, 2-A). Another adolescent found the content to be helpful and relayed youth would use the application in the future (3-A). Although the majority of participants were excited about the application, two adolescents expressed concerns if certain groups would use the application, specifically older adolescents (4-A, 5-A).

Adolescent focus group participants provided mixed reviews for their first impressions of the prototype. While the majority of adolescents stated the prototype was easy to use, participants provided initial concerns about the application's content (1-AFG, 2-AFG).

Similar to adolescent individual interview participants, adult participants expressed positive first impressions of the prototype. One clinician stated the prototype was organized and that they enjoyed listening to the characters (1-C). One parent provided a similar

sentiment and found the application simple and easy to use, which they thought would be important for adolescents (1-P). Another clinician expressed excitement about the application, but they were also concerned about adolescents being able to sit through and watch multiple videos (2-C). Although most of the adult participants provided positive feedback, some interviewees were concerned about the interactive nature between the user and the application. Some participants expressed worries the application would not be exciting enough to keep up adolescent usage (3-C, 1-T).

Features

Main Logo

Participants were shown a picture of the main logo with the title: Whippy Resilience and asked for their feedback. The majority of adolescent individual interview participants addressed positive and negative features of the main logo. Some of the adolescents stated they appreciated the color selection and believed it created an appealing logo (1-A). One interviewee thought the logo was attention-grabbing, but they wanted icons to be incorporated into the logo to match with application content (2-A). While the majority of participants were content with the color selection, some adolescents were concerned about the intensity of the red for resilience. One participant offered some color suggestions (3-A). Other adolescents provided more critical feedback and revealed that certain text styles were too bold, which could make the application less appealing (4-A). Another adolescent stated the mix of colors was appropriate, but they were unsure about the meaning of the application name: Whippy (5-A). Another interviewee stated the appearance of a book in the background could confuse users (6-A). Some of the participants provided ideas about the design for the image. One adolescent expressed interest in having a logo that would be perceived as calmer by users (7-A). Another participant expressed interest in a universal image for the logo that could appeal to all users (8-A).

All of the focus group adolescents were unsure about the meaning of Whippy, which some participants revealed would make them less likely to click on this prototype within the application store (1-AFG, 2-AFG). Upon reviewing the design, adolescent focus group participants expressed interest with incorporating lighter colors for the logo. Multiple adolescents emphasized adding colors, which they described as cozy (3-AFG, 4-AFG). There was some disagreement in the group about using red for resilience in the logo. One adolescent stated the red was appropriate while another participant believed it was a more aggressive color choice (5-AFG, 6-AFG). The focus group participant proposed multiple ideas for the logo image. One adolescent described a logo that included a fist raised in the background (7-AFG). While the majority of adolescents agreed the logo was important, one participant stated the value of having an accurate description within the application store (8-AFG).

The adult participants expressed mixed opinions about the current logo. Most of the participants were content with the color scheme, but one clinician was concerned about the font used (1-C). Other interviewees were confused about the application name. Another clinician enjoyed the colors, but they were unsure of the meaning of Whippy in “Whippy: Resilience”. (2-C). One parent stated the name had a negative connotation (1-P). One teacher mentioned the logo resembled an open book, which could confuse users about the purpose of the application (1-T). Some of the adult participants had ideas to replace the current image for the logo. One clinician mentioned an image that conveyed resilience so users would know the purpose of the application instantly (3-C).

Home Page

Participants were shown a picture of the home page and asked for feedback. All of the adolescent interviewees had a positive reaction to the main menu. Adolescents agreed there was a good balance between the colors and text, which made the home page appealing, but

not overstimulating (1-A, 2-A). Another adolescent added that the main menu design reminded them of classroom videos, which in their opinion was a positive characteristic (3-A).

There were split opinions about the icons used within the home page for adolescent focus group participants (1-AFG, 2-AFG). Some of the adolescents expressed interest in having different images on the main menu instead the same picture for each sub-section (3-AFG, 4-AFG). Adolescent focus group interviewees were generally unsure of what to expect for the sub-sections on the home page. One adolescent added that having a play button displayed for each module section was not helpful (5-AFG).

Most of the adult participants offered positive feedback about the home page. One adult participant noted that the home page was easy to navigate and use (1-T). One clinician enjoyed the same format in each of the three modules, which made the prototype simple to follow (1-C). Another clinician enjoyed a more detailed background and thought each depression section was labeled appropriately on the homepage (2-C).

Submenus

Participants were shown one of the submenus within the depression module. One adolescent individual interviewee described how the usage of icons could increase youth excitement about the application (1-A). Another adolescent commented about the submenu layout and stated that it would be aesthetically pleasing to multiple users (2-A). Although most of the submenu feedback was positive, one adolescent was confused about the connection between specific icons and content. This adolescent expressed being less likely to use certain aspects of the application if the icons did not convey a clear meaning (3-A).

One focus group adolescent enjoyed the design, but they were interested in incorporating some changes (1-AFG). The majority of focus group participants were dissatisfied with the pictures used and believed adolescents would not take them seriously (2-

AFG, 3-AFG). Adolescents expressed concerns about the icon within the submenu and provided ideas for alternative images (4-AFG, 5-AFG).

Most of the adult participants were content with the aesthetics of the submenu. One parent enjoyed the balance between the icons and the font used (1-P). While the majority of participants provided positive feedback about the submenus, there were some concerns from one teacher about the image designs (1-T).

Graphics

Participants were shown a still image of a video from the depression module and were asked to focus on the graphics. All of the adolescent interview participants expressed their enthusiasm for this graphic style. One adolescent stated the artistic style was simple, but still effective. This adolescent also added the importance of having a gender-neutral character (1-A). Another participant enjoyed the usage of cartoons in contrast to human characters. This adolescent also commented that the blend of shapes within the video was an excellent addition (2-A). Another adolescent was able to understand the character and could convey her emotion based on her facial expressions and the depiction of her tears (3-A).

Some of the adolescent focus group participants were not content with the graphic aesthetics (1-AFG, 2-AFG). One adolescent understood why cartoons were being used, but they were worried about the marketability to youth audiences (3-AFG). Another adolescent added that the videos could balance having cartoons and people to create more variability (4-AFG).

One clinician thought the emotion of the character was portrayed accurately and they emphasized that youth would enjoy the graphics (1-C). Another clinician agreed with the above statement and found the graphics were easy to comprehend and the message was clear (2-C). While the majority of participants enjoyed the graphics, one parent was concerned if this would be relatable for adolescents or if youth would want more dynamic designs (1-P).

Game

Participants were asked about the mood-enhancing game within the depression module. Most of the adolescent participants provided positive feedback. One adolescent described the graphics as targeted for younger audiences, but they stated the game served a functional purpose (1-A). Another adolescent enjoyed the graphics and found the game to be enjoyable, but they were concerned about users finding the game again since it was not easy to find from the homepage (2-A). Some adolescents were concerned about specific features within the game. One adolescent reported the music did not sync up with game content, which was frustrating at times (3-A). While the majority of adolescents enjoyed the simple nature of the game, some participants were concerned the game would become boring over time. One adolescent suggested including different versions of the game to increase user interest (4-A). The same participant added having a leaderboard could encourage competition among users to keep returning to the application and play the game (5-A).

The majority of focus group participants believed the game served a purpose, but some adolescents wanted to see improvements with the special effects (1-AFG, 2-AFG). One adolescent stated understanding the purpose of the activity, but they believed changes could be made to improve the gameplay (3-AFG). Some of the participants enjoyed the idea of playing against another player, even if the other user was a robot (4-AFG, 5-AFG). One adolescent discussed the value of rewards within the game, which would increase youth daily usage (6-AFG). Other focus group participants discussed the benefit from adding more games across the application modules (7-AFG, 8-AFG).

The majority of adult participants enjoyed playing the game, but most adults were concerned the gameplay and graphics were targeted for younger children instead of adolescents (1-P, 1-C). Adult participants provided suggestions for improving the game. One

clinician identified having a leaderboard so youth could notice their high score and compare it to other users (2-C).

Engagement

Multiple adolescent individual interview participants discussed the importance of incorporating features that can grab users' attention. One adolescent mentioned the animation appears to be exciting and engaging to adolescents (1-A). Another interview participant stated that the usage of cartoon characters in videos can make the features more aesthetically pleasing and dynamic to capture user interest (2-A). Most adolescents valued the engagement within the activities. One adolescent reported it increased their interest in using the application and that more activities should be included within the final version (3-A).

The majority of adult participants reported specific aspects within application were engaging. One clinician enjoyed the game and stated it brought a different kind of interaction compared to other activities within the application (1-C). While most of the adult participants enjoyed the game, some adults were concerned that other features of the application would not keep adolescents engaged. Another clinician enjoyed the video content, but they wanted more graphics to keep adolescents' attention within the application (2-C). Another adult interviewee disagreed, and believed the videos would keep youth engaged, but they were concerned about the lack of other interactive activities (1-T).

Content

Although interview participants could choose what specific parts of the application they wanted to review, general questions were asked about the mental health content. The majority of adolescent individual interview participants enjoyed the balance between videos, activities, and games. One adolescent mentioned the value of combining videos and activities when learning new information (1-A). The majority of adolescents appeared to find the surveys useful and enjoyable. One participant mentioned it was appropriate to include

surveys after watching informational videos (2-A). Another adolescent stated the surveys were short and did not ask users to log in too much information (3-A). Interview participants appeared to enjoy receiving feedback from the surveys as one adolescent mentioned within the lifestyle module (4-A). The majority of adolescent interview participants enjoyed the delivery of content within the application. One adolescent described the value of receiving information directly and that the take home message was clear when listening to the characters (5-A). Although most of the adolescents agreed with this statement, one interview participant was concerned the messaging was targeted for younger audiences and not for high school students (6-A). Some of the adolescents reviewed the lifestyle section and one participant learned new information that they wanted to incorporate within their daily life (7-A). One interview participant navigated the depression section and was content with the information provided. This adolescent enjoyed the layout of the material into four sections and stated it was helpful to learn about other ways depression can present (8-A).

The majority of adolescent interview participants revealed enjoying learning about new coping skills they could use when sad or stressed. One adolescent mentioned they would not only use the tips for themselves, but they would offer ideas to their friends whom are struggling with their mental health (9-A). While most of the adolescent participants described the depression module content as informative, one adolescent commented the depression module only presented a surface-level view of symptoms. They acknowledged the module could have gone more in-depth about symptoms and coping strategies (10-A). Another interview participant expressed interest in receiving more information about talking to a psychologist if they or a friend were depressed (11-A). One adolescent was curious about learning about the relationship between depression and attention-deficit hyperactivity disorder (ADHD) symptoms (12-A). While the majority of participants were content with the three prototype modules, some adolescents provided suggestions for additional content. One

participant commented being interesting in learning more about how to talk to friends when feeling stressed (13-A).

Focus group adolescents provided positive and negative reviews about the videos. One focus group adolescent enjoyed the videos that discussed coping strategies when feeling sad or stressed (1-AFG). However, the same participant stated multiple educational videos would not be helpful for someone experiencing acute mental health symptoms (2-AFG). Multiple focus group adolescents provided suggestions to give users the options to watch videos or skip them to proceed to the surveys and interactive exercises (3-AFG, 4-AFG). Some of the focus group adolescents enjoyed the surveys to check how they were doing in the areas of depression, stress, and physical health (5-AFG). However, focus group participants noticed some errors with survey scoring, specifically with some of the lifestyle module questionnaires (6-AFG, 7-AFG). One adolescent commented that including previous survey scores would be helpful to track change over time (8-AFG).

Some of the focus group participants explored the depression module. Focus group adolescents provided specific changes that could improve the content within one of the depression module submenus (9-AFG, 10-AFG). Some of the participants reviewed the stress module and provided feedback. One adolescent enjoyed having content about anxiety they knew came from a trusted source (11-AFG). However, the same participant commented that the majority of users who already experience anxiety would not be interested in the introduction videos (12-AFG). The majority of focus group participants were concerned about the examples the teen vlogger and doctor provided within the application. One adolescent mentioned only remembering one good example (13-AFG). Some adolescents commented that the examples provided were not realistic or relevant to youth. Suggestions included adding more current examples or descriptions would increase youth interest in the content (14-AFG, 15-AFG). One focus group participant referenced an idea of providing youth with

dilemmas and scenarios to help them decide what they would do in specific situations (16-AFG). The majority of focus group participants enjoyed the interactive exercises, but one adolescent felt limited in her activity options (17-AFG). Some of the adolescents mentioned the importance of including resources. One participant suggested the idea of adding websites or phone numbers youth could use when stressed (18-AFG).

After reviewing the content, most adult participants expressed positive views of the information presented within the application. One teacher believed the content to be relevant and important for adolescents to hear and incorporate into their daily life (1-T). Clinicians provided positive feedback about the incorporation of rating scales. One clinician was interested in the function of the game as a distraction technique to potentially increase users' mood (1-C). While both clinicians found the rating scales to be useful, there were concerns about user feedback. One clinician revealed the depression survey did not provide personalized feedback, which was frustrating (2-C). Another clinician added concerns about survey scoring where users could skip certain items and get incorrect feedback (3-C). Some of the adult participants provided options for improving the rating scales. One clinician was interested in a daily log to track mood that could show user trends over time (4-C). When reviewing the depression submenus, both clinicians were excited about the content presented and thought it would be informative for adolescents (5-C, 6-C). One of the clinicians was content with how the teen vlogger discussed ways to talk to a friend or adult when feeling depressed (7-C).

Although most participants provided positive feedback, one clinician provided improvements for content within the depression module. They stated the importance of discussing when adolescents should seek out therapy or other resources (8-C). One participant reviewed the stress module and was content when the speakers discussed positive stress (9-C). However, this clinician was concerned about the accuracy of some of the

information stated, specifically the difference between anxiety and an anxiety disorder (10-C). One participant reviewed the lifestyle content and believed the module could go into more detail about how to exercise and eat healthier (1-P). One clinician enjoyed the drag-and-drop exercises, but they were concerned about the language used for selecting an activity (11-C). Another interviewee discussed the value of adding not only various activities, but a section that focused on resources youth could utilize when stressed (2-T). The same teacher added the idea of including reflection questions after activities to provide youth with space to write what they learned (3-T). One of the clinicians discussed the importance of including dilemmas users could review to think about what they would do in specific situations. This clinician believed adolescents would be interested if this activity was engaging (12-C). This clinician was content that the application discussed suicide, but they were wondering if youth could be provided with scenarios to handle complex situations with friends (13-C). Some of the adults identified concerns about the lack of resilience mentioned in the application. Two participants did not hear resilience referenced frequently, which could confuse users since resilience is part of the application title (14-C, 4-T).

Teen Vlogger

Participants were asked specific questions about the teen vlogger (character name: Breanna). The majority of adolescent individual interviewees revealed positive feedback about the teen vlogger. Multiple adolescents emphasized that her demeanor and energy came across as genuine and increased their excitement about the content (1-A, 2-A). The majority of participants commented that the teen vlogger was relatable. They noted she was able to provide personal details and examples, which connected her to adolescents (3-A, 4-A). Although most participants believed the teen vlogger to be relatable, one participant revealed that they did not connect with her examples (5-A). Another participant enjoyed the teen vlogger, but they stated having multiple youth characters would be helpful to provide

different perspectives on depression and other topics (6-A). Some of the participants were concerned the teen vlogger was too old. One of the participants suggested having teen vloggers closer to their age would be more appealing to users (7-A).

The adolescent focus group participants provided mixed reviews about the teen vlogger. One adolescent liked the teen vlogger, but noticed her lines were very scripted (1-AFG). The same adolescent also described the teen vlogger as appearing older than high school, which could make her appear less relatable to youth (2-AFG). The majority of adolescent focus group participants wanted more youth vloggers to increase connection to adolescents across the age spectrum (3-AFG, 4-AFG).

Adult individual interview participants provided positive feedback about the teen vlogger. One clinician found her to be very pleasant (1-C). Almost all of the adults found her to be relatable to youth (2-C, 1-P, 1-T). However, some of the adults believed the teen vlogger resembled a college student (2-P, 3-C). One clinician was concerned the teen vlogger provided too few examples, which could make her less relatable to adolescents (4-C).

Doctor

Although not as popular as the teen vlogger, adolescent individual interview participants provided mostly positive feedback about the doctor (character name: Dr. Smith). One participant enjoyed that the doctor was speaking directly to youth and not treating users differently from adults (1-A). Another adolescent revealed that the doctor provided relevant information and the teen vlogger would mention the doctor, which this participant felt was a strength (2-A). While the majority of adolescents provided positive views of the doctor, one participant stated the doctor did not present the same excitement as the teen actress and did not stand out (3-A). Most adolescents stated the doctor provided educational content, but they did not find her as relatable to the teen vlogger. One adolescent added that more personal examples from the doctor could make her more relatable to youth (4-A).

The focus group adolescents had differing opinions about the doctor. One adolescent stated the doctor appeared kind (1-AFG). Another adolescent was concerned about the doctor's appearance and believed her outfit could be improved (2-AFG). Some of the adolescent focus group participants did not believe the doctor was genuine. One participant expressed her desire to have the doctor be more animated (3-AFG). Adolescents discussed an interest in having multiple doctors. One adolescent suggested the idea of bringing in specific experts depending on the content being discussed (4-AFG).

Adult individual interviewees provided mixed feelings about the doctor. Two adult participants believed the doctor was informative and appeared kind (1-C, 1-T). In comparison, some of the interviewees were concerned about the doctor's appearance and lack of interpersonal warmth (1-P, 2-C). While one adult participant found her to be generally relatable (2-T), another interviewee believed the female doctor might not be relatable to male adolescents (3-C).

Concern

Participants were asked about aspects they disliked about the prototype. One adolescent reported their concern about motivation for youth to use the application. They stated the application does not provide any reinforcement for continued usage (1-A). While most of the adolescent individual interviewees enjoyed the surveys, one participant was concerned that the questions were repetitive, and some items were difficult to answer (2-A). Another adolescent noticed they were not receiving questionnaire feedback within some of the modules. They reported it would be helpful for the application to provide that information to users (3-A). The majority of interview participants wanted easier access to activities by being able to click past the videos.

Focus group adolescents provided feedback about aspects they disliked within the prototype. One participant noted lack of human connection opportunities within the

application, which was concerning (1-AFG). Focus group participants had problems with the structure of the application. Some of the participants stated it was challenging to go directly to surveys, activities, and games in the prototype (2-AFG, 3-AFG). The majority of focus group participants were concerned the application was limited and there were minimal reasons for continuous use. Some of the adolescents questioned why they would need to return to use the application (4-AFG, 5-AFG). One adolescent was unsure about the application's purpose especially for users who had previously experienced depression and anxiety (6-AFG). However, all of the focus group adolescents denied concerns about confidentiality since the application only asks for limited information (7-AFG).

Although the majority of adult participants focused on the positive features of the application, there were some concerns shared amongst the interviewees. Some of the adults were worried that adolescents would use the application briefly before stopping altogether (1-C). One clinician was concerned about the outcomes if an adolescent reported they were suicidal within the application. Although one clinician was content with the information provided within the application, this was an area that made them worry if youth endorsed suicidal thoughts (2-C). Although the majority of adults found the application content to be useful, there were concerns about the source of information (1-T). Other adults wondered if the application could be efficacious as a solo intervention. One teacher expressed concern if this is the only medium adolescents are using to improve their mental health (2-T). However, the majority of adult interviewees were not concerned about privacy or confidentiality. One clinician discussed what would happen if someone was able to break into the application and reported minimal personal information would be obtained (3-C).

Improvement

While the majority of adolescent individual interview participants had positive views of the prototype, youth wanted to include multiple changes to make the features and content

more appealing to users. Most of the adolescents expressed concerns that youth would not use the application frequently. One adolescent referenced having a calendar function within the application, stating that would increase youth daily usage (1-A). Multiple adolescents wanted the application to incorporate an incentive to increase youth daily usage. One participant proposed having a daily reward for logging into the application and completing certain activities (2-A). Other adolescents agreed and expressed worries youth could go through the content quickly and recommended including more activities (3-A, 4-A). One adolescent reported the application should include more enjoyable activities on repeat (5-A). Some individual interview adolescents expressed interest in being able to connect to other users online. One participant reported being able to build a social network could encourage daily usage (6-A). Another participant explained that having the application provide reminders to complete activities would help youth continue using new coping skills (7-A). One adolescent referenced interest in receiving notifications if new content was added to the application (8-A). Multiple adolescents reported wanting more access to mental health resources. One adolescent recounted the positive experience from a previous application that provided relevant mental health information (9-A).

The majority of adolescent focus group participants suggested changes to improve accessibility to specific application features including tabs that could take users to games or other areas (1-AFG, 2-AFG, 3-AFG). Most of the adolescents were concerned features would not be updated. Some participants provided suggestions that features could be changed a few times per year (4-AFG, 5-AFG, 6-AFG). Multiple adolescents enjoyed the idea of having a journaling section to discuss their stress. Some participants were content with being able to reference journal entries to track changes in their mood and behavior (7-AFG, 8-AFG, 9-AFG). Unfortunately, the updated prototype was unable to incorporate the “Rate Your Mood” function, but one adolescent was interested in the idea of tracking their mood over time to

notice trends (10-AFG). Some of the focus group participants were interested in incorporating a social interaction component within the application. One adolescent wanted to include a chat function where anonymous users could talk about their mental health (11-AFG). Adolescents expressed interest in having the application be more personalized. One adolescent discussed the possibility of having two versions of the application for people who know less and those who know more about mental health (12-AFG). Another adolescent enjoyed the idea of letting the application learn more about users so youth' experiences could be tailored to their mental health needs (13-AFG). The majority of focus group adolescents were optimistic about the application, but they wanted more changes. One adolescent suggested adding more to multiple areas of the prototype (14-AFG).

Adult participants identified multiple improvements to the application. One interviewee was worried about the nature of the graphics and believed adolescents would not take the application seriously unless there were aesthetic changes (1-P). One clinician enjoyed the information presented, but they believed the addition of graphics within the videos would increase youth engagement (1-C). Another clinician discussed the possibility of including a reward system to keep adolescents returning to the application (2-C). Adult interviewees proposed alternative feature changes separate from graphics. One parent stated the inclusion of music could keep adolescents interested in using the application (2-P). One of the adult participants discussed the possibility of including push notifications. This participant believed this could increase youth interest and usage in the application (1-T). The majority of adult participants provided suggestions to increase individual interest. One teacher thought including a journaling section could prove adolescents with space to write about their thoughts and emotions (2-T). Both clinicians agreed that the application needed to be personalized to entice adolescents to use it. One clinician added that providing youth with more hands-on activities would increase daily usage (3-C). Another clinician discussed the

importance of increasing social interaction in the application, but they noted concerns about privacy and confidentiality would have to be addressed (4-C).

Most Important Area to Improve

Focus group adolescents were asked about the most important area to improve within the application. The four participants had different answers, which included changing the animation, having more variety, including a journal, and creating different versions of the application depending on age (1-AFG, 2-AFG, 3-AFG, 4-AFG).

Frequency of Use

The majority of adolescents individual interviewees reported they would use the application weekly. One participant expressed concerns about the current prototype, which would limit their usage to once or twice per week (1-A). Another adolescent expressed similar concerns indicating they would only use the application for a short period of time (2-A). Most interview participants agreed that they would log into the application after school or on weekends. Some adolescents referenced they would use it during those intervals since they have more availability (3-A, 4-A). One adolescent stated they would like to use it at school, but they would not have enough time to watch some of the videos or go through a module (5-A). Some interview participants reported they would use the application in specific situations. One adolescent mentioned referring to the stress module the night before a test would be helpful (6-A). Another adolescent agreed and noticed the value of logging into the application when their stress level increases (7-A).

The majority of focus group adolescents stated they would use the application once or twice per week at the most. One focus group adolescent liked the application, but they did not have a reason to use it daily. This indicated that maybe younger adolescents would use it more often (1-AFG). When asked about times they would use the application, the majority of adolescents stated they would use it after school, at night, on the weekends, or before a major

test. (2-AFG, 3-AFG, 4-AFG, 5-AFG). Adolescents agreed that specific additions to the application would increase their daily frequency. One participant mentioned being able to write down their feelings and thoughts would provide more incentive for youth to use the application regularly (6-AFG).

All adult participants expressed that youth would probably use this application weekly, not daily. One clinician discussed the importance of including a logging system, which they believed would increase youth frequency of use (1-C). Most adult interviewees believed that adolescents would use this application after school or at night when youth might be feeling anxious or sad (2-C, 1-P, 1-T). One clinician re-iterated their concerns about user engagement, but they also believed youth would use it more at night (3-C). Although most interviewees disagreed, one clinician discussed when they thought adolescents might use the application at school (4-C). One parent did not believe adolescents would use the application at school because they are either in class or playing games with their friends (2-P).

Recommendation

The majority of adolescent individual interview participants reported they would recommend the application to their peers. One adolescent revealed multiple ways that application could be beneficial to their peers (1-A). One adolescent referenced that the application would help their peers when they are stressed especially when worrying about homework and tests (2-A). Another interview participant mentioned they would recommend the application, but they would mostly target younger audiences (3-A). Although most of the participants expressed their willingness to recommend the application, one adolescent stated they would not (4-A).

In contrast, the majority of focus group adolescents were not ready to recommend this application to their peers. One adolescent stated a definitive no related to their concerns about the content (1-AFG). Other focus group adolescents provided mixed reviews about the

current application and identified both positive and negative components (2-AFG, 3-AFG). Some of the participants liked the idea of having more focus groups to keep receiving feedback to modify the prototype. One adolescent who said no stated more focus groups could lead to an application that most youth would be interested in using (4-AFG).

The majority of adult participants were willing to endorse the application to adolescents. Both clinicians discussed the benefits of offering the application to clients in conjunction with therapy (1-C, 2-C). One teacher viewed the application as an important addition that adolescents could utilize in addition to counseling and resources (1-T). However, one parent stated there needed to be changes before they would recommend it to adolescents. This parent could not see their children use the application as currently constructed (1-P).

Study 1, Phase 2 Quantitative Results

The second aim investigated whether adolescent and adult participants (i.e. clinician, parent, teacher) evaluated the application as feasible and is presented in Table 15. Consistent with hypothesis Ia and Ib, participants rated the application as acceptable overall through the Computer System Usability Questionnaire (CSUQ, $M = 6.30$, $SD = 1.03$) and the Mobile App Rating Scale (MARS, $M = 4.08$, $SD = 0.61$). These findings were also true when adolescent and adult users were separated as evidenced in Table 16 and Table 17.

Further analysis determined that participants viewed the application as adequately engaging ($M = 3.85$, $SD = 0.67$), functional ($M = 4.54$, $SD = 0.60$), aesthetically pleasing, $M = 4.28$, $SD = 0.57$, informative ($M = 3.90$, $SD = 0.80$), and impactful ($M = 4.29$, $SD = 0.59$) through the MARS. Participants found the application more functional, aesthetically pleasing, and impactful in changing behavior, in comparison to the application's information

and engagement. These results are also presented in Table 15. These findings remained true when adolescent and adult users were separated (Table 16 and Table 17).

There were two different prototypes used between the adolescent individual interviews (Prototype 1.0) and adolescent focus groups (Prototype 2.0). Adolescent individual interviewees found Prototype 1.0 more adequate, engaging, functional, aesthetically pleasing, informative, and impactful based on the CSUQ and MARS ratings in comparison to adolescent focus group users' viewpoints about Prototype 2.0. These findings are listed in Tables 18 and 19. However, the Prototype 1.0 was only tablet compatible while Prototype 2.0 was adaptable for phones, so version 2.0 was used for Study 2.

Exploratory analyses examined participants' ratings of the application, the expected frequency of use for adolescents, and if they would recommend the application to others. Participants gave the prototype a rating close to 4 stars after reviewing it for a short period of time ($M = 3.85$, $SD = 0.69$). Eight of the 13 participants (62%) stated they would recommend the application to "many people" or "everyone". These findings are also presented in Table 15. Five of the nine adolescent participants reported they would use this application between 10 to 50 times (55%) over the course of a year. These results are presented in Table 16.

Study 2 Results

40 participants were consented for Study 2 to use the application for 30 days. Study 2 demographics are listed in Table 8. Consort diagram for Study 2 is listed in Table 7. The analysis removed the non-users ($N = 7$), defined as participants who never logged into the application after the baseline application tutorial. Exploratory analyses conducted found there were no statistically significant differences between non-users and users for baseline total resilience, baseline internal resilience, and demographic factors (e.g. gender, race, and grade).

The analysis also removed a participant who used the application, but who did not complete the post-study questionnaires ($N = 1$). Therefore, the final analysis includes 32 participants.

Resilience means and standard deviations for questionnaires completed before and after application usage are in Table 20. The third aim examined whether adolescents' levels of resilience would significantly increase after the use of a resilience application. Inconsistent with hypothesis IIa, youth did not report a statistically significant increase in levels of resilience from before ($M = 325.66$, $SD = 59.35$) to after ($M = 323.66$, $SD = 60.30$) using the application for 30 days ($t(31) = -0.96$, $p = 0.34$). Inconsistent with hypothesis IIb, youth did not report a statistically significant increase in levels of individual factors of resilience from before ($M = 143.35$, $SD = 28.94$) to after ($M = 143.78$, $SD = 27.58$) using the application for 30 days ($t(31) = 0.31$, $p = 0.76$). The analysis is presented in Table 22.

Secondary mental health means and standard deviations for questionnaires completed before and after application usage are in Table 21. The fourth aim investigated if youth' self-efficacy would significantly increase after the use of a resilience application. Inconsistent with hypothesis III, adolescents did not show statistically significant increases in levels of generalized self-efficacy from before ($M = 32.16$, $SD = 5.61$) to after ($M = 31.97$, $SD = 5.45$) using the application for 30 days ($t(31) = -0.29$, $p = 0.78$). The analysis is presented in Table 22.

The fifth aim examined if adolescents' overall happiness would significantly increase after the use of a resilience application. Inconsistent with hypothesis IV, youth did not report statistically significant increases in levels of subjective happiness from before ($M = 19.84$, $SD = 5.34$) to after ($M = 19.97$, $SD = 5.06$) using the application for 30 days ($t(31) = 0.24$, $p = 0.81$). The analysis is presented in Table 22.

The sixth aim investigated whether adolescents' emotional awareness would significantly increase after the use of a resilience application. Inconsistent with hypothesis V,

adolescents did not demonstrate statistically significant increases in levels of emotional awareness before ($M = 66.68$, $SD = 10.27$) to after ($M = 66.68$, $SD = 10.25$) using the application for 30 days ($t(31) = 0.00$, $p = 1.00$). The analysis is presented in Table 22.

The seventh aim investigated if adolescents' ability to use adaptive coping skills would significantly increase after the use of a resilience application. Inconsistent with hypothesis VIa, youth did not show statistically significant increases in ability to use adaptive coping skills before ($M = 45.66$, $SD = 9.78$) to after ($M = 46.34$, $SD = 11.11$) using the application for 30 days ($t(31) = 0.46$, $p = 0.64$). Inconsistent with hypothesis VIb, youth did not show statistically significant decreases in utilizing maladaptive coping skills before ($M = 16.16$, $SD = 4.70$) to after ($M = 16.38$, $SD = 5.35$) using the application for 30 days ($t(31) = 0.37$, $p = 0.71$). The analysis is presented in Table 22.

The eighth aim examined whether youth' interpersonal support would significantly increase after the use of a resilience application. Inconsistent with hypothesis VII, youth did not report statistically significant increases in interpersonal support before ($M = 16.69$, $SD = 3.23$) to after ($M = 17.13$, $SD = 2.73$) using the application for 30 days ($t(31) = 0.68$, $p = 0.50$). The analysis is presented in Table 22.

The ninth aim investigated whether adolescents evaluated the application as acceptable after using it for 30 days as is presented in Table 23. Consistent with hypothesis VIIIa and VIIIb, adolescents stated the application was feasible overall through the CSUQ ($M = 6.14$, $SD = 0.84$) and MARS ($M = 3.94$, $SD = 0.62$). Further analysis determined that adolescents viewed the application as adequately engaging ($M = 3.49$, $SD = 0.82$), functional ($M = 4.41$, $SD = 0.65$), aesthetically pleasing ($M = 4.17$, $SD = 0.67$), informative ($M = 3.90$, $SD = 0.72$), and impactful ($M = 3.89$, $SD = 0.90$) through the MARS. Study 2 Participants found the application more functional and aesthetically pleasing in comparison to the

application's information, impact to change behavior, and engagement. These results are also presented in Table 23.

Exploratory analyses examined adolescents' ratings of the application, the expected frequency of use for adolescents after a year, and if participants would recommend the application to their peers. Participants gave the prototype a rating above 3 stars after using it for 30 days ($M = 3.37$, $SD = 0.83$). 15 of the 32 participants (47%) stated they would recommend the application to "many people" or "everyone". These findings are also presented in Table 23. 15 of the 32 adolescent participants (47%) reported they would use this application between 3 to 10 times over the course of a year. These results are presented in Table 23.

The tenth aim examined which adolescents viewed the entire application, how often they used the application (measured by logins), if there was a preference for specific modules, and what sections of the application youth were using. Ten of the 40 youth participants completed the entire application. 23 participants used some of the application and seven participants did not log-on to the application. On average, adolescents logged on average close to 4 times ($N = 3.83$) over the 30 days. Removing the seven non-users provides an average above 4 logins per user ($N = 4.64$). Exploratory analyses provided evidence the number of user logins was positively correlated with increases in individual resilience ($r = 0.39$, $p = .03$). No other usage variables significantly correlated with increases for resilience. For application usage, more users completed the depression module ($N = 18$) in comparison to the stress module ($N = 13$) and the lifestyle module ($N = 10$). Including participants who only partially completed modules, the depression module still had the most users ($N = 29$) in comparison to the stress module ($N = 25$) and the lifestyle module ($N = 22$). For each specific component, the "Where do I rate?" section was most used for the depression module ($N =$

29), the stress module ($N = 25$), and the lifestyle module ($N = 18$). Adolescent usage data is presented in Table 24

Chapter VI

Discussion

Study 1 Discussion

The aims of Study 1 were to incorporate qualitative and quantitative input from adolescents and stakeholders to develop a feasible resilience application. Adolescents and stakeholders stated the prototype was adequate and acceptable. This study adds to the application literature by examining core features and content adolescents and stakeholders believe should be considered when developing and refining a mental health application.

Application Features

When discussing a potential mental health application, youth emphasized features over content. Participants within Study 1, Phase 1 identified the application's aesthetics and designs as the most important consideration for designers. The finding that highlighted participants' desire to have an aesthetically pleasing app is not surprising, given previous applications with appealing aesthetics and components have been viewed more favorably by users (Bakker et al., 2016, Kenny et al., 2016, & Grist et al., 2017). Adolescents cited previous experiences using non-functional applications as a reason incorporating certain features would be necessary to pique youth interest. Applications which focus on feasibility and usability have been positively reviewed by youth (Kenny et al., 2015, Rickard et al., 2016). Participants discussed improvements to facilitate user interest and engagement, which included logging features to track changes in mood and behavior. Turvey and Roberts (2015) found user interest in mental health applications increases with the ability to track mood and activities. Adolescents stated the application had to provide information that differentiated from lectures at school. Whitehouse and colleagues (2013) reported adolescents are more interested in learning about mental health through engaging videos and activities in contrast

to didactic formats. Clinician participants focused on improving engagement, with incorporating more interesting activities and a user reward system. Lack of engagement has previously deterred youth from using mental health applications (Matthews & Doherty, 2011; Kenny et al., 2015).

Adolescents wanted to make the application more personalized and suggested there could be a “Get to Know You” section where users complete some initial information within the application. Entering in basic demographic and behavioral information has effectively improved users’ application experiences (Morrison et al., 2012). Adolescents and stakeholders expressed concerns about the application’s scope (e.g. age group). The audience for the prototype was universal, but Werner-Seidler and colleagues (2017) have provided evidence that stepped-care approaches should be considered when targeting mental health improvement. Splitting up the application between age and mental health knowledge would be helpful to make sure users are receiving content tailored to them.

Adolescents and clinicians discussed social connection as a vital feature to include within mental health applications. Youth participants wanted to connect with other adolescents through multiplayer games or anonymous chat rooms to talk about daily stressors. Increased social interaction within applications can lead to improved mental health outcomes (Turvey & Roberts, 2015). Although adolescents and stakeholders have identified concerns about safety and privacy within mental health applications (East & Havard, 2015; Kenny et al., 2016), there are measures to increase social engagement outside of direct communication. Morrison and colleagues (2012) have stated this can include increasing the variety of avatar automatic dialogue and mimicking peer-to-peer social interactions. Being able to incorporate social interaction is important for future youth mental health applications.

Application Content

Although adolescents focused mainly on prototype features, users provided preferences for mental health application content. Adolescents reported being content the prototype discussed using relaxation skills when feeling sad or stressed. Youth mental health applications that teach coping skills have been viewed as more effective (O'Brien et al., 2017; Tighe et al., 2017). Adolescents enjoyed the mental health surveys and discussed including components to track thoughts or feelings through a journaling component. Youth also reported being interested in receiving feedback within an application about how they were doing in areas of their life to track personal progress. Previous mental health applications have emphasized the importance of self-monitoring components (Morrison et al., 2012, Turvey & Roberts, 2015).

Although the prototype identified content strengths, users were interested in specific additions or changes. Users wanted the application to include more resources especially if someone was struggling with depression, anxiety, or wanted to talk to a psychologist. Interview participants also inquired about including dilemmas to provide youth with opportunities to determine what they would do in complex situations. Wasserman and colleagues (2015) incorporated reviewing dilemmas within the Youth Aware of Mental Health (YAM) program and found significant decreases in mental health symptoms (Wasserman et al., 2015).

Application Benefits

While aesthetically pleasing features and informative content is helpful, participants believed the application had to provide direct benefits. Adolescents discussed an application would be beneficial if it could decrease school stress. Youth stress from school has increased over the years and occurs from a multitude of interpersonal and academic pressures (Bester, 2019). A recent meta-analysis reported adolescent targeted stress-reduction programs were efficacious (Feiss et al., 2019). Adolescents were invested in an application, which reduced

school stress. Adolescent and adult participants expressed doubts about youth usage since there was minimal incentive to continue using the application prototype. User incentive has previously been linked as an integral application feature (Schuller et al., 2014). Any mental health application that is developed will need to include rewards and incentives or adolescents will stop using it.

Application Improvement

Adolescents and stakeholders reported the application was feasible and acceptable through post-prototype surveys. However, adolescents expressed preference for additional options and feature changes. Overall, the adolescents and adults believed the application features were acceptable, but there was a consensus that a multitude of changes and variety would make the application more appealing. Application features have to be appealing or youth will lose interest in using the application (Schuller et al., 2014). With the ever-expanding word of technology, adolescents are more interested in the newest applications with dynamic features.

If we were able to incorporate feedback from Study 1, Phase 2 users for the final version of the prototype used in Study 2, we would have included the rate your mood function, improved navigation to engaging application functions (e.g. game), added dilemmas for youth to review, provided incentives to use the application (e.g. rewards), and had more variety of characters to increase social engagement.

Adolescent Individual Interviews and Focus Groups

Incorporating an adolescent focus group prompted opportunities for discussion of themes within an interactive setting. Self-consciousness was a new theme in the Study 1, Phase 1 focus group, which was not identified within the individual interviews. This focus group theme was identified since there were adolescents ranging from 7th grade to 12th grade.

Bernard (2006) reported focus groups can provide additional information that would not be obtained during individual interviews.

Although there were multiple areas of agreement, Study 1, Phase 2 adolescent individual interviewees and focus group participants provided differing opinions about the prototype. There are various reasons that could account for these discrepancies. First, adolescent individual interviewees and focus group participants were shown different versions of the prototype. The device medium could account for contrasting viewpoints with the tablet prototype receiving higher feasibility ratings. Davidson and colleagues (2019) reported that a tablet-based youth mental health intervention received high ratings for feasibility and acceptability. However, this was not in direct comparison to a phone-based intervention, so Davidson and colleagues' (2019) findings do not provide evidence a tablet-based intervention would be more feasible. While the majority of features and content were the same, there were slight changes between the different versions (e.g. "Rate Your Mood" function, game). The removal of the "Rate Your Mood" function could have led to lower quantitative ratings from the focus group participants. Self-monitoring features have been rated highly by youth in previous mental health applications (Matthews & Doherty, 2011; Kenny et al., 2015; Whiteside, 2016).

Another possibility for contrasting opinions could be the small sample sizes for the adolescent individual interviews ($N = 5$) and adolescent focus group ($N = 4$). Within each group, one participant could add significant variance to qualitative and quantitative results. Therefore, the randomness of participants could explain the discrepancy between the two groups.

An additional explanation could be the nature of individual interviews in comparison to focus groups. Individual interviews involve a one-on-one interaction with an interviewer, who can be viewed as an authority figure given their perceived investment in the product.

Also, since one-on-one interviews were conducted with adolescents, there could be a power differential given the interviewee-interviewer age difference. Power differential between participant and research is enhanced in one-on-one interview settings (Peterson-Sweeney, 2005). Therefore, it may have been challenging for participants to report more accurate feedback about the prototype. In contrast, focus groups allow same-aged peers to interact with one another and lessen the perception of power differential since there were more adolescent focus group participants ($N = 4$) than interviewers ($N = 2$). Adolescents in the focus groups may have felt more comfortable expressing improvements for the application since they were in the presence of peers (Heary and Hennessy, 2002). In contrast, focus groups can lead to groupthink where participants tend to agree with one another instead of forming independent ideas (Janis, 1982). If one participant forms a strong opinion, other participants might come to a consensus to be viewed as likeable among group members (Janis, 1982). Therefore, this can lead to skewness of viewpoints that changes qualitative feedback within groups that would be less likely to impact individual interview opinions.

Adolescent Interviews/Focus Groups and Adult Interviews

Study 1, Phase 1 adolescents reported being interested in using a mental health application while clinician participants were concerned youth would only use a mental health application briefly. There is a reason why this discrepancy may be present. Clinicians in this study reported previous experiences encouraging youth to use mental health applications, but stated their interest decreased quickly. Grist and colleagues (2018) provided evidence that adolescents are concerned about the accuracy of information in applications and do not find them as useful as face-to-face interventions, which may explain why clinicians have found adolescents to be hesitant to use applications.

Adult stakeholders discussed safety and confidentiality in more detail compared to adolescents. There is a reason why this difference may be present. Parents have discussed

concerns about safety and privacy more than adolescents in previous mental health application development studies (East & Havard, 2015; Kenny et al., 2016). Addressing concerns about youth safety was the researchers' justification for including adult stakeholders in the development process. O'Loughlin and colleagues (2019) found the majority of mental health applications do not have specific regulatory restrictions, which is in agreement with what parents, teachers, and clinicians discussed during interviews. Future youth applications should follow American Psychiatric Association recommended guidelines about privacy and confidentiality of personal information within applications as described by Torous and colleagues (2018).

Adolescents emphasized features, but clinicians discussed more content ideas and changes for the prototype. Traber-Walker and colleagues (2019) obtained evidence that clinicians focused on application content, in comparison to youth who discussed issues about feasibility and acceptability. There are reasons for this discrepancy. Adolescents would use this application to learn more about their mental health, so their expertise would be about application features in comparison to mental health content. Youth feature expertise is also evidenced by their increased application usage (Wang et al., 2019). Therefore, it would be more challenging for adolescents to provide specific content feedback. The clinicians recruited for this study would be experts on content given their work primarily with youth.

Teachers and parents discussed the importance of focusing on adolescents' strengths and highlighting those within a mental health application. Fenwick-Smith and colleagues (2018) provided evidence that youth resilience-enhancing programs focusing on individual strengths were effective. Including teachers, clinicians, and parents provided researchers with more information about application development beyond what adolescents reported. Adult stakeholders provided more in-depth responses about content and safety issues, which are essential for developing an effective youth mental health application.

Limitations

Some limitations should be acknowledged within our sample. First, all adolescent participants were recruited from the current UT Southwestern Center for Depression and Clinical Care (CDRC) setting. Recruitment from this setting may have created a sample selection bias, as these youth participants may have more insight and awareness about mental health. Kenny and colleagues (2016) discussed similar limitations with recruitment for their mental health application study. Therefore, these findings may not generalize to other adolescent preferences within applications. Future application studies should focus on recruitment through schools and community centers to create more diverse samples representing spectrum of mental health awareness and knowledge. Additionally, adult stakeholders who participated in this study may be from a sample whom are more interested in mental health. This may make the findings less generalizable to other parent, teacher, and clinician preferences for youth mental health applications.

Another limitation for Study 1, Phase 2 is that adolescent and adult individual interview participants were shown the prototype on a tablet (iPad) instead of a phone. Adolescent focus group participants were able to review the prototype on their phones. Concerns about phone feasibility and usability prompted the prototype to be initially reviewed on a tablet. Therefore, the Study 1, Phase 2 individual interview findings might not be generalizable to how adolescents and adults would view the application on a phone. There were slight changes from the tablet to phone version including the removal of the “Rate Your Mood” function (platform incompatibility) and change in game youth could play. Therefore, this is an additional variable that has to be considered when analyzing the discrepancies between Study 1, Phase 2 adolescent individual interviews and adolescent focus group qualitative and quantitative feedback.

Although Study 1, Phase 2 adolescent focus group participants were able to review prototype 2.0, our sample was small ($N = 4$). More participants should have been recruited to make these findings for prototype 2.0 generalizable to adolescents. Additionally, users were only able to review the prototype for approximately 15 minutes. Erguera and colleagues (2019) developed a mental health application targeting HIV medication adherence and had users involved in this iterative process to test feasibility and acceptability of the application over two months. This feedback was implemented into future versions of the application for pilot testing (Erguera et al., 2019). In contrast to Erguera and colleagues' (2019) application, we were unable to incorporate Study 1, Phase 2 feedback for our application, which is a weakness of our study.

Clinical Implications

Applications should be utilized for youth resilience interventions to reach adolescents who may not be receiving mental health information elsewhere. In-person prevention programs have demonstrated efficacious changes for mental health outcomes (Van Voorhees et al., 2009; Dray et al., 2017; Fenwick-Smith et al., 2018). However, the burden of resources needed to implement universal approaches in schools and primary care clinics is high. Youth mental health applications could be both a target universal approach to reach adolescents and could decrease the burden on schools and primary care clinics, which have rigorous curriculum and healthcare demands.

Overall, adolescents reported being interested in using mental health applications. Quantitative and qualitative feedback showed adolescents and adults were content with the Study 1, Phase 2 prototype. Results from individual interviews and focus groups may encourage developers to make youth mental health applications.

Future youth mental health applications should incorporate features that maintain adolescent interest and is enjoyable. Schuller and colleagues (2014) discussed the importance

of being able to deliver application content in multiple ways. Adolescents were also interested in incorporating additional features to this application, which included mental health resources, how to navigate complex situations, and journaling. In conjunction with features, users should be provided with benefits to continue using mental health applications. With an increase in applications available, youth will be more likely to quit using mental health application if there is no improvement to their quality of life. While these features were not in the current prototype, future mental health applications should incorporate these components to facilitate youth interest. Kenny and colleagues (2016) provided support that incorporating adolescent feedback can lead to more feasible and efficacious applications.

Adolescents acknowledge psychoeducation about mental health is important, but they stated applications should include self-assessment and coping strategies. Morrison and colleagues (2012) and Whiteside (2016) provide support that users enjoy immediate feedback from surveys. Kenny and colleagues (2015) found evidence that youth enjoyed being able to rate their mood and track other areas of their mental health. Fenwick-Smith and colleagues (2018) have found initial evidence that adolescents benefit from programs, which focus on enhancing coping skills. Tighe and colleagues (2017) obtained evidence that including coping skills within applications lead to older adolescent benefits. Youth also reported interest in applications that facilitate social communication. Although some adult stakeholders were nervous of incorporating social interaction, automatic dialogue through avatars can increase adolescents' connection to the application (Morrison et al., 2012). Mental health application developers should continue incorporating these areas in future applications.

Mental health application designers should be cautious when developing universal applications since users will have different preferences. Making the application tailored to the individual is an important function to include. Morrison and colleagues (2012) reported applications that include multiple demographic or behavioral features are more personalized

than applications, which only use one variable. Patwardhan and colleagues (2015) provided evidence that youth are more interested in mental health applications that can be tailored to their experience. Werner-Seidler and colleagues (2017) provided evidence that stepped-care approaches can be more personalized and helpful for youth. Even with universal applications, being able to tailor to the individual will lead to a beneficial user experience.

Study 1 Conclusion

Study 1 provided new information about themes related to feature and content development for a resilience mental health application prototype. Clinical implications for future mental health applications include incorporating adolescent feedback, making the application engaging, personalized, and addressing any safety concerns from adolescents and adult stakeholders.

Study 2 Discussion

The aims of Study 2 were to investigate the feasibility and acceptability of a resilience mental health application and determine if usage would lead to changes in resilience and secondary mental health outcomes. Although there were no statistically significant mental health changes, adolescents determined the application was adequate and usage data provided important information about clinical implications and future directions for youth mental health application research.

Participants reported that the application was feasible through ratings on the Computer System Usability Questionnaire (CSUQ) and Mobile Application Rating Scale (MARS) after use for 30 days. These findings are as a strength since users still found the application to be adequately engaging, functional, aesthetically pleasing, informative and helpful after prolonged use. This is an important first step for application development, as

applications have to be rated as feasible and acceptable before they can become effective (Bakker et al., 2016; Kenny et al., 2016; Grist et al., 2017).

There were no significant differences between pre-post scores for resilience and other mental health outcomes after adolescents used the application for 30 days. There were still no significant differences after removing non-users ($N = 7$). For application usage, 10 of the 40 participants used the entire application. On average, users logged into the application close to 5 times ($N = 4.64$). There are various reasons why there might have been no changes for user resilience and secondary mental health outcomes. One possibility is participants did not use the application enough or have enough time to use the application (i.e. 30 days) to lead to mental health changes. Our exploratory analyses demonstrated a positive correlation between the number of times users logged in and increases with internal resilience factors. Therefore, more application usage could lead to changes within specific mental health outcomes. Tighe and colleagues (2017) had adolescents use a mental health application for 6 weeks, which is more than the length of time adolescents had access to the Study 2 prototype. Users logged into the application once per week on average, but researchers were unable to approximate the amount of time participants spent in the application. In addition, only 10 users completed all the application modules. In comparison, Tighe and colleagues (2017) had 34 out of 61 (21 lost to follow-up data) users complete all modules and measures, which may be necessary for statistically significant mental health changes.

This application was targeted as a universal intervention for individuals with low and high levels of resilience. However, the inclusion of participants with high levels of resilience might have decreased interest in the application and benefits from continued usage. The CDRC has ongoing studies of resilience in at-risk youth. It is possible that youth presenting for study participation might be presenting with higher levels of resilience in comparison to the general adolescent population, which would limit gains in resilience from ceiling effects.

Our research baseline scores were higher ($M = 326$) in comparison to Guilera and colleagues' (2015) findings from a Spanish adolescent sample ($M = 315$). Fenwick-Smith and colleagues (2018) reported implementing universal interventions might not be efficacious for those who already have high levels of resilience. Participants might not have been interested or needed the application, which could have led to decreased usage and no significant change in mental health outcomes. Resilience also increases in the presence of negative stressors (Dray et al., 2014). Negative stressors and adverse events experienced were not measured as part of this study. Other than the COVID-19 pandemic, which likely impacted several participants during study participation ($n = 31$), participants might not have experienced other significant adverse events during the period of study (30 days), then their levels of resilience would not be expected to increase.

Another possibility is that the content in the Whippy: Resilience application did not include the most salient information, learning opportunities, or intervention strategies to actually impact resilience. As previously discussed, Dray and colleagues (2014) described resilience as having multiple internal and external factors. The current application may not have covered all of those factors, which could explain the lack of changes for resilience and secondary mental health outcomes. Another possibilities is that a phone application may not be the best medium to deliver an intervention to improve resilience. Although meta-analyses have found universal resilience applications to be efficacious (Dray et al., 2017; Fenwick-Smith et al., 2018), these have been in-person interventions. There have been no youth resilience-enhancing applications mentioned in the literature, so a mental health application might not be an effective medium to improve youth resilience.

Additional reasons may include concerns about the application's engagement. Although users determined the application was adequately engaging, it was the lowest rated MARS subscale for Study 2 participants. Applications need to be engaging and provide

incentives to increase youth usage (Bakker et al., 2016; Kenny et al., 2016; Grist et al., 2017). This is necessary since youth application use has increased over the past five years (Wang et al., 2019). If the mental health application is only viewed as adequately engaging and has to compete for youth attention with entertainment applications, then the mental health application will be used infrequently and not be viewed as effective.

There were specific features and content missing from the application, which may have decreased usage and made the application less efficacious. The application did not include the functionality to have participants rate their mood or send notifications within the current platform. Researchers sent weekly e-mail reminders to encourage use of the application, but the application was not designed to utilize SMS push notifications. Previous youth mental health applications have reported higher feasibility ratings and effectiveness when incorporating these components (Matthews & Doherty, 2011; Kenny et al., 2015, Patwardhan et al., 2015), so not having these features could decrease youth engagement in the application.

Another potential obstacle to increased application use and mental health changes could be low personalization functionality within the application. Users enjoy the ability to tailor their experiences within applications by incorporating user demographic and behavioral information (Morrison et al., 2012; Patwardhan et al., 2015). Fenwick-Smith and colleagues (2018) suggested universal interventions lack personalization and tailoring, which could minimize positive outcomes.

Navigation within the application may have been another barrier for participants. Difficulties with feature and content accessibility could have decreased participant frequency of use and interest in using the application. Certain activities and games were challenging to find and could only be used after watching or skipping introductory videos. Being able to

easily locate specific application components increases participant usage and promotes more positive outcomes (Whitehouse et al., 2013; Pramana et al., 2014; O'Brien et al., 2017).

Adolescents appeared to prefer the depression module ($N = 18$) in comparison to the stress ($N = 13$), and lifestyle modules ($N = 10$). Users preferred the “Where do I Rate?” section within each module compared to other sections. One possibility is the placement of the depression module within the home page. Depression was listed as first in module order from left to right. Users might have started with the depression module first, but participants did not proceed to the stress and lifestyle modules. Without post-study 2 individual interviews and focus groups, researchers are unsure of the reasons for higher depression module usage. Another possibility is sample selection bias. The CDRC has ongoing studies of depression in at-risk youth. Youth participants with previous or current history of depression could account for depression module preference. Adolescent depression prevalence is higher compared to adolescent anxiety rates (Bruffaerts et al., 2018), which could be the reason for higher user interest. Kerst and colleagues (2019) obtained evidence that applications centered around depression received positive feedback about their effectiveness.

Adolescents preferred the “Where do I rate?” section within each module, which provided surveys users could complete to receive feedback about possible depression symptoms, anxiety symptoms, and physical activities (eating, sleeping, exercising). There are possibilities that may explain this preference compared to other application areas. Whiteside (2016) found youth were more likely to complete self-assessments in comparison to practicing new coping skills. Surveys are more interactive and engaging, which is an important component for mental health applications (Matthews & Doherty, 2011; Kenny et al., 2015). Surveys can be easier to maintain adolescents' attention in comparison to videos, which might increase youth interest and usage.

There appeared to be some discrepancies between user ratings and usage time. Although almost all participants provided acceptable ratings for the application, users only logged in on average once per week. There are various reasons for contrasting survey and usage data. One potential reason is that applications viewed as “acceptable” does not mean the application is more likely to be used. While the prototype was viewed as adequate, there are other applications available that have dynamic features, interesting content, and provide incentives for continued usage (e.g. Snapchat, Instagram, Twitter). Therefore, users believe the prototype is feasible, but they are less likely to use the mental health application when are more entertaining applications, which provide feature and content updates.

Limitations

Some limitations are the same as Study 1. Almost all adolescent participants were recruited from the current UT Southwestern Center for Depression and Clinical Care (CDRC) setting. Application feedback, application usage, and non-significant changes to mental health outcomes may not be generalizable to other adolescents.

The application had some feature and content limitations that were unable to be incorporated into the updated prototype. Specifically, the application was unable to include the “Rate Your Mood” function since it was not compatible with the phone prototype (Prototype 2.0). The researchers were also unable to make significant changes from the prototype to the final version of the application, so qualitative feedback from Study 1, Phase 2 was unable to be fully incorporated.

Study 2 participants did not participate in individual interviews and focus groups after using the application for 30 days. Gaining post-Study 2 qualitative feedback was beyond the scope of the study, but these interviews would have provided more in-depth information about feasibility ratings and usage rates for the application.

Clinical Implications

These findings provide additional support that mental health applications can receive positive feasibility and acceptability ratings after prolonged use. Future mental health application research should incorporate aesthetics and functionality components from this application to develop efficacious interventions. Usage data from this study may provide support that youth only like using mental health applications weekly. Whiteside (2016) found youth usage to be weekly or less for Mayo Clinic Anxiety Coach. Expectations for mental health applications may need to be set to weekly usage as a goal.

Weekly usage and non-significant changes in study outcomes provide support that this application should be paired in conjunction with an in-person component. Study 1, Phase 2 adult stakeholders believed this application would be most effective with psychotherapy or additional support. One possibility for school and primary care settings is to have teachers and providers use the application videos to provide youth psychoeducation about individual resilience factors and other mental health areas (e.g. depression, stress, lifestyle factors). In-person psychoeducation could be paired with asking youth to complete the interactive features of the application on their own (e.g. fill-out module surveys, practice coping skills within the application) and make it homework for adolescents within school settings. Pramana and colleagues (2014) have received positive feedback from youth pairing Cognitive Behavioral Therapy (CBT) and SmartCAT. The current version of the application may be more efficacious in combination with additional in-person interventions.

Exploratory analyses found there was a positive correlation between amount of times users logged into the application and increases with internal resilience factors. Therefore, more usage may lead to changes with resilience and other mental health outcomes. Future mental health application developers should incorporate features and content that provides an inter-application incentive to increase time youth spend within applications. Pramana and colleagues (2014) referenced goal setting with rewards can increase youth application usage.

The depression module was preferred among adolescent users. Adolescents might be interested in depression content since it is more prevalent in youth. Future mental health applications should incorporate psychoeducation and coping skills to alleviate depression since adolescents may be more interested than stress or physical mental health factors. Tighe and colleagues (2017) reported Ibbobly was efficacious in reducing older adolescent depressive symptoms.

Study 2 participants preferred completing the “Where do I rate?” section in the depression, stress, and lifestyle modules. This section consisted of surveys where youth could receive feedback in these areas. Whiteside (2016) provided evidence that youth enjoy completing self-assessment in comparison to coping skill activities. Future mental health application developers should incorporate surveys and interactivity to maintain user interest and engagement.

Study 2 Conclusion

Adolescents found a resilience mental health application to be feasible and acceptable after 30 days of use. Although there were no significant changes in mental health outcomes, users logged into the application weekly and preferred the depression module and application surveys. These findings provide important clinical implications to make future mental health applications more appealing and efficacious for adolescents.

Future Directions

Future goals include incorporating feedback from Study 1 participants to improve the current version of the application. The researchers were unable to add specific features and content from Study 1 qualitative data for reasons related to time and financial constraints. Therefore, future versions of the resilience application will incorporate areas of improvement identified by Study 1 participants.

After updating the current prototype, our research team is interested in conducting secondary individual interviews and focus groups with adolescents to receive additional feedback about the application. Kenny and colleagues (2016) reported mental health application development involved multiple rounds of input from adolescents. Receiving more information about the strengths and weaknesses of the prototype would lead to a more engaging and effective resilience application.

Future studies will obtain interview feedback from adolescents after using the application for 30 days. One of the main study limitations was receiving no qualitative feedback from Study 2 users. Post-study interviews would help researchers obtain insight about features and content that positively or negatively impacted adolescent' usage. List of possible post-study interview questions are listed in Appendix 4.

Additional research should also be conducted to determine if a mental health application is the best medium for improving adolescent resilience. If it is not, other mediums should be pursued to determine the best context to implement these interventions.

The original goal was to pair the application with content for teachers, mental health professionals, and pediatric physicians to use with adolescents. Although the application did not lead to changes in resilience and mental health outcomes, future studies will focus on the efficacy of pairing the content in additional settings. Applications have been previously viewed as efficacious in combination with mental health interventions (Pramana et al., 2014; Traber-Walker et al., 2019). Utilizing this application in conjunction with mental health treatment could lead to increases in resilience.

Overall Conclusion

This study is the first to test the feasibility and efficacy of a resilience youth mental health application. New research was obtained about specific features and content adolescents

would want incorporated into mental health applications. Although there were no significant changes in user mental health outcomes, participants found the application to be functionally acceptable after using it for 30 days. The study's findings provide researchers and clinicians with important information for developing future youth mental health applications. Future studies should examine the efficacy of the application in conjunction with in-person mental health intervention

Table 1. *Adolescent Mental Health Application Table*

Reference	Name of App	App Aims/Objectives	Research Design	Findings
Kenny et al. (2015)	CopeSmart	Foster positive mental health through: 1) emotional self-monitoring and 2) promotion of positive coping strategies. Includes multiple sections including: Rate My Mood, Coping Tips, Resources and Mood History	43 participants in Ireland (88%) female, 15-17 years old, gathered information about feasibility and acceptability	79% of people liked the app, 93% said it was easy to use, 70% would use the app in the future. Participants used the app on 4 of 7 days. Evening was most popular time (6 – 9 pm). Rate My Mood was most useful part of app. Some participants found Coping Tools and Resources to not be helpful (23% and 40%).
Kennard et al. (2015).	Safety Plan App	Develop a brief inpatient intervention for suicidal adolescents.	Gathered qualitative data from five teenagers and clinicians to focus on benefits and concerns about developing a safety plan app for teenagers	Clinicians said they were comfortable having patients put safety information on their smartphone. Worried about privacy or confidential terms. Parents thought that a smart phone application for safety planning would be convenient and easily accessible and would improve safety. Teens reported that they would be comfortable using an app. All participants endorsed a phone application to improve accessibility and portability of the patient's safety plan.

Tighe et al. (2017)	Ibobbly	In module 1, participants learn to identify thoughts, feelings and behaviors. In module 2, participants were taught to regulate their emotions through mindfulness, acceptance and self-soothing activities. In module 3, participants were helped to identify values important to them and asked to set small, achievable goals to help them live their lives	RCT for efficacy of mental health application	Significant pre and post-intervention differences in treatment arm for SI. Participants in Ibobbly arm showed a substantial and statistically significant reduction in PHQ-9 scores compared with waitlist controls. Significant change for general psychological distress for Ibobbly arm. For 40 participants of whom usage data were available, 34 of 40 completed all modules and assessments. Significant reductions for depression and psychological distress, but not suicidality or impulsivity
Reid et al. (2013)	Mobiletype	Mobile health assessment and management application that monitors mood, stress, and everyday activities and transmits that information to PCPs through secure website	RCT for efficacy for mental health application	When participants completed program, PCPs gained a better understanding of patient functioning. Compared to attention comparison group, application provided help with medication choices, referrals, help with diagnosis and mental/health problems. Findings suggest that a mobile phone monitoring program, which captures and summarizes detailed, specific mental health and more general health information in a time-efficient manner may assist

				PCPs in management of youth mental health problems. Young people thought it was beneficial to send info to PCP.
Loventoft et al., (2012)	Daybuilder	Smartphone intended to support people with depression by monitoring their daily lives and by supporting interactions in community, included mood tracking along with lifestyle factors, life events, and medication management	Six participants aged 17-24 completed the study, gathered information about feasibility and acceptability	Collected information about attitude towards the prototype, individuals liked the idea of an app in the style of Daybuilder, but had reservations of some aspects of the application, usability and software concerns
Matthews & Doherty, (2011)	Mobile Mood Diary	Participants could rate mood, energy and quality of sleep with SMS reminders to do so, diary could involve text entries as well	Focus groups- 12-14-year olds about the prototype,	significant usability issues were found Second portion of study had 21 kids of inner-city schools use the app- higher adherence than paper group, easy to use and minimal worries about privacy Clinical evaluation of MMD with therapists and clients- 9 participants over span of 2 years-

				<p>higher adherence than paper versions of diary, found it to be “engaging”</p> <p>Therapist wanted a buddy system due to lack of experience with technology in treatment</p> <p>Enjoyed graphs of what their mood looked like over past 2 years</p> <p>Teens expressed concern over using application due to name</p> <p>Provide options for use (paper, mobile, desktop)</p>
O’Brien et al., (2017)	Crisis Care	<p>Crisis Care has an adolescent mode and a parent mode designed to be used in tandem when the adolescent is experiencing a suicidal crisis following discharge from ED or inpatient psychiatric unit</p> <p>Adolescent mode gave immediate access to a set of coping skills they have identified as being helpful during a suicidal crisis- “My Skills” section- Call an Adult, Relax, Laugh and Do Something “Help Me Now” section presses if adolescents feel at imminent risk of self-harm</p> <p>Parent Mode of Crisis Care: gives access to tips on how to effectively listen to suicidal adolescents, helps parent to coach adolescents in their personalized coping skills and gives</p>	20 parent-adolescent dyads participated in this study for feasibility and acceptability	<p>High ratings of feasibility, individuals found it to be useful during a crisis, satisfaction with content, changes were made to application to improve ratings</p>

		immediate access to professional help and consultation		
Patwardhan et al. (2015)	REACH	REACH for Personal and Academic Success is an indicated prevention and early intervention program targeting anxiety disorders and related problems in youth. Activities included daily diary	22 youth from public schools participated in the “system usefulness, satisfaction, and ease” aspect of this research. Reach application was highly and positively rated. REACH is capable of deploying notifications relevant to skill practice, offers tools for personalizing and tailoring the protocol, higher ratings for quality of support information, system ease of learning, and system satisfaction	Reach application was highly and positively rated. REACH is capable of deploying notifications relevant to skill practice, offers tools for personalizing and tailoring the protocol, higher ratings for quality of support information, system ease of learning, and system satisfaction
Whitehouse et al. (2013)	TickiT	Develop an app that assessed adolescents’ current psychosocial levels through screening questions that could be sent to PCPs or other providers	12-18 years old, n = 80, adolescents helped with co-creation of screener along with gathering information about usability and feasibility	Talked to health-care providers as well as IT administrators Teens wanted colorful interface that was “different from school”, gender neutral colors 92% of adolescents said screener was easy to use, found question easy to understand, comfortable answering questions, Residents felt positively about the instrument, surgeons did not like the measure
Pramana et al. (2014)	SmartCAT	Smartphone application that cues youth to use the CBT skills taught in sessions, online portal that allows therapists to monitor skill use, send cues and treatment-related materials to engage youth in real-time via secure messages,	Pilot study with nine youth (9-14 years old), gather initial adherence information about using application	Data showed that app was used frequently during treatment, patients were compliant with brief CBT protocol, app was rated as highly usable, goal setting through rewards can incentivize kids to use the app

		communication protocol that allows real-time bi-directional exchange between the app and the portal. App incorporates authentication and encryption for security purposes Use of reward bank		
Whiteside (2016)	Mayo Clinic Anxiety Coach	Self-help application designed to meet the need for individuals through exposure-based CBT, self-evaluation module measures the frequency of anxiety symptoms with a self-report Likert-type scale, second module contains psychoeducational material, third module focuses on exposure exercises	169 children and adolescents downloaded the app in the past year, between ages 5-17, adherence to using the application	70% used the app between 4-20 times Individuals were more likely to take the self-assessment than to create a fear ladder or complete an exposure
Hides et al. (2019)	Music eScape	Application designed to help people identify, express, and regulate their emotions. Users take music from their own song libraries to create playlists that reflect level of valence (pleasant to unpleasant) and arousal (very low to very high)	169 adolescents and young adults (ages 16 – 25) used the application. 84% of those participants completed follow-up data at 6 months	Users gave the application a high objective level, with good engagement, aesthetics, information, and acceptable functionality. There were improvements for emotion regulation strategies, mental distress, and well-being over the 6 months
Traber-Walker et al. (2019)	Robin	Application used in conjunction with standardized manual to target adolescents, whom are at risk for developing psychosis	A prototype of the application was tested with patients (N =7, ages 14 – 18) and clinicians treating early psychosis	Patients reported interested in using the application daily. Clinicians wanted to incorporate the application within therapy. Modules containing information about symptoms and coping strategies

				were the most utilized
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Table 2. *Study 1, Phase 1 Adolescent Individual Interview Sample Demographics*

<u>Variable</u>	<u>Total Sample (N = 5)</u>
Gender	
Female	3 (60%)
Male	2 (40%)
Ethnicity	
Non-Hispanic	2 (40%)
Hispanic	3 (60%)
Race	
Caucasian	2 (40%)
Asian	2 (40%)
American Indian	1 (20%)
Grade	
7 th Grade	1 (20%)
8 th Grade	1 (20%)
9 th Grade	2 (40%)
10 th Grade	1 (20%)

Table 3. *Study 1, Phase 1 Adult Individual Interview Sample Demographics*

<u>Variable</u>	<u>Total Sample (N = 9)</u>
Gender	
Female	8 (89%)
Male	1 (11%)
Ethnicity	
Non-Hispanic	6 (67%)
Hispanic	3 (33%)
Race	
Caucasian	7 (78%)
American Indian	1 (11%)
More than One Race	1 (11%)
Stakeholder	
Parent	3 (33%)
Teacher/School Personnel	3 (33%)
Pediatric Clinician	3 (33%)

Table 4. *Study 1, Phase 1 Adolescent Focus Group Sample Demographics*

<u>Variable</u>	<u>Total Sample (N = 6)</u>
Gender	
Female	1 (17%)
Male	4 (66%)
Other	1 (17%)
Ethnicity	
Non-Hispanic	4 (66%)
Hispanic	1 (17%)
Unknown	1 (17%)
Race	
Caucasian	2 (33%)
African American	1 (17%)
Native Hawaiian	1 (17%)
More Than One Race	1 (17%)
Other	1 (17%)
Grade	
7 th Grade	1 (20%)
9 th Grade	1 (20%)
10 th Grade	1 (20%)
11 th Grade	2 (40%)
12 th Grade	1 (20%)

Table 5. *Study 1, Phase 2 Adolescent Individual Interview Sample Demographics*

<u>Variable</u>	<u>Total Sample (N = 5)</u>
Gender	
Female	2 (40%)
Male	2 (40%)
Transgender	1 (20%)
Ethnicity	
Non-Hispanic	5 (100%)
Race	
Caucasian	3 (60%)
African American	1 (20%)
Asian	1 (20%)
Grade	
8 th Grade	2 (40%)
12 th Grade	3 (60%)

Table 6. *Study 1, Phase 2 Adult Individual Interview Sample Demographics*

<u>Variable</u>	<u>Total Sample (N = 4)</u>
Gender	
Female	2 (50%)
Male	2 (50%)
Ethnicity	
Non-Hispanic	4 (100%)
Race	
Caucasian	3 (75%)
Asian	1 (25%)
Stakeholder	
Parent	1 (25%)
Teacher/School Personnel	1 (25%)
Pediatric Clinician	2 (50%)

Table 7. *Phase 2 Adolescent Focus Group Sample Demographics*

<u>Variable</u>	<u>Total Sample (N = 4)</u>
Gender	
Female	2 (50%)
Male	2 (50%)
Ethnicity	
Non-Hispanic	4 (100%)
Race	
Caucasian	2 (50%)
African American	1 (25%)
More Than One Race	1 (25%)
Grade	
9 th Grade	1 (25%)
10 th Grade	2 (50%)
11 th Grade	1 (25%)

Table 8. *Study 2 Adolescent Sample Demographics*

<u>Variable</u>	<u>Total Sample (N = 40)</u>
Gender	
Female	24 (60%)
Male	14 (35%)
Transgender	1 (3%)
Do not Identify as Male or Female	1 (3%)
Ethnicity	
Non-Hispanic	26 (65%)
Hispanic	12 (30%)
Unknown	2 (5%)
Race	
Caucasian	19 (48%)
African American	6 (15%)
Asian	8 (20%)
American Indian	2 (5%)
More than One Race	4 (10%)
Other	1 (3%)
Grade	
6 th Grade	1 (3%)
7 th Grade	4 (11%)
8 th Grade	5 (13%)
9 th Grade	4 (11%)
10 th Grade	7 (19%)
11 th Grade	10 (26%)
12 th Grade	7 (18%)
Other	2 (6%)
Post-Survey Completion	
Completed	37 (92%)
Lost to Follow-Up	3 (8%)

Table 9. Study 1, Phase 1 Adolescent Individual Interview Quotes

Construct	Quotation
Interest in using a Mental Health Application	<p>“I think nowadays talking about mental health is not as taboo. I think people would be more inclined to just download the application because it is not such a hush-hush topic anymore” (1-A)</p> <p>“I honestly just like learning about humans. I am interested in science and studying the brain so [an application] like that would be super cool.” (2-A)</p>
Content in a Mental Health Application	<p>“Maybe [adolescents] can share their experiences from [online] bullying because that happens more these days with social media...and share their experiences how they stopped [the bullying].” (1-A)</p> <p>“With videos, people can share their experiences within the application and show a picture describing what happened in the [situation].” (2-A)</p> <p>“Definitely mental health aspects. It can be like the Fitbit app because it tells you how much water you drink every day, what food [you eat], just like lifestyle would be nice. If the app covered how much sleep you needed to get every night for different age groups, that would be helpful.” (3-A)</p> <p>“I would expect the application to cover tips, ways to improve already ...Having short quizzes to assess how I am doing and also for a way to track my progress would be helpful to see if I’m getting better with eating habits or how much sleep I am getting. Similar to most of the apps I uses, if I’m able to see I’m doing better than it encourages me to use the application more.” (4-A)</p>
Features in a Mental Health Application	<p>“Definitely videos or pictures because I know I would not want to be on a mental health app that did not have any visual appeal. Make it colorful, fun for kids so they do not feel like it is for school. Make it happy. Games would be really nice and interactive text would be cool too.” (1-A)</p> <p>“I think the application could rate feelings with faces. Not like human faces, but they would have different colors and stuff. Include emoji type faces.” (2-A)</p> <p>“I would make sure that the features were very different in their own way. And, also that [the features] provided something unique to the [application].” (3-A)</p>

Engagement in a Mental Health Application

“The application could have tab for each [section] at the bottom so depending on what you need you will be able to click on it and it takes you to whatever you need.” (4-A)

“Definitely the interactive portion. It cannot be an [application] similar to writing stuff down in class. There need to be some engaging games to play or be quizzed to help you learn more about mental health. The interactive part is important because it makes kids my age want to use it.” (1-A)

“I think if the [application] was able to pull videos from YouTube...[adolescents] could talk about how they deal with stress and give tips, which would draw teens to the [application].” (2-A)

“If there is just one cool feature, people may just get bored of it. So, if there’s different things to do, then I feel like you’d just stay on [the application] longer.” (3-A)

Ease in a Mental Health Application

“Again, it should not be a complex app. Maybe three or four pages with lifestyle, stress, and depression and you can click on one of those pages. I do not think it should have three or five pages with unnecessary information.” (1-A)

“I like the way most applications are set up; it makes it easy to find things. Especially with social media applications, you know where everything is and how to use it very quickly...makes it super easy to talk to my friends.” (2-A)

Benefits in a Mental Health Application

“If the [application] focused on stress and ways to relieve stress that would be very helpful for kids my age. Right now, is very stressful with huge tests and thinking about college. I think a lot of my friends would use it if had the [stress] aspect in it.” (1-A)

“[Having] data and charts. If I could maybe find out why I am feeling a certain way at a certain time or after something I do.” (2-A)

Enjoyment in a Mental Health Application

“What would get me [interested] in that type of application is the games. They can be fun, and people usually like them.” (1-A)

“Kids my age do not want an application where you just learn stuff and that is it. We want it to be interactive, like have games and stuff. Because it makes it more fun and makes it more usable.” (2-A)

Concerns about a Mental Health Application

“I think the part of the [application] I had trouble with was the logging, having to put in exactly what you ate was too much with my schedule.” (1-A)

Confidentiality in a Mental Health Application

“What I would not like is if once you get the [application], it would ask too many details about your life. What it should really ask is your birthdate, age, and that is it.” (2-A)

“My biggest concern is there could be a hacker that could get into your personal information like where you live, your bank account if you have one.” (1-A)

“About privacy, probably not having your name in the application when you register and maybe have a nickname that does not contain your name. Just in case someone was able to get the data.” (2-A)

Self-Conscious about a Mental Health Application

“It depends on the application itself, because I know with some applications, people perceive it as “Oh, you are really depressed and that is why you have a mental health application.” (1-A)

Most Important Thing for Designers to Consider

“It should definitely be interactive. That is the main thing. It should focus a lot on that because I know a lot of people that do not want an application that is teaching you stuff constantly and there is nothing fun about it. So, I think an interactive portion would be really fun and make people want to use it more and they would go tell their friends about it.” (1-A)

“Make sure that the [application] is appealing to teens to come back. I have downloaded at least seven applications on my phone that talk about eating habits, exercising and I have probably opened them about two times now. If the [application] was able to draw me in especially with the progress thing, that would be the most important thing for me to keep going on the application.” (2-A)

“The person needs to be able to describe how they are feeling. Or at least having a blank field to describe what they are trying to say.” (3-A)

“Depression. Bullying as well because that causes depression in some people...More people get depressed throughout the year because of online bullying and I think it can be helpful to get them to focus on something like games or they can interact with someone to cheer them up.” (4-A)

Table 10. Study 1, Phase 1 Adolescent Focus Group Quotes

Construct	Quotation
Interest in Using a Mental Health Application	<p>“For me, if it was just a mental health application that was telling me what to do, like just giving me questions or something that would make me more hesitant. But, if it was something I could fidget with or give me an activity to do or a game for my mental health, that would give me a reason to go back to the application.” (1-AFG)</p>
Content in a Mental Health Application	<p>“To take your mind off what you are stressing about.” (1-AFG)</p> <p>“Compared to a robotic response, I guess you can tell a difference. With the robotic response, you do not get the sense of “Oh that person does not understand what I am going through,” versus a human response where they have empathy.” (2-AFG)</p> <p>“I feel like give us something to do on the application. Since it is a mental health, it would encourage us to get off the application eventually. The application could tell us to go for a walk, which would take us off the application, but also includes [activities] to do on the application.” (3-AFG)</p>
Features in a Mental Health Application	<p>“Yeah, a search bar. I think you can search for what help you want. If you are stressing at school, you can search for that or stressing with family, you can search for that. If you have anger issues, you can search for ways to calm down. You could have a menu and a manual. For example, if you want games, go to the menu and click games. If you want videos, go to the menu and click videos. Something like that to help with organization of the application.” (1-AFG).</p> <p>“Like she said, if there are any strategy games. Not necessarily a game, but like puzzles that gets your going. Since it is somewhat like a game, there would probably be points that you would get and maybe to keep you going, there would be updates or an everyday reward if you are on the app.” (2-AFG).</p> <p>“Adventure games. Like when I say adventure, I do not mean you have to go everywhere on conquests and stuff, but I mean like a continuous game with levels.” (3-AFG).</p> <p>“Activities, maybe not like typical games you would see, but maybe games that would calm your mind like simple strategies.” (4-AFG).</p>

Benefits from a Mental Health Application

“Very eye-pleasing or eye-catching. The colors, adjust to what color you think would be better for you and being able to change the background to customize it.” (5-AFG).

“I think the style making it more like the icons would be rounded and less harsh. I think the softness would be more comforting.” (6-AFG).

“[Do not use] pixels with little squares.” (7-AFG).

“Let’s say me and my friend were sitting in my Advanced Placement class and we are both stressing about something. We could say, “Hey, let’s do this together. Maybe this will help us calm down.” (1-AFG).

“I agree with her. It would be something I would use during school to help with stress. I guess to help you figure out how to deal with stress.” (2-AFG).

“Well it depends because like someone said earlier, [people] have different personalities. Like it depends on how the person is that day, what they are doing, what’s going on in their mind. But other than that, I would see that other people would use it to calm down if there is a stressful thing that makes you unable to concentrate.” (3-AFG).

“[Having a] better mindset. People at school will say, “I do not want to do this. I do not want to take this test.” Maybe the application could help with [youth’ attitudes], “Oh, if I do this then it will be over with and I will be fine.” Then you can go home and do whatever you want, and it will not matter.” (4-AFG).

“Obviously, some type of humor and it does not necessarily need to be related to mental health because it would just have to be humorous. Anything to make you laugh because that would make everything feel better. Mental health can be better if you laugh.” (5-AFG).

Concern about Using a Mental Health Application

“Something that would make me not want to use it is if it was asking me too many questions or asking too personal questions because that is just weird. Maybe you do have depression, but that does not give you the right to ask me questions the application does not need to know.” (1-AFG).

“I think people with overprotective parents who look at their phone might not want to use the [application] much because [their parents] would get really concerned.” (2-AFG).

“If the application is not helpful, I would delete the application. If it is not helping for what I intended it to help with, I would delete it off my phone and look for other applications.” (3-AFG).

Self-Conscious about Using a
Mental Health Application

“I think in high school, everyone is stressed. No one is going to say anything about it, they are going to be like, “Yeah, I should get that.” You are in 7th grade, right? Like I do not want to say anything, but high school is a lot more stressful than middle school. In middle school, people were probably annoying about it, but it would not matter either way. But in high school, you probably would not get that response because everyone is going through the same thing.” (1-AFG).

Confidentiality about Using a
Mental Health Application

“Maybe before you sign into the application, you can sign into an account that can secure your data and protect your information. So, if [someone else] would sign into the application, that person would not see everything.” (1-AFG).

Most Important Thing For
Designers to Consider

“I think the quality on it and everything, just fluidity, how easy it is to use, how easy it is to use it on your phone. The graphics, more vibrant cartoon color kind and to have options to personalize the application.” (1-AFG).

“Fluidity, like how smooth the app is. If you see YouTube or Instagram, Snapchat, you can find whatever you want instantly at the touch of a button. I think it is fast-moving, not too hard to find what you are looking for.” (2-AFG).

Table 11. Study 1, Phase 1 Adult Individual Interview Quotes

Construct	Quotation
Adolescent Interest in Using a Mental Health Application	“Because there are so many people that are in turmoil, facing these issues in life to where I think they will see the importance, the need to have this app. There are so many teenagers dealing with these problems. The rise is unimaginable, but I think a lot of teens would use it seriously.” (1-P)
	“I think an increasing number of teens are interested in mental health and talking about it. I think especially based on the layout of the application, its design, and even the name of it, all of those things would make a big difference. But I think that a lot of people would be interested because it is becoming more acceptable to talk about mental health and getting help.” (1-T)
	“I think [teens would be interested]. Generally, I do. There have been a few times, I have encouraged app use and in session, they say [yes]. And then they do not do it. I anticipate they will use them more because it is so user-friendly, easy, and it is something they are used to doing on their phones. But I am not sure why some do not go for it. Maybe, they do not want their friends to see them using a mental health app. I am not exactly sure what is behind the resistance.” (1-C)
	“Initially, I think [adolescents] would be interested, but anything they might use as a coping skill, they will move on quickly.” (2-C)
	“Using best practices. If research says that nutrition, fresh air, sunshine, movement, limiting electronics are the best practices, then have that front and center. This is self-care. This is how you need to be taking care of yourself during life. Learning those top five things can set you up for success during these tough years.” (1-P)
Content in a Mental Health Application	“Another component might be problem solving because I think in order to be more resilient, you need to have problem solving skills. For example, teaching simple acronyms on problem solving.” (1-C)
Features in a Mental Health Application	“I think anything that will stimulate, something that teens might find funny or something that might turn their mood a little bit. You could use current music that they might enjoy.” (1-T)
	“It all depends on how it is designed. If it’s got a couple of different kinds of interactive portions, they are going to use it on a regular basis, so you know probably community issues and games with levels where you can improve. I think

	<p>teenagers want to go, “Oh yeah, I beat such and such level.” I think the concept of getting to such a level would help them engage and I do not think they would be embarrassed to say that to their friends.” (1-C)</p> <p>“I think any videos or pictures just including people that look like [adolescents] would encourage them to use the app. So, whether it is race, body type, ability, gender, I think teens like when they can look at someone and say “Oh, that person looks like me.” (2-T)</p> <p>“The [youth]’ clothing has to be current. The information has to be current. [The designers] have to get into their real world.” (3-T)</p>
Engagement in a Mental Health Application	<p>“[Lack of engagement] has been my issue with so many applications. There’s ton of [Cognitive Behavioral Therapy] applications out there. They just are not appealing. They are not engaging. They are kind of bland and boring or cumbersome. So, I think engaging and simplicity is what I kind of feel like has been missing.” (1-C)</p> <p>“I think it has to be engaging. It has to be quick and fast with information. [Adolescents] don’t like to wait for their information. They want it now.” (1-T)</p>
Concern about Adolescents Using a Mental Health Application	<p>“There is judgment placed [on youth] and these kids are at such a critical time in their lives that they are being judged or feeling vulnerable. [Adolescents] want to look like they have it all together and any weakness could be seen [negatively]. (1-P)</p> <p>“If there was some kind of social engagement piece and it depended on who was engaging with the material, that could be hurtful if there was someone who was not supportive or did not know what to say.” (1-T)</p> <p>“Having everything accessible via phone, you do not have to leave your home. It promotes isolation, which we know is not helpful for someone with depression or probably increases anxiety, so that is definitely a negative.” (1-C)</p>
Confidentiality for Adolescents Using a Mental Health Application	<p>“If [adolescents] are putting in personal, confidential information, it would be important to find a way to keep that secure and protected for them. Then I guess the parents might worry about that or have concerns. I think that might get tricky to balance, their confidentiality, and their privacy with them being supported and monitored with developmentally-appropriate ways.” (1-C)</p> <p>“I do not know how it would be handled when serious issues come up. Would parents be alerted? What would be my involvement? If confidentiality is the most important thing,</p>

Most Important Thing for Designers to Consider

then how are parents involved if their child has a serious question or what would be the protocol?” (1-P)

“One thing. Keep it simple because adults tend to overcomplicate stuff at times and [youth] do not have a lot of time. They have so many competing applications, so it just needs to be simple like the messages or whatever you want them to do.” (1-P).

“I would say focus on what the teens find interesting to them. What interests them and what would be the things they are looking for.” (2-P).

“Helping students or teens identify strengths that they already have or support they already have.” (1-T).

“If the application is saying that you are very upset and that you could talk to this person via text, phone or even video, whatever you feel is most comfortable. And then that person is trained enough to be able to talk them down or maybe encourage them to get some help.” (2-T).

“Unless the application is enjoyable for the participant, they will not keep coming back [to use it]. (1-C).

“The application needs to be something that is easily accessible and [the application] is not going to ask me a bunch of question when I use it.” (2-C).

Table 12. Study 1, Phase 2 Adolescent Individual Interviews

Construct	Quotation
First Impressions of Mental Health Application	“I thought [the application] was well designed. I thought it was appealing to the eye because it looked like a fun application. The videos were entertaining, and the games were fun.” (1-A)
	“I really liked [the application]. I thought the design was great. I thought it was really cool just the integration of videos and activities. I am a big fan.” (2-A)
	“I liked [the application] because it was very informational and a lot of things they said, I did not know, but the stuff they said I might do in the future.” (3-A)
	“I think it is a very fine application. I just do not think that many teens would use this for an extended period of time.” (4-A)
	“I guess my initial thought would be that it is pretty good for getting the point across. I feel like it was more targeted towards younger audiences than someone who is about to turn 18.” (5-A)
Features (Main Logo)	“It is more of a visual thing and then it is pretty simple, which I like when it comes to app covers. Color choices are nice as well. I like that most of them are blues and cool colors, which is usually calming for me which is weird because usually they are supposed to keep you awake. I like the blue.” (1-A)
	“I like it. It’s colorful. I think it will grab people’s attention and I feel like some of the pictures like depression and lifestyle [icons] should have been included in the logo. Overall, I like the logo.” (2-A)
	“Maybe, the brightness of the red. Maybe just a bit lighter with the teal in the background. That is usually what I would do anyway. I usually stay monochromatic whenever I design something or stay in the cool colors or warm colors.” (3-A)
	“I’m not a big fan of the top text. I think if you want to portray the brand name, you should have a font to match it. I think this one is too bold. I think you should use a more wispy text or font-style...[The font-style] should be looser, less blocks. Use a lot lighter and curves.” (4-A)
	“I like the logo. I think the colors are pretty and they correspond with each other. I do not know what Whippy means though. I’ve never heard the word.” (5-A)

	<p>“I feel it is off-center a little bit, which be how it was printed out right here and there is more space. Just like the lines right here look like a book, which I am not sure if that was intended, but it is not a reading application.” (6-A)</p> <p>“If you did not have one, I think something colorful, and you’d have the name Whippy on it and then you could have flowers or something that seems calming.” (7-A)</p> <p>“It is centered around mindfulness and just in general brain stuff so maybe something that would just have to do with awareness in general. Maybe, something that everyone has like an eye or a head or something like that, kind of like the icons for the options. I think that would be good.” (8-A)</p>
Features (Home Page)	<p>“I think it looks really nice. I like the colors a lot. These ones especially because they are mostly cool colors. I like how it is minimalist, but there are patterns as well. So, it is interesting, but not too eye-catching to where it bothers you a lot.” (1-A)</p> <p>“I think it is a good main menu because I have seen good and bad [user interfaces]. This one is on the better side of [user interfaces]...The icons are popping and the text works with the icon very well. When you click on the icons in the videos are all in the menu, so you know that it’s talking about depression.” (2-A)</p> <p>“It reminds me of an old, I know in class we’d watch these videos called BrainPOP, which is something everyone loved to do. So, it reminds me of that and the designs in the background with the play button at the top, they look really good. They look happy.” (3-A)</p>
Features (Submenus)	<p>“I think that when there are icons, instead of just reading lonely or irritated or whatever, you get to see an icon and are like, “Oh that is inviting, I might click on that.” Because text can be boring.” (1-A)</p> <p>“I think the graphics and layout are good. There’s enough space so that they are not touching one another, the bridge between the space help it out. There is nothing I can really say, it’s a good interface as well.” (2-A)</p> <p>“I think like the top two: low mood and loss of interest. Loss of interest has a thumbs down. I just think it does not explain much since it is a thumbs down and most people will not know what it means with the picture. When I looked at the picture, I did not know what the thumbs down meant” (3-A)</p>
Features (Graphics)	<p>“I really like this illustration or art style. I feel like it is really minimalist, but you could tell what was happening and it is not a certain skin color can people can relate to the character...No,</p>

Features (Game)

I feel the character was gender neutral, which was a good thing.” (1-A)

“I am a big fan; I like this style. It does a good job of showing emotions really well. I like the cartooniness of it so everyone can resonate with it. You do not want somebody to feel like it is obviously a lady on the couch, but just like she’s not some certain demographic. She’s just a collection of geometry so I like that. I like it, very cool style” (2-A)

“It is good. With her face, there is probably one tear and you have to look closely to the picture to see that she is crying. You can see that she is sad, but I do not see a tear or anything, but the picture has a bunch of tears coming out of her face, so you do not have to zoom in to see she is crying.” (3-A)

“I think the graphics were pretty childlike, which is okay. I felt my heart rate go up because I always feel anxious playing games cause, I have to be quick. But it took my mind off of it because I was more focused on the anxiety from the game versus anxiety from anything else. And that anxiety went away soon anyways.” (1-A)

“I thought it was really fun. I loved the animation. It kind of reminded me of Plants vs. Zombies. Not the gameplay, but how it looked. I thought it was fun. I would make it easier to go back and play. I mean you can go back and play, but it goes back to the preview concerns. Just so you know where it is so you can beat your score. You can have a leaderboard. That would be fun.” (2-A)

“When the music stopped, it either had an audible pause, or it started from a point where the music was building up again.” (3-A)

“And, have a variance where you have a mode where you have to...it gives them another challenge. Maybe, you can only pick this one type of vegetable within a specific amount of time. Maybe, an analyst mode where you can pick until you lose once.” (4-A)

“Also, maybe add a leaderboard so...well don’t use their actual names, but you know, have them enter a username so that you can still keep that confidentiality, but you know you’re on top of the leaderboard.” (5-A)

Engagement in Mental Health Application

“Well, animations usually make things more interesting for people to want to learn about something. And I know whenever we are watching videos in class, whenever it gets to an animated part, it is more interesting to watch.” (1-A)

“With the cartoon, it will grab kids and teens’ attention because I feel like with humans you would not be able to do it,

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Application

or it would be like the soap dramas. And I feel like using cartoons will make it more kid-friendly and just grab their attention with a bunch of colors and stuff.” (2-A)

“I liked the drag and drop one, multiple ones. It was kind of like a low-pressure quiz in a way. Obviously, that is how it is designed. And you know that’s a good one. They were all good. I would even try to add more slightly, not time wasters or actual things or if I wanted to do something with my hands as much as possible. I would want between every video some sort of even if it is just a button to press. What I am saying is I liked the engagement in some of the activities.” (3-A)

“The videos were short, but they also made the activities and explained information about it and probably not just read off the activity. The activities were appropriate and to your speed.” (1-A)

“It was probably just that the surveys are fun in general. So, it was just, like, after watching the video it was like, “Okay, I’ll answer these questions.” (2-A)

“The surveys are also very concise and brief. They are not too long but hit all the questions you should ask about a person’s well-being.” (3-A)

“When I was done with the food survey, it would tell me what kind of things were healthy and what was not. Also, the physical activity one. The bottom one said you need to do more stuff and the top one was like you are really active, but you should slow down.” (4-A)

“I think presentation is great. It gets straight to the point. There’s no wavering around the subject. Sometimes people want things to be told to them directly, and the application gives us the message that we want or need to hear.” (5-A)

“I guess my initial thought would be that it is pretty good for getting the point across. I feel like it was more targeted towards younger audiences..., but it was pretty good.” (6-A)

“[The characters] said put your electronics away 60 minutes before you go to bed and there was something else. They also said not to do your homework on your bed because that is where you sleep and not for schoolwork or anything like that. That was cool and something I would be thinking about doing in the future.” (7-A)

“I think they definitely were. I liked that, it was relevant, and I enjoyed it is something you do not have to, you can see them and say I do not have to have all four of these to know I am depressed. Because I do not think it is as common to think of depression as it can manifest as anger, weight loss, or

whatever. I liked that these were all present at the same time so in your mind you could check it off. You know or not check it off.” (8-A)

“I feel like I’ve had people tell me like very specific things that one of the two speakers mentioned, or I’ve like, they’ve told me about it and for instance, her friends did not know what to do. I also had no idea what to do or what to tell them. Just the list of I chose to listen to music or whatever, go for a walk, or listen to a happy song, all of those things. I was like okay, now I’ll have at least little suggestions for people when they ask or tell me issues like that.” (9-A)

“This one felt more lighthearted I guess without getting into the deeper tones of it, which is okay, but I think depression can get serious so I feel like if it was more serious to talk about that, then they might understand how serious it is like, what it can lead to, and how important it is to talk about it.” (10-A)

“Let’s see. So, on the depression one specifically, it talked about going to see a doctor. I might want a whole module on that because it can be hard to decide to do that. And also, what do I tell them? I guess that is in “How do I Change it?”, but also just like a specific asking for help one.” (11-A)

“Maybe, having that in a smaller section, not as big of a focus, but a smaller section with ADHD and how that can affect your mood.” (12-A)

“Yeah, that was definitely in one of them in who to speak to, but maybe something about you do not want to treat your friends like your therapist, so there is a lot of different levels. You can tell your friend you are struggling, but you do not want to unload all of your problems onto them. So, who do I go to with different levels of what I am experiencing? That would be an interesting module to have.” (13-A)

Teen Vlogger

“I think just like, almost like after school special energy. I think that is the best way to get across that the activities she was talking about. Waking up to a happy son or cooking dinner. Even if it did not sound helpful to someone with depression, that kind of productivity could be helpful or exciting.” (1-A)

“I liked the way she was happy and animated. And she seemed like, she smiled a lot, which was good because when you see other people smile, you want to smile. And I liked how she was not too loud when she talked, but she was loud enough that you could hear her.” (2-A)

“I think so especially just staying in your room. Even if I have not been depressed, there is something very sad about staying in your room or staying in bed more than that and [I liked] the

addition of the little brother. Smart move. Relatable move.” (3-A)

“I think she is because she does schoolwork, which most teens and kids do these days. She does extracurricular activities like most kids. Like most kids, they want to do something fun, play with friends, or play video games. She is relatable. She understands what most kids these days want to do.” (4-A)

“I do not find her to be relatable, but I do like the information that she does give me. It’s information that I can easily understand, digest, and start thinking about.” (5-A)

“Yeah, because a lot of people have gone through a tough time at one point in their lives, whether it be depression or regular sadness. I feel like they related by going through a tough time and not having it go away when they thought it would. And then, her wanting to get better I think was a good thing, but I know some people feel they should not be better or do not want to because their feeling of sadness is something they deserve or something like that. So, I feel, maybe having another person who feels like that might be helpful as well. Just having friends that encourage them to keep going.” (6-A)

“If you had another actor, I’d say maybe you’d have a young one, like younger than her. Not like my age, but a few years older than me so that she can relate to kids our age.” (7-A)

“She gives out information that is easily understood by teenagers. She is treating you like an adult, not treating you any different from her patients, which allows you to not feel like you’re being talked down to.” (1-A)

Doctor

“I liked her because she was full of information and also Breanna would refer back to Dr. Smith. Not just saying, all of those words, but Dr. Smith was informational and helpful. Like if you did not do this, then you should go back and do it. She was good. I liked her.” (2-A)

“She was kind of, she was not emotionless, and she was not out there. She was not animated. She was not smiling or talking that much with joy or anything. She was kind of just like there.” (3-A)

“I think it is mostly, just, she might not be in as relatable of a position because she did not have as many anecdotes. I do not know how you incorporate more relatable things for a doctor. If there is any possible way to make her warmer. She was very nice and good, but it is hard with the doctor to include that sort of thing. Maybe, just something to make it more personal. See if we can relate to her.” (4-A)

Concern About the Mental Health Application

“The application does not provide an incentive to make people want to return to it. You get all of it done in one go, and then just leave the application there.” (1-A)

“Maybe, just more examples. It felt like some of the questions were repetitive and I already answered like, “How much physical activity do you do over the past 7 days?” Some of it was not specific and so it says non-school. I am like okay; I do not understand this as much as the other questions.” (2-A)

“This is kind of nitpicky, but it came to mind. I cannot remember the name of the section, but I did it for both the depression and the stress one. It said at the end if you have more than one or two of these if you answered yes, then, I think it was just for the depression one, but if you said this maybe contact your doctor. It did not actually tell me at the end how many I answered for.” (3-A)

Improvement for the Mental Health Application

“I like the idea of specific changes about the application, changes to make your routine for life or someday. I would make that a bigger part of it. Yeah, because of the lessons talked about adding this to the calendar or trying to incorporate different physical activities. I would make it a bigger part of the app, but other than that, I would find it super helpful.” (1-A)

“I guess something fun because I know that you get daily rewards for check-ins and stuff like that. You get whatever currency is in the game and you can use that currency to buy more stuff.” (2-A)

“I think probably just more activities than just like five videos. I mean I almost finished all of it in almost 20 minutes. But just like have more videos or activities or have the activities be longer.” (3-A)

“Like if there were more activities, I guess, then I would probably use it more. Because you would not watch the same videos and games over and over again. So, if there were more videos about topics and then more games, then yeah, I would use it more.” (4-A)

“I guess just more options that did not require audio or video. Maybe, a quick start for the options like the deep breathing exercises and stuff like that you can get through quickly without having to go through 30 seconds with a video that says, “Alright, let’s begin,” or “This is how you do it,” but if you’ve been using the application for a long time then you’ll already know how to use it. I feel like they should have that breathing exercise maybe on a loop at some point. That way, we can access it and do it for as long as they need.” (5-A)

Frequency of Use for the Mental Health Application

“Maybe, if there was a way to connect to other teens. From personal experience, I rarely, if ever, recommend apps to somebody. But you could build a network and try to post. You could use teens and make them use their social media sites and share it, to give them a small incentive where they could share the application.” (6-A)

“Maybe, a reminder like notifications. Let’s say they put a reminder after a video, “How many times are you going to walk today or tomorrow or something like that”. And you could say how much, and they could notify you. “Hey, you said you would walk this much” and it would remind you to do so. If you did, I think it would tell you to do it next.” (7-A)

“Add a notification where there’s a new video that would be uploaded to this section of the application if there is a new video about stress or something like that.” (8-A)

“I remember one application that I got for depression, Booster Buddy. I think they had a list of resources you could go to for online forums where you would talk to therapists. I feel like that area could help at least because that is how I actually started getting help in the first place.” (9-A)

“I just like how interactive it is, but the shortcomings hurt the chances I’d come back to it too often. I’d probably use it once, maybe twice a week.” (1-A)

“I guess it would be more comfortable for not really fast instances, but shorter instances so you would use it for a few days because it gets repetitive if you’ve used it for a long time so maybe if it updated regularly with new videos or coping skills.” (2-A)

“I think I would use this after school because if I am done doing homework and stuff, I am usually bored. I’ll probably just use the app until I am not bored. And so, that is when I would use it plus the weekends.” (3-A)

“During school, I am not really using my phone. I am talking with friends or doing schoolwork. During the weekends, I am sometimes done with work and maybe I just want to do something different from playing games or drawing or something like that.” (4-A)

“I think I would. Well, I am busy at school. I think I would be inspired to use it at school and then come back to it later in the day. I do not think I would necessarily take my headphones out and listen to a module during lunch or whatever, but I do think it is pertinent to school in general.” (5-A)

“Probably before a test for the stress one. Cause usually I am stressed before tests. I would not use it at school because we

Recommendation of Mental Health Application

are not allowed to watch videos on our phone during school. And at nighttime, it is a little less busy, so I can fully devote time towards it, and I am not in a rush or anything.” (6-A)

“I would imagine that I would use it a high level of stress, just at those times because that is when I give up whenever I am feeling super stressed and stuff. Usually after school or before school because before school is usually when I get anxious. After school, everything has happened and I feel anxious all day so if I rate my mood at the end of the day versus at the beginning of the day, then it is very different. Before school, I’ll be fine because I have not experienced much outside of waking up and eating breakfast. Probably use it after school or in the evening.” (7-A)

“I think I would. I think it would be super helpful for a lot of people. Just trying to think of specific things. I like the idea of specific changes about the application, changes to make to your routine for life or someday. I would make that a bigger part of it. Yeah, because of the lessons talked about adding this to calendar or trying to incorporate different physical activities. I would make it a bigger part of the application, but other than that I would find it super helpful.” (1-A)

“Yes. Because I go to a TAGs school, talented and gifted, so a lot of people are stressed there. So, we are doing high school stuff now. So, everyone is stressed there. So, when we talk about being stressed, I’d say hey I just got this app and I’d tell them about it because it would probably relate to them and they’d probably use it.” (2-A)

“I think so, at least to my little siblings. I do not know a lot of teenagers, but I would definitely recommend to my younger siblings if they have a tough time. “Hey, check this out. It might help you for a little bit.” And it is easier to give resources than to say it myself because I am usually busy or feel depressed, so I do not feel like talking that much and I am dealing with my own stuff. We will get them to make the first move on it instead of depending on someone else for resources.” (3-A)

“It would not be more than I personally do not like the app, I rarely recommend any application every no matter how good or bad it might be.” (4-A)

Table 13. Study 1, Phase 2 Adolescent Focus Group Quotes

Construct	Quotation
First Impressions of Mental Health Application	<p>“Easy to use. It had four buttons, so it was not complicated... I like it. It just needs a few more things to make it feel more personal.” (1-AFG)</p> <p>“There were not any glitches or anything. I just was not the biggest fan of the videos. It just did not feel realistic.” (2-AFG)</p>
Features (Main Logo)	<p>“Yeah, I feel like if it was on the application store, I would definitely not click on it because I would not know what it is... Whippy does not scream anxiety to me or helpful, it just screams Whippy.” (1-AFG)</p> <p>“But then, I am a little curious about what [Whippy] is supposed to be, but it is something that does not feel geared towards depression or anxiety.” (2-AFG)</p> <p>“Like something that is cozy or something that does not scream excitement. You know, with bright colors. Grays, lights.” (3-AFG)</p> <p>“Like a soft pastel color and the lines, could be a little bit cozier.” (4-AFG)</p> <p>“I think the red sounds kind of aggressive.” (5-AFG)</p> <p>“If it is resilience, I would see that as the opposite of the nice pastel color and being more of a reddish kind of thing if that is what you were doing it for too.” (6-AFG)</p> <p>“No, you could do just a fist that goes up with resilience you know. I think that would be a good idea. I would definitely click on that.” (7-AFG)</p> <p>“I think the big thing is and I’m not super artistic so would not know how to do this, but I think most of it is the words and what comes after the image in the application store. I think that is going to be the big hook and then the icon follows whatever that is, and I am not sure what words you use, but it does not have to be something super catchy. I just need to know what it is.” (8-AFG)</p>
Features (Homepage)	<p>“I liked the graphics.” (1-AFG)</p> <p>“[The graphics] feel outdated. They seem like images you would find on the internet.” (2-AFG)</p>

“Yeah, like something more creative. And maybe like also all the pictures. It just seems like a video, video, video. Like maybe a question of what is it instead of a video, put up a picture of something else like a question mark or something like that.” (3-AFG)

“With multiple videos, it feels repetitive so you should mix up the icons, so people are not like, “Oh, another video. I do not want to sit through this.” (4-AFG)

“Like besides, “Where do I rate?”, you can sort of get what that says, but it’s just a big play button.” (5-AFG)

Features (Submenus)

“I like it. It just needs a few more things to make it feel more personal.” (1-AFG)

“Yeah, I feel like [the pictures] are childish. I do not know. I would show this to a three-year-old with these pictures.” (2-AFG)

“The pictures just need an update... Not like emojis, but emoji-type pictures, more 3Dish.” (3-AFG)

“When I look at the Low Mood/Irritability, it had the same head as the second one, but it has different things around it. Maybe change it up and add more variability.” (4-AFG)

“Yeah or like for Loss of Interest maybe you can show a girl away from her friends or at home.” (5-AFG)

Features (Graphics)

“No, I was not a huge fan of the graphics. I thought they could maybe use a little bit of an update. Maybe, not stick figures, but a little bit more animated to it. You could animate it a little more.” (1-AFG)

“[The characters] look a little too blocky in my opinion.” (2-AFG)

“[The cartoons] sort of makes sense when you are trying to market to a ton of people, but it also loses that personal touch that you want, and it deals with these personal things you have to go through.” (3-AFG)

“Maybe, you could mix it up a little bit. Some could have real people or those pictures like maybe a family sitting on the couch watching TV or something and maybe a stick-figure for an example or something like that so you can change it up.” (4-AFG)

Features (Game)

“The game was alright. I wish it had more special effects and stuff, but with the arrows I thought it was cool, but kind of boring. Like the fire arrow and ice arrow. I think those could have been cool effects. The ice could have had frozen effects or something like that.” (1-AFG)

“The game felt like it was something you make with a friend as a project for a class. Not professionally done, but more active.” (2-AFG)

“It seems like that game was there to make you feel a little bit happier. “Oh, I just played this fun game” and now I am not necessarily thinking about if I was having a panic attack or if I was thinking about something. It serves as a distraction and if it just says it’s another person or a little bit more distracting of a game.” (3-AFG)

“And it should be for the multiplayer, like a little textbox if you wanted to chat back and forth or something... Maybe a few key words like “I am going to get you.” Maybe not like that, but like a multiplayer when someone is playing against each other.” (4-AFG)

“It could just be even a bot and that could be fun with four programmed responses from a bot can honestly feel kind of fun. A little game like there like in the video if it does not.” (5-AFG)

“I’ve played games like you have four things you can say, and you continue to unlock cooler things you can say and that keeps it from saying anything personal, which could be a problem within the mental health application. It also makes it like, “If I play the game more, it helps my mental health” and it has unlockable rewards. We love instant gratification.” (6-AFG)

“Or add more like stress-relieving games. Like there are a bunch of applications that will have you hold your breath or something that will help you relieve stress. Not just like clicking a button...Even just like puzzle games. I mean I love puzzle games. Even just being able to slide a piece or do something fun.” (7-AFG)

“Word searches or different meanings or sayings based on what you read or different variety of games. And the word searches can switch up and change. Not like the same so it re-starts again.” (8-AFG)

Content in the Mental Health Application

“I liked the videos that talked about how you could help or what you can do to improve this. I liked those because those actually helped.” (1-AFG).

“If I was going to use this application and was having a panic attack, I would not want to watch the videos on what it is and how it affects people. I already have it so that’s why I was a little confused.” (2-AFG)

“Do you want to watch a video about this? You can then say yes or no. That way if people just want to get to the

questionnaires, then they can hit no or if they are in a rush and do not want to watch the video.” (3-AFG)

“And I think all of that should be maybe in the introduction, at the very beginning so if they do not want to watch it all at the very end, they can watch the introduction since it has all the parts in it so they do not have to go to each video all the time.” (4-AFG)

“It was kind of nice to have surveys about how you felt and give a rating about what is actually going on.” (5-AFG)

“Yeah, like the True or False for the food, I do not eat this, so my answer was false, but it counted against me, so it was not as accurate since you did not have as many options.” (6-AFG)

“Some of the surveys, there will be questions that were like, “This or that”, but the answer was neither, but that was an option.” (7-AFG)

“Once you get the feedback, you hit continue and then it is gone. Like if there was some historical stuff, you have been using the app over the course of the year, “Hey, I am getting better, I have been feeling happier.” Showing your past scores would be helpful.” (8-AFG)

“Or like for Thoughts/Feelings, you could do a stick figure with a thought bubble, but it’s all scratched out and black and it is just messy, but that would be a good example of how depression feels.” (9-AFG)

“Maybe, if you had these, they could be buttons and if you clicked on “Loss of Interest,” go into Loss of Interest and not the symptoms, but I do not know. Go into it so people can get a full understanding if they have depression or not.” (10-AFG)

“The truth is you cannot really trust the Internet because people who’ve had anxiety for years will understand what it is like, but for people coming into anxiety or looking up, “What is anxiety? What are the symptoms?”, that might not be telling them the correct thing. This application could tell them the truth about what is anxiety and what does it feel like instead of false information that they get from the web.” (11-AFG)

“The introduction, “What is anxiety?”, I already know what it is, so I do not need it.” (12-AFG)

“And you are not able to expand on every possible situation, but I made it through the depression and anxiety, and I was almost done with lifestyle, but I only got one example.” (13-AFG)

“Not everyone does that. Like make it something realistic, like go get your toes done or talking to someone.” (14-AFG)

“Or maybe even examples or something. Like, Sally got her feelings hurt or something so if someone did not know or if they wanted a sentence then or something to help them. They could go to an example and maybe some questionnaires. Then, they could click it and then it tells them a mini fake short story or gives them advice about what to do.” (15-AFG)

“Or maybe give some scenarios like actual scenarios of where people would be pressured or stressed, parties, friends they do not know. Give some actual examples so people can actually relate to that instead of feeling like they are the only one.” (16-AFG)

“And like, the activities you do. I wish you would have picked a few more instead of just one because you might feel like you’re in a different mood.” (17-AFG)

“Maybe, it could have websites or at the very bottom phone numbers to call. Like if you were having a panic attack or wanted to kill yourself, you could call a number right away.” (18-AFG)

Teen Vlogger

“She was very nice, happy actress like I get you want somebody up there not crying or making you feel bad, but also felt fake in a sense.” (1-AFG)

“Obviously, that can be hard to make it professionally shot video in a room, but I did not realize she was a teen. I thought it was an adult person talking to you and I was like cool.” (2-AFG)

“Maybe more people that have experienced it. Then can tell their stories or a little bit about themselves or how they felt and then maybe they could talk about their problems and then other people could relate to it.” (3-AFG)

Doctor

“Yeah, because having a 9th grader and 11th grader could increase the variance. Like, “Oh, this affects them.” (4-AFG)

“She seemed like a nice doctor.” (1-AFG)

“Her shirt is kind of wrinkled so maybe she did not leave or spent the night in her office or something.” (2-AFG)

“Instead of a script, “Anxiety is very hurtful.” That is not what a real doctor would say to me if I had anxiety or were diagnosed with these symptoms... Get them to be more enthusiastic. You could tell it was scripted. Maybe, add some of their own words in there, walk around, or do not stand in the same place and talk.” (3-AFG)

“Maybe, for a specific area of study, having an expert in the field kind of thing to feel more like they understand.” (4-AFG)

Concern about the Mental Health Application

“I felt like I was talking to a robot instead of talking to an actual person. It felt like the feedback was coming from a machine that was calculating how I would feel.” (1-AFG)

“And the application feels very linear. Like you start at the introduction and you go to this, then this, you click continue and continue. And you want choices, and this fits you into one box, so you have to keep going.” (2-AFG)

“Because you would hit continue and then you would go through each one individually and maybe I do not need all of these, but just this one to look at. If I want to get to Thoughts/Feelings, I do not want to go through Low Mood, then Loss of Interest, then Physical Changes to get to Thoughts/Feelings.” (3-AFG)

“Because the application is very finite and once I’ve done everything, I’ve done everything and it is done, so part of that having the everyday where it shows your progress over time. Even if you did not make the application bigger, it would expand that I would use this so much more because it feels like there is more to the application versus, I’ve watched all nine boxes that exist, and I’m done.” (4-AFG)

“[The application] tells you about anxiety, depression, tells you parts of this and then it gives you, “go do some activities” or whatever. Okay, great. I learned that the first time. Now, I have no need for the application. Like there are not these solutions and they do not necessarily have to solve anxiety and depression, but it’s like here are these few things to do and then what why do I have to watch every day about an application that tells me what anxiety is. I sort of got it by now. Why would I use this application for a whole year or whatever.” (5-AFG)

“What is the end goal of the application? Because I feel like it does not have an identity. It sort of has some stuff about solving it, but it also just seems to be informing you about it. Because if you’ve had anxiety for 5 years or depression for as many years, it’s not going to help you if there’s a game and you do not need to know all of this general information about it because you know it so is it supposed to be for teens to know about depression and anxiety or for people with depression and anxiety to help them cope with that through an application.” (6-AFG)

“I feel like there were no concerns because it does not take your information or shows you. It just shows what you like to do and what people are supposed to do with that? If it asked more personal stuff, then I would be more concerned, but as

Improvement for the Mental Health Application

long as it stays outside of those boundaries, then I really would not care.” (7-AFG)

“And maybe, there’s a button that can take you to Loss of Interest through the home screen instead of automatically continuing going to the next one and the next one.” (1-AFG)

“Also, with the main game and stress-relieving games, knowing where those are and having direct access to them because I did not know there was a game and I would have gone to that if I needed it for a reason of panic attack or otherwise.” (2-AFG)

“So maybe create another box that says, “Games for Stress” or “Games for Depression”” (3-AFG)

“It does not have to be large updates, but maybe color changes.” (4-AFG)

“Or leaves or fall leaves or something like that or snowflakes.” (5-AFG)

“Yeah, you do not have to change clothes or the person but changing the theme or the season would make an impact.” (6-AFG)

“I feel like there should be a calendar with the past months on the top or how are you feeling today or what could be better. And maybe, a section, where you can write why you feel stressed. Like actually typing, “Oh, I feel stressed because…” like a journal. That way, you can go back and look at it.” (7-AFG)

“I think a lot of the taking notes and having a journal, it puts a bunch of applications you would have downloaded into one thing. I do not have to take notes and then go to my stress reliever game. It puts everything into one, which makes the application more useful because it covers a lot of stuff.” (8-AFG)

“But I feel like if it incorporated more anxiety, calming down drills or journals that gave feedback on how you were feeling. “Well, today I am feeling stressed. How are you feeling stressed? Well, I think I am feeling stressed because of this. I do not know if it is out budget, but for me I would like to type into my phone why I am feeling stressed and talk to someone while typing.” (9-AFG)

“Yeah, I feel like a mood thing like if today I was really upset, and I had a panic attack, and this is why. These are my symptoms and how I feel and then over the course of months you say, “Hey, this is when I was most stressed. Why was I

stressed? Oh, it was exams,” so you know how to improve throughout the months.” (10-AFG)

“And you do not need to know each other’s name. You could just chat with each other and another kid who may be feeling the same way and they do not have to be the same age. Just telling each other your problems and you guys can relate to each other. And then maybe learn or experience something.” (11-AFG)

“It could be just that you have the same application, but two sections where I am someone who has these and I am using the application for this purpose or I’m someone who and it can be almost exactly the same sort of tailored in two separate ways so you’re hitting everyone without making it feel like if I have depression, I have to learn all of this stuff that a regular person does not know or if I’m a regular person I do not have to learn about all the strategies people with anxiety would.” (12-AFG)

“There should be a getting to know you in the application. Or if you already have anxiety or if you are diagnosed and trying to look for information. Maybe you might have it.” (13-AFG)

Most Important Area to Improve in the Mental Health Application

“As long as I know, that could help with people, “Okay, I trust this.” What I am feeling is that most of it and this is constricted budget and through a college and everything, but most of it is more. With the application, we need more games, more advanced logos, more individualization and that seems to be the general response.” (14-AFG)

“Maybe like the animation. Like, yeah just main parts about it.” (1-AFG)

“More variety to stay on the application and multiplayer games. Different age groups and different people. It might be out of budget but having a robot to communicate with people if possible.” (2-AFG)

“Just more of the encompassing of the diary, just more of a reason for me to stay on the application so it can help me. It would have more effect of my life as an application and more stuff to do.” (3-AFG)

Frequency of Use

“Definitely, the differences between do you already have anxiety or are you starting to experience anxiety so definitely the age group between people who are 16,17,18 that have already been through anxiety versus the 6th and 7th graders who are just coming into anxiety.” (4-AFG)

“I liked the application, but I feel like personally people would not use the app every day...I feel like there would definitely be some younger people that would. People who are just coming

into anxiety would definitely use the application, but people who've had it for 5, 6 years would maybe not." (1-AFG)

"At night." (2-AFG)

"Yeah, at night." (3-AFG)

"After my school day, this is how I am feeling or maybe on the weekends if I have a mental breakdown." (4-AFG)

"A test coming up." (5-AFG)

"Yeah, because I feel like it would be way better because I know a lot of young people that have anxiety. They do not like telling their parents, "I'm stressed or I'm this," but be so much easier if I talked to my phone and just having someone to listen to instead of an actual person via phone would be so much better. I would definitely use it every day if that were the case." (6-AFG)

Recommendation of Mental Health Application

"No, because it is not developed." (1-AFG)

"There were some great parts about it, but there were some not great parts we did not like." (2-AFG)

"You are on the right track but have not made it to the point where I would give this to my friends or use it to the point where it would be recommended. It was not a bad use of 20 minutes, but like it would have been 20 minutes and then I am done." (3-AFG)

"Yeah, I definitely feel like with the more focus groups you have and the more updates you have, there will be a point where this app is perfect and would definitely recommend it. I would not recommend it right now just because it is kind of a mess. It's just kind of an experiment that did not quite go right, but still parts that were really good about it." (4-AFG)

Table 14. Study 1, Phase 2 Adult Individual Interview Quotes

Construct	Quotation
First Impressions of Mental Health Application	“I thought it was very organized. I liked the people in it. I really liked the doctor. I thought she was relatable, and I liked the teen character as well. Organized, interactive, and the people were relatable.” (1-C)
	“It was very clear. It was easy to understand and follow. It was not very complicated.” (1-P)
	“It’s nice, clear, concise. I like it. I am not sure how many teenagers would have the attention span to be able to go through the videos. I think the graphics were very simple. I think some of the graphics could be included in the video more.” (2-C)
	“I think the interface could be more exciting and appealing. And I am basing that off, thinking about teenagers and younger people who are more high-tech than myself.” (3-C)
	“I do not know if there needs to be any more interaction between the user and the application because it was mostly videos. But for kids, they might need more interaction.” (1-T)
Features (Main Logo)	“I think that to be perfectly honest, it looks outdated. I like the colors, more the font that makes it outdated. Maybe too simple.” (1-C)
	“It’s a good color scheme. I imagine Whippy is the developers, which leads you to think what is Whippy? Ideally, resilience would be bigger and maybe flip with resilience up top with the big letters and then Whippy in smaller letters below unless that’s their logo. If this is aimed towards teens, I wonder if there is a way to make it not necessarily colorful or have a different image.” (2-C)
	“When I first saw it, I thought it said “wimpy.” Then I looked at it said “Whippy”, so “Whippy” to me sounds very...somebody that is not very strong.” (1-P)
	“Kind of looks like a book. The background looks like an open book. Like if I just saw this, would this be the icon for the app? Yeah, I think it is fine. If I just saw that on the app store without any kind of description, I would not know what it was though.” (1-T)
	“I am looking at the “I” and that is the head of a person and then there is a little mountain here. I am not sure how to convey an image of resilience as well, but otherwise that is

Features (Homepage)

interesting. I have worked with teenagers and have never heard of Whippy before.” (3-C)

“It’s user friendly, not a lot of frills which you don’t want. You do not want someone to get frustrated. It is straightforward. It is just user friendly. I click on depression, and then I click through the steps. I want to learn about stress. I click on it and then it pops up.” (1-T)

“I liked there were three big sections. Thinking if I was ever to use the app or direct someone to use it, I would have a clear idea about being able to break it down for whatever works for them. As I used it, I liked how each of the three sections were pretty similar in their format.” (1-C)

“I think it is pretty simple, I like it. So, I clicked on Depression and there was an introduction and it said, “What is it?” so I assumed it was about depression. “What does it look like?” so what does depression look like. “Where do I rate?” I did not click on that one, so I do not know if it is asking where do I rate and compare to depressive symptoms maybe. “How do I change it?” with depression and “Where do I practice this” I assumed related to changing depression so pretty simple. Just looking at it, it follows a similar format for the rest, so it is clear. Very clear really.” (2-C)

Features (Submenus)

“The combination. Icons are good, someone older like me can look at it and know that it is easy to follow. For instance, what each of them mean. The fonts are bold, and the pictures are good.” (1-P)

“Well that one throws me off. But if you’re wanting to be a thought bubble, really just change the shape because it looks like a cloud. I do not know if kids would identify with that stamp icon. I do not know. I do not know if they see that anymore growing up. But that being said, I cannot give you a good icon to switch with it.” (1-T)

Features (Graphics)

“I liked them. I liked the colors. I thought it evoked good emotion and you know; it makes me feel something when I saw the images... I am always thinking through that [adolescent] lens so I am thinking if it is cheesy then I am going to drop it. I think you did a good job of not making this cheesy. It evokes emotion but is still visually pleasing.” (1-C)

“I do recall seeing this and it normalized watching something sad in relationship to where it was in the video so that was quick, clear visual where it makes sense the person is sad on the TV. A person is sad they are watching a movie with a sad moment and it is okay to feel sad, which was very clear.” (2-C)

“For me, that is fine, but for a teen, [I do not know]. They might think the TV is old-fashioned because it’s a console and

Features (Game)

not a flat screen, so probably update it. Probably change the tears, it looks like she's sweating." (1-P)

"Considering I don't do computer games, it was fine. I'm not advanced as a teenager. It was fun, grabbing the fruits. A teenager might find it too elementary. Somebody that was younger would probably find it more fun than an older teenager, like my kid's age." (1-P)

"I think it was very simple. Very basic so I think it does a good job of being like, "Oh, this is fun" and trying to figure out why I am getting negative points, but that is probably because I did not read the instructions of how to play really well or clearly. On the other hand, I wonder from a teenager's perspective because it might be too basic for them or think this is for a little kid. But, at the same time, it prefaced in the video that this is a game for distraction instead of being super detail oriented so it is very simple so a little kid can do it." (1-C)

"If there is a way to if I am thinking a kid is going to re-use this, they may want to keep track of their score. Can I improve my score? Because it gave my score at the end and I had no idea if it was a good score or a bad score so if there is a way to keep track of their own score or what a normal score would be. That can actually be really helpful for them if it was a fun game that improved their mood that they could go back and play it." (2-C)

Engagement in Mental Health Application

"I liked that it was another form of interaction rather than just clicking and rating, which were the other types of interactions. It boosted my mood a little bit even though I was not in a bad mood so that was cool." (1-C)

"I think it was a great combination. The videos are all just a person talking and so having something like this, an avatar or image of a cartoon with colors bringing it all together with the mood. It could be more engaging." (2-C)

"Some more type of interaction, I do not know what that looks like. But I am thinking if the kids are going to be working through it for 20 minutes. You got to get that hook in them. But the videos I felt were very engaging." (1-T)

Content in Mental Health Application

"Well, one I think it's topical, pertinent. In school, working with these kids all day, there's a need. So that is the first part. And the things that were presented in it. Kids need to hear it. I also liked, not only did it address depression and stress, but also talked about the lifestyle and how kids can look at what they're doing now and what changes they can make. So, I liked that. It gave them options and was guiding, not just informative." (1-T)

“I was so excited that you were able to put an experiment through the application. I’ve never seen that before in the other applications I’ve seen so I was not too focused on the technical aspects of it. I was more focused on that you could rate your mood, do something through the application, and then rate again.” (1-C)

“One thing I did not like was how it seemed on the depression [survey] that I went through and took the time to answer the questions, but I did not get a personalized summary or result at the very end. It said if you answered yes to one or more of these questions, which I did not find to be very useful. If I am using a depression application, if I said yes then I need to look further into that. I wish it gave me something like “You’re at risk” or some levels after that screen.” (2-C)

“And the same thing with eating habits and exercise. They can skip all the questions and it can show they are getting adequate exercise and they are just sitting there and not doing any exercise.” (3-C)

“I wonder if you could work in the rating scales, you could work in a daily log so it feels more like you get some sort of output like this is what the trend is of your mood over the week or you know, some reason, some overview of a timeline or something like that.” (4-C)

“I love it. I thought it was really logical how you divided all the symptoms of depression into four categories. However, as a clinician, it is something I would appreciate versus other people, but it’s nice to help people understand how things are grouped and solidified. I liked it a lot.” (5-C)

“Pretty clear, I like it. Physical changes, I do not think I clicked on that. I imagine it would talk about physical symptoms or changes associated with depression, appetite. I assume looking at the other icons, they would address appetite changes, sleep changes, concentration. Yeah, because there are more than four symptoms of depression. I am assuming that the others are captured in these.” (6-C)

“Another thing I really liked was the teenager talking about how to get help and the encouragement of talking to a friend or adult or parent and I especially liked...[how] she gave examples of you could say it this way.” (7-C)

“Would it be worth to say if you notice these symptoms, you should go to a counselor. If you meet five or more for two weeks at a time, then recommend therapy or counseling for a major depressive disorder as a mental illness versus sadness, but do you separate from counseling to normalize that.” (8-C)

“I liked when they talked about stress and anxiety and mentioned positive stress because that is a conversation, I have to find the sweet spot of the right amount of stress to keep someone motivation or studying for an exam, the Dodson curve.” (9-C)

“So, the teenager said there is a difference between sadness and depression and said depression is a mental illness and talked about anxiety, which can be normal with stress and that it is not a mental illness. Well, the counselor said, and this is a direct quote, “Anxiety is a mental illness”, which is incorrect.” (10-C)

“I think you could probably go a bit further into explaining, like she mentioned, going into details about what else you can do to exercise without going to the gym, the simple things. Go a little more into detail about the fruits and vegetables you may eat.” (1-P)

“There was a lot of behavioral activation and the activity, which was a neat example. I liked that. However, when it went to another screen that asked about or gave certain activities to do, the teenager said, “Choose something that is going to be active” and the next screen went to a list of activities that were both active, but also inactive so I chose reading a book. That is a sedentary activity.” (11-C)

“More resources too. In the sense that, “That breathing activity was great” more of that. Because if there’s not enough it’s repetitive over and over again. How often are they going to want to watch the videos? So, more resources.” (2-T)

“And maybe after the fact, not just beforehand, you rate yourself before and rate yourself after, there’s some type of reflection questions like how you do something similar like this or use the activity you just did to help you in the future. Because kids are going to want to know, why’d I do that?” (3-T)

“Even, maybe not making a game, but making it interactive with these as our best options, giving variety and choosing which option would be better if you were to respond to a friend or than like an open-ended answer or maybe not have an open-ended one because they could make an inappropriate statement. Yeah, I think that would be helpful for specifically talking to parents. How do you address complex scenarios or boyfriend or girlfriend for instance to break-up with you and if you tell an adult you are struggling, how do you do that? How do you manage that?” (12-C)

“And then, they also mentioned a little bit about suicide, and I like that they mentioned, “It is okay to lose a friend by telling

Teen Vlogger

an adult rather than losing them by death.” I wonder if there is a way to incorporate that in more complex scenarios that kids can face as far as what if my friend told me to keep it a secret. Because I suspect that would be a more conflicted experience for a teenager versus saying the friend will be mad.” (13-C)

“I was thinking the focus is resilience. It does not seem to get to that until the Lifestyle module so I think if there is a way to incorporate resilience and that word throughout including like an introduction to each of the modules because I could see people talk about Whippy and resilience, but it is not really talked about until briefly at the end.” (14-C)

“Maybe, referencing resilience more throughout the activities. Referencing it or maybe even as kids are going through the video, here’s something we are working towards like mindfulness is a part of it, but they may not make that connection.” (4-T)

“So, she was pleasant. I liked her voice, demeanor. It was calm, but I thought it was believable she was depressed a year ago. She looked a bit older than a teenager to me. I do not know if it was just how she was dressed conservatively. That was one negative. I did not like how you could see her microphone.” (1-C)

“Just overall relatable. She seemed like a nice person. She was talking about personable issues and that made her trustworthy and just a pleasant voice and I think her interactions were very real. It did not seem scripted. Even though you know it is scripted, but it felt like it flowed.” (2-C)

“I think she was very relatable. She seemed like the typical, average person. You say, “That could be me,” as opposed to the commercials you see now, where “if you get on the Peloton bike, you could look like this actress.” That gives you a false belief. She’s more relatable. I look like her, I have friends that look like her.” (1-P)

“For the same reasons. She seems genuine. Kids want to believe somebody. I want to believe that person is real, because they’re going to see right through someone who is fake.” (1-T)

“She looks older than a teen, a little bit older, but not an old woman telling you what to do. She’s more like in her 20s that the teens could follow, and they’ll listen to because she’s an older person and not just a normal teen telling them what to do.” (2-P)

“She was an older teenager. Actually, she might be a college student from what I am guessing, but I think at the beginning I could tell it was not a genuine person, I knew it was an actress. This was not a real kid struggling, but they memorized their

lines and they did a good job without cues. But I thought she did a good job being concise and maybe it was just the script she was given. As far as relatability, she did give a few good examples like parents arguing. More stories like that would make her more relatable.” (3-C)

“Yeah, because I think it is clear she is an actress from the get-go, but with more examples of, “This past weekend I had exams,” is relatable or “My parents got into a fight” or she said maybe your parents got into a fight, but I think giving personal examples would make it more relatable instead of just saying and I think she does give recently talked to a friend, but there was not much detail about how that conversation went and/or how what came to that so I think adding more personal stuff would flesh out her character and make her more relatable.” (4-C)

Doctor

“I think her glasses made her seem smart. I do not want to be judgmental, but she has that wise doctor look with her glasses, her bangs, and pulled back hair. Her stance is kind of thoughtful like she is a thoughtful doctor. But she is casual where she can be relatable. I think her age makes her relatable, not too old or too young.” (1-C)

“I did. I liked Dr. Smith. And for some of the same reasons that I said about the other speaker. She seemed passionate, and she talked about how she works with teenagers that age and why she does it. She was informative and I felt like, yeah she really wants to help somebody. So, if I was somebody having depression or stress, I’d be like man I want to hear what she has to say. Because what she is talking about, she seems knowledgeable, and she seems like she really wants to help people. She’s got experience.” (1-T)

“The hairstyle, the cat eyeglasses, what she’s wearing...if you did not know, she’d look like a grandma, but not really. They gave the impression she’s someone my age. If you took down the hair and took off the glasses, she’d look younger.” (1-P)

“Yeah, seems a little stiff as far as what I guess a typical doctor might be. I mean a medical doctor is usually more cold. I could picture her wearing a white coat and talking very serious and sterile, kind of cold in a way. So, if she is a counselor, would. I want to see her as my counselor. Probably not as a teenager, maybe as an adult. Does not seem that approachable. Seems knowledgeable outside of the anxiety illness comment and of the videos I watched.” (2-C)

“Yes for both. She did not talk over people. Even though she’s a professional, she was not using terminology or anything talking over the heads of students. It was on her level, but at the same time you also want, like I want, I believe her. She’s a

professional. She knows what she is talking about, but she's not talking over. You want somebody that is knowledgeable. Yeah, relatable, very calming, not distracting. It was like here's my message. Clear message." (2-T)

"As a teen, I do not know how relatable she would be to males. I would like to see if I'm really being picky and thinking how to improve it, I would like to see different kinds of doctors. And also, just for thinking about how teens might relate, but also thinking about interest and engagement. Hearing from different people might just switch it up a little bit and make it more interesting." (3-C)

Concern About the Mental Health Application

"To get them back in there, to look at changes. Review concepts. Because I can see a kid just go through it and never opening it up again once they go through the content." (1-C)

"I feel a little bit concerned if they were to rate really high on the suicide item. But I do not see a feasible or realistic way [to address it]." (2-C)

"I do not know if you need to clearly cite where the information came from. Most kids probably would not care, but some would. Where is it coming from? Is it a trusted source? That could probably be in the application description." (1-T)

"I do not want the application to be the only thing a kid is seeking out if they are having issues with depression or stress. Maybe that is also something, like an activity that could be built into the application. Like to have them identify a trusted adult, like someone to go talk to and share with. I would not want a kid to solely rely on it." (2-T)

"I would think someone could break in and maybe figure out what their mood was way back and figure it out, but that is pretty minimal so it is not disclosing too much personal information from what I can tell." (3-C)

Improvement for the Mental Health Application

"Yeah, make it more realistic so a teenager can relate to it a little bit better. That was too cartoon for me when I was a teenager, thinking back when I was their age, 14 or 15. The graphics they're used to now, they may not take it seriously." (1-P)

"I think with the videos, that is the time where you would lose a lot of kids just because a lot of videos and it was great information, but we are talking about creativity and engagement with the app. It is not like Candy Crush or something that is going to keep them since there is no intermittent reinforcement or random reinforcement because it

is a video and the next thing is a video. Great content, but like you said we need to incorporate graphics.” (1-C)

“I’ve seen certain applications that have like a reward or you can get stickers, or you can build up different credits.” (2-C)

“[Adolescents] can click on certain shows because it was a musical and had teens singing and dancing, so that might pique their interest. “Let’s see what this is about?” There’s a lot of singing and dancing.”...That might pique their interest as opposed to, “Oh, it is an application, it’s information, next.” (2-P)

“A tracker, like rate yourself. Like a tracking system, kids rate themselves throughout the app and maybe that could be a part of the surveys they fill out. It records their responses... it could send them a push notification. Here’s a positive breathing technique. Throughout the day, like if they’re not thinking about it, here’s a mindfulness tip.” (1-T)

“I think it goes back to that interactive piece. And the more input that they can put into the application, almost like even a journal, an optional journaling section or optional “Hey, I’m going to put down my thoughts.” But then, some kids might not use this as a diary, but somehow where they can be tracking in addition to their mood, different exercises or positive thoughts, or things they struggled with that day.” (2-T)

“I think it could be personalized even more and that is the problem of where privacy and confidentiality come into play. You can personalize it more with open-ended questions or they can rate their mood. Have graphs to see how their mood is being tracked. There are apps themselves for tracking or websites. Personalize it more that way because right now educational is not as engaging for them to go back and review.” (3-C)

“I am brainstorming right now, and this would be tricky because you do not want to break confidentiality or you would want to make it a private thing, but now I am thinking about how things can go haywire like social media. I do not know if there would be a positive or nice way to link up accounts on the lifestyle questionnaire. I do not know. Obviously, this can get hairy, but “so and so likes to take a walk. You could take a walk together” or something like that, but I like my other two answers better. I mean way down the road if you find a thoughtful way to do it. I do not know. I think there could be a prosocial positive spin to it.” (4-C)

Frequency of Use for the Mental Health Application

“Or a way of going back and logging in what you engaged in and re-rating your mood. This tells you what to do, but this is what I did. I went on a walk every day and this is how it helped

me. I am not sure if this is a goal for y'all or if the goal is to use it every day, then it may have some logging system." (1-C)

"I would think they would use it a lot at night when everybody is going to sleep, and they do not have access to other people that might provide this information for them. Or maybe after school too." (2-C)

"Probably would not do it during school. Maybe after school, before bed. Probably not on the weekend so much if they are busy. Probably right before they go to bed or after dinner or after homework, maybe when they are done with school." (1-P)

"Oh man, nighttime for sure. I do not think this is something they pull up unless they were in a counseling office or something. I do not know that you'd see students, and some are very aware and the ones that are very aware may be like, "Hey I need to go out in the hallway", but besides that I am thinking at home. Like I had a really bad day and that's why I think nighttime." (1-T)

"I like what you said earlier about health class because watching the videos it feels like I have to do it so that is why it is not as engaging. But, if it was more engaging, maybe they would use it at night when they are most prone or likely to be depressed, sad, anxious, stressed when they are on their own." (3-C)

"Thinking more about the depression piece, but the stress piece, absolutely in-between classes. The lifestyle piece on weekends when they have more time. When they want to work on themselves, when not working on school or social life." (4-C)

"Well, during school they are in a public setting, so they are probably not going to click on the phone during school because a lot of facilities confiscate phones. In a public setting, they're not going to be thinking "look at what this app does". In a public setting, they are probably playing, if they have their phones out, games or other applications. The likelihood of a teenager going through an informational application is low, unless they're trying to do their homework." (2-P)

"Like I was talking about before, how approachable and easy to use it is. I would definitely recommend it because I like the idea of you know, saying things in session and having a way for them as a refresher and sometimes I feel like I have certain teens come in and they have so many things going on. Sometimes you have to skip some of the basic stuff and that is when I refer or recommend a book for them to read, but I would love to recommend an app. Where I could say go in and

look at all the different symptoms and play around with it and see what is going on with you and how it relates to you.” (1-C)

“I definitely would for the education piece. If I were to recommend it, I would do it in tandem with our therapy sessions so the application can provide education in-between sessions for them to review. If they are doing it in health class, I would recommend it that way to talk about the difference between sadness and depression in this video.” (2-C)

“If a student is having struggles like that, I do not think you can ever give them enough resources because my reasoning is, some they are going to like and some they are not. They may not like the application, but it is an opportunity for them. Or they may not like talking to the counselor all the time, then hey I’ve got this application in addition to what I am also doing. I’m really going like this. This is going to help me hear the same message probably, not all the same terminology probably, but similar messages from different people.” (1-T)

“Yes, if it had all the components. The games, the music, something to draw them in. Just because being dry like that, you are going to lose the teen. I cannot see my teen [using it].” (1-P)

Table 15. Study 1, Phase 2 Computer System Usability Questionnaire and Mobile App Rating Scale Scores, Total Sample (N = 13)

<u>Variable</u>	<u>Mean (SD)</u>
Computer System Usability Questionnaire ¹	6.30 (1.03)
Mobile Application Rating Scale ²	4.08 (0.61)
Application Engagement ²	3.85 (0.67)
Application Functionality ²	4.54 (0.60)
Application Aesthetics ²	4.28 (0.57)
Application Information ²	3.90 (0.80)
Application Impact on Behavior ²	4.29 (0.59)
Application Rating ²	3.85 (0.69)
Frequency of Use over a Year ³	3.62 (0.96)
1-2 times	2 (15%)
3-10 times	3 (23%)
10 – 50 times	6 (46%)
>50 times	2 (15%)
Application Recommendation ⁴	3.84 (0.98)
Few People	1 (8%)
Several People	4 (31%)
Many People	4 (31%)
Everyone	4 (31%)

¹Computer System Usability Questionnaire (CSUQ) Mean on a scale from 1 to 7

²Mobile Application Rating Scale (MARS) Mean on a scale from 1 to 5 for all subscales

³MARS Predicted Application Use over a year

⁴MARS Application Recommendation to Peers

Table 16. Study 1, Phase 2 Adolescent CSUQ and MARS Scores, Total Sample (N = 9)

<u>Variable</u>	<u>Mean (SD)</u>
Computer System Usability Questionnaire ¹	6.13 (1.23)
Mobile Application Rating Scale ²	4.06 (0.71)
Application Engagement ²	3.80 (0.76)
Application Functionality ²	4.47 (0.67)
Application Aesthetics ²	4.26 (0.94)
Application Information ²	3.93 (0.66)
Application Impact on Behavior ²	4.35 (0.61)
Application Rating ²	3.89 (0.78)
Frequency of Use over a Year ³	3.44 (1.01)
1-2 times	2 (22%)
3-10 times	2 (22%)
10 – 50 times	4 (44%)
>50 times	1 (11%)
Application Recommendation ⁴	3.56 (1.01)
Few People	1 (11%)
Several People	4 (44%)
Many People	2 (22%)
Everyone	2 (22%)

¹Computer System Usability Questionnaire (CSUQ) Mean on a scale from 1 to 7

²Mobile Application Rating Scale (MARS) Mean on a scale from 1 to 5 for all subscales

³MARS Predicted Application Use over a year

⁴MARS Application Recommendation to Peers

Table 17. Study 1, Phase 2 Adult Individual Interview CSUQ and MARS Scores, Total Sample (N = 4)

<u>Variable</u>	<u>Mean (SD)</u>
Computer System Usability Questionnaire ¹	6.66 (0.37)
Mobile Application Rating Scale ²	4.12 (0.36)
Application Engagement ²	3.95 (0.50)
Application Functionality ²	4.69 (0.47)
Application Aesthetics ²	4.33 (0.55)
Application Information ²	3.82 (0.39)
Application Impact on Behavior ²	4.17 (0.62)
Application Rating ²	3.75 (0.50)
Frequency of Use over a Year ³	4.00 (0.82)
3-10 times	1 (25%)
10 – 50 times	2 (50%)
>50 times	1 (25%)
Application Recommendation ⁴	4.50 (0.58)
Many People	2 (50%)
Everyone	2 (50%)

¹Computer System Usability Questionnaire (CSUQ) Mean on a scale from 1 to 7

²Mobile Application Rating Scale (MARS) Mean on a scale from 1 to 5 for all subscales

³MARS Predicted Application Use over a year

⁴MARS Application Recommendation to Peers

Table 18. Study 1, Phase 2 Adolescent Individual Interview CSUQ and MARS Scores, Total Sample (N = 5)

<u>Variable</u>	<u>Mean (SD)</u>
Computer System Usability Questionnaire ¹	6.80 (0.22)
Mobile Application Rating Scale ²	4.37 (0.51)
Application Engagement ²	3.96 (0.86)
Application Functionality ²	4.70 (0.21)
Application Aesthetics ²	4.60 (0.28)
Application Information ²	4.37 (0.66)
Application Impact on Behavior ²	4.63 (0.46)
Application Rating ²	4.20 (0.84)
Frequency of Use over a Year ³	4.00 (0.71)
3-10 times	1 (20%)
10 – 50 times	3 (20%)
>50 times	1 (11%)
Application Recommendation ⁴	4.00 (1.00)
Several People	2 (40%)
Many People	1 (20%)
Everyone	2 (40%)

¹Computer System Usability Questionnaire (CSUQ) Mean on a scale from 1 to 7

²Mobile Application Rating Scale (MARS) Mean on a scale from 1 to 5 for all subscales

³MARS Predicted Application Use over a year

⁴MARS Application Recommendation to Peers

Table 19. Study 1, Phase 2 Adolescent Focus Group CSUQ and MARS Scores, Total Sample (N = 4)

<u>Variable</u>	<u>Mean (SD)</u>
Computer System Usability Questionnaire ¹	5.44 (1.50)
Mobile Application Rating Scale ²	3.68 (0.82)
Application Engagement ²	3.60 (0.67)
Application Functionality ²	4.19 (0.97)
Application Aesthetics ²	3.83 (0.69)
Application Information ²	3.39 (1.04)
Application Impact on Behavior ²	3.89 (0.59)
Application Rating ²	3.50 (0.58)
Frequency of Use over a Year ³	2.75 (0.96)
1-2 times	2 (50%)
3-10 times	1 (25%)
10 – 50 times	1 (25%)
Application Recommendation ⁴	3.00 (0.82)
Few People	1 (25%)
Several People	2 (50%)
Many People	1 (25%)

¹Computer System Usability Questionnaire (CSUQ) Mean on a scale from 1 to 7

²Mobile Application Rating Scale (MARS) Mean on a scale from 1 to 5 for all subscales

³MARS Predicted Application Use over a year

⁴MARS Application Recommendation to Peers

Table 20. Study 2 Adolescent Pre and Post Resilience Scores (N = 32)

<u>Variable</u>	<u>Pre score Mean (SD), Post score Mean (SD)</u>
Adolescent Resilience Questionnaire (ARQ) Total Score	325.66 (59.35), 323.66 (60.30)
ARQ Individual Composite	143.35 (28.94), 143.78 (27.58)
ARQ Individual Confidence	31.91 (5.09), 31.47 (5.76)
ARQ Individual Emotion Insight	28.66 (6.35), 29.53 (5.99)
ARQ Individual Negative Cognition	26.75 (7.54), 25.84 (8.23)
ARQ Individual Social Skills	27.16 (7.17), 27.91 (6.32)
ARQ Individual Empathy	28.88 (6.20), 29.03 (5.96)
ARQ Family Connectedness	29.13 (7.51), 29.53 (7.99)
ARQ Family Availability	11.69 (3.35), 11.59 (3.64)
ARQ Peers Connectedness	29.38 (5.27), 27.88 (6.17)
ARQ Peers Availability	28.31 (7.73), 28.56 (7.24)
ARQ School Supportive Environment	31.16 (5.96), 30.34 (6.05)
ARQ School Connectedness	30.38 (4.84), 30.56 (5.07)
ARQ Community Connectedness	22.28 (5.93), 21.41 (6.23)

Table 21. Study 2 Adolescent Pre and Post Secondary Mental Health Scores (N = 32)

<u>Variable</u>	<u>Pre score Mean (SD), Post score Mean (SD)</u>
Generalized Self-Efficacy Scale (GSE)	32.16 (5.61), 31.97 (5.45)
Subjective Happiness Scale (SHS)	19.84 (5.34), 19.97 (5.06)
Emotion Awareness Questionnaire (EAQ)	66.68 (10.27), 66.68 (10.25)
BRIEF COPE Adaptive Coping	45.66 (9.78), 46.34 (11.11)
BRIEF COPE Maladaptive Coping	16.16 (4.70), 16.38 (5.35)
Interpersonal Support Evaluation	16.69 (3.23), 17.13 (2.73)

Table 22. Study 2 Paired-Samples t-tests for Pre-Post Questionnaires (N=32)

<u>Variables</u>	<u>M^D</u>	<u>SE</u>	<u>t</u>	<u>p</u>	<u>R²</u>
ARQ Mean Difference	-2.00	2.08	-0.96	0.34	0.17
ARQ Individual Difference	0.44	1.40	0.31	0.76	0.06
GSE Mean Difference	-0.19	0.65	-0.29	0.78	0.05
SHS Mean Difference	0.13	0.51	0.24	0.81	0.04
EAQ Mean Difference	.00	0.93	0.00	1.0	0.00
BRIEF Adaptive Coping Mean Difference	0.72	1.55	0.46	0.64	0.08
BRIEF Maladaptive Coping Mean Difference	0.22	0.59	0.37	0.71	0.07
ISEL Mean Difference	0.44	0.64	0.68	0.50	0.12

Table 23. *Study 2 Adolescent CSUQ and MARS Scores, Total Sample (N = 32)*

<u>Variable</u>	<u>Mean (SD)</u>
Computer System Usability Questionnaire ¹	6.14 (0.84)
Mobile Application Rating Scale ²	3.94 (0.62)
Application Engagement ²	3.49 (0.82)
Application Functionality ²	4.41 (0.65)
Application Aesthetics ²	4.17 (0.67)
Application Information ²	3.90 (0.72)
Application Impact on Behavior ²	3.89 (0.90)
Application Rating ²	3.37 (0.83)
Frequency of Use over a Year ³	2.91 (0.96)
None	4 (13%)
1-2 times	4 (13%)
3-10 times	15 (47%)
10 – 50 times	9 (28%)
Application Recommendation ⁴	3.53 (1.24)
Not at All	2 (6%)
Few People	4 (13%)
Several People	11 (34%)
Many People	5 (15%)
Everyone	10 (31%)

¹Computer System Usability Questionnaire (CSUQ) Mean on a scale from 1 to 7

²Mobile Application Rating Scale (MARS) Mean on a scale from 1 to 5 for all subscales

³MARS Predicted Application Use over a year

⁴MARS Application Recommendation to Peers

Table 24. *Study 2 Adolescent Usage Data, Total Sample (N = 40)*

<u>Variable</u>	<u>Frequency (% of sample)</u>
Application Completion	
None	7 (18%)
Some	23 (58%)
All	10 (25%)
Total Logins	153
Average Log-in	3.83
Average Log-in with only users (N =33)	4.64
Log-in Range for users	0 to 14
Module Completion	
Depression	18 (45%)
Stress	13 (33%)
Lifestyle	10 (25%)
Module Usage	
Depression	29 (73%)
Stress	25 (63%)
Lifestyle	22 (55%)
Depression Sub-Section Completion	
Introduction	20 (50%)
What is it?	20 (50%)
What does it look like?	19 (48%)
Where do I rate?	29 (73%)
How do I change it?	18 (45%)
How can I practice this?	19 (48%)
Stress Sub-Section Completion	
What is it?	19 (48%)
What does it look like?	18 (45%)
Where do I rate?	25 (63%)
How do I change it?	16 (40%)
How can I practice this?	14 (35%)
Lifestyle Sub-Section Completion	
What is it?	17 (43%)
What does it look like?	15 (38%)
Where do I rate?	18 (45%)
How do I change it?	10 (25%)
How can I practice this?	13 (33%)

Figure 1. Study 1, Phase 1 Adolescent Individual Interview Consort Diagram

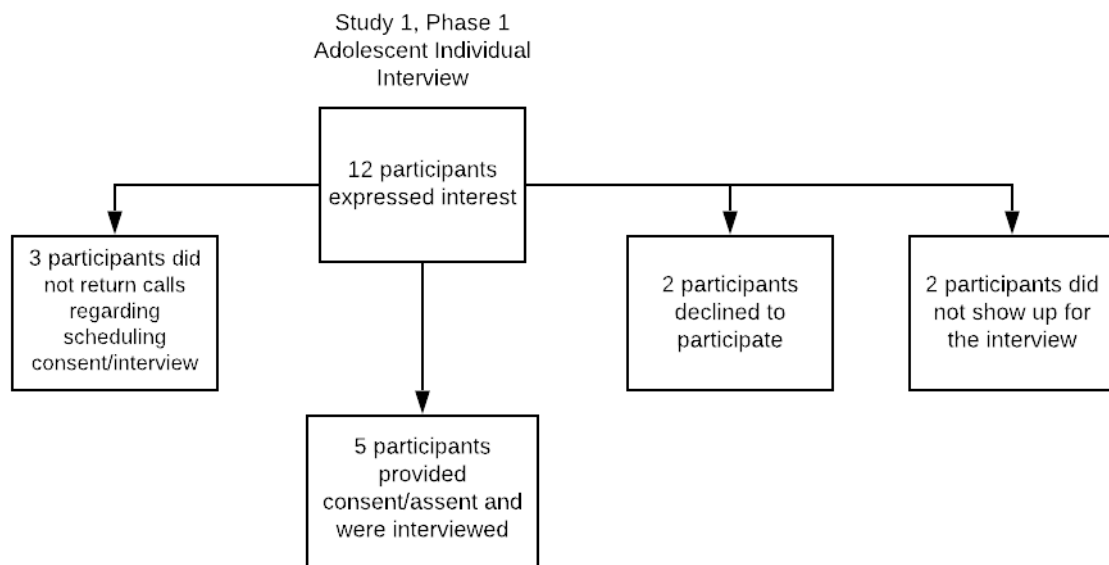


Figure 2. Study 1, Phase 1 Adolescent Focus Group Consort Diagram

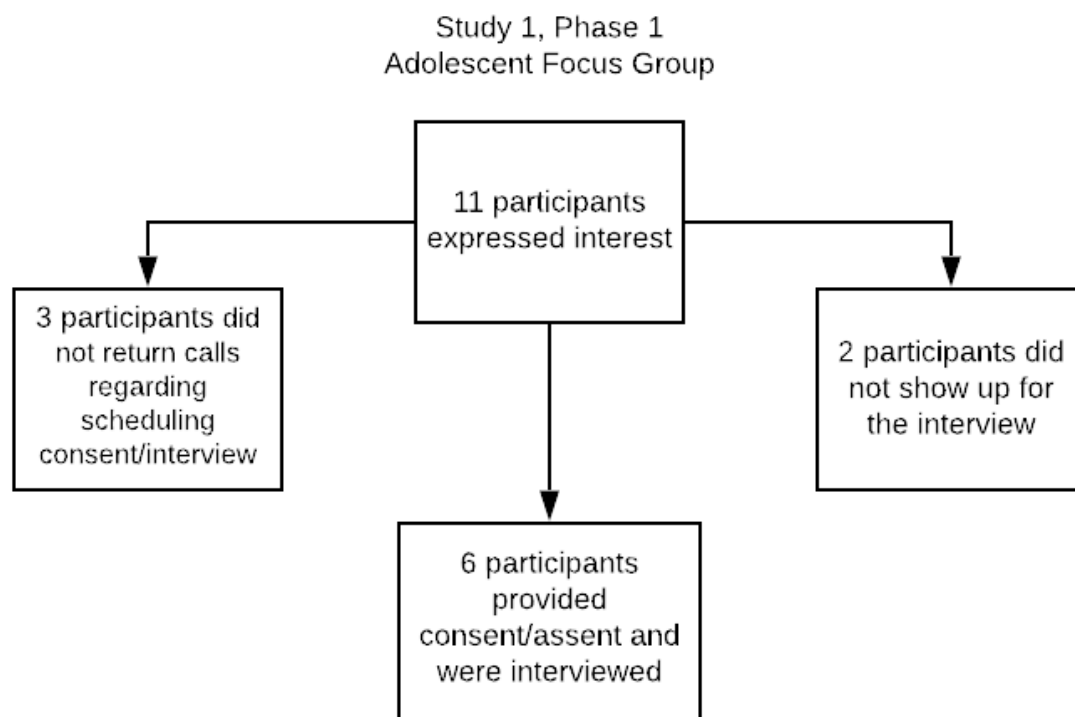


Figure 3. Study 1, Phase 1 Adult Individual Interview Consort Diagram

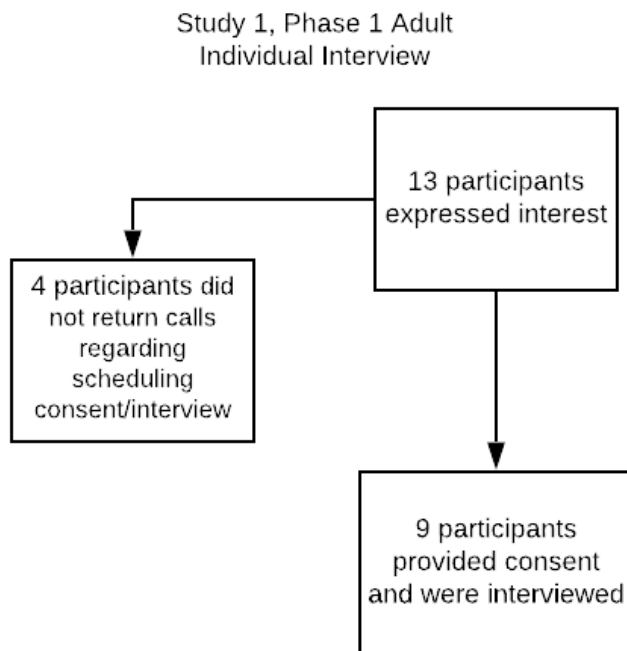


Figure 4. Study 1, Phase 2 Adolescent Individual Interview Consort Diagram

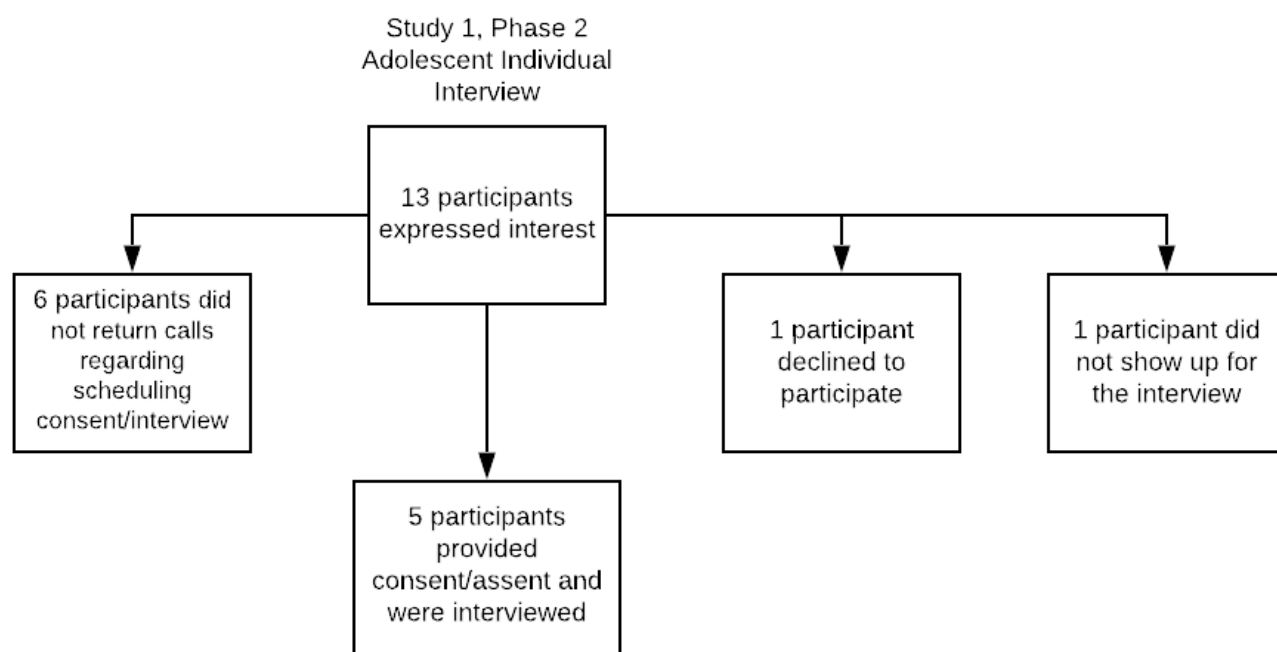


Figure 5. Study 1, Phase 2 Adolescent Focus Group Consort Diagram

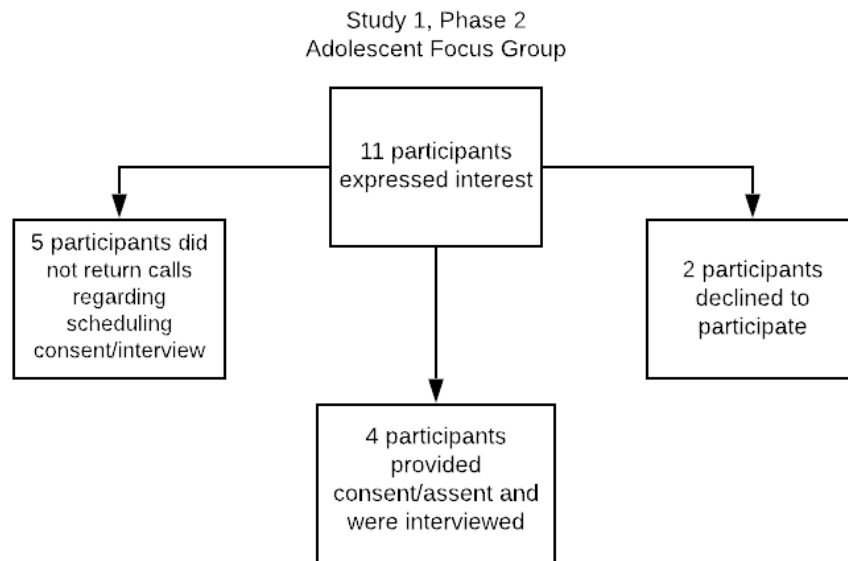


Figure 6. Study 1, Phase 2 Adult Individual Interview Consort Diagram

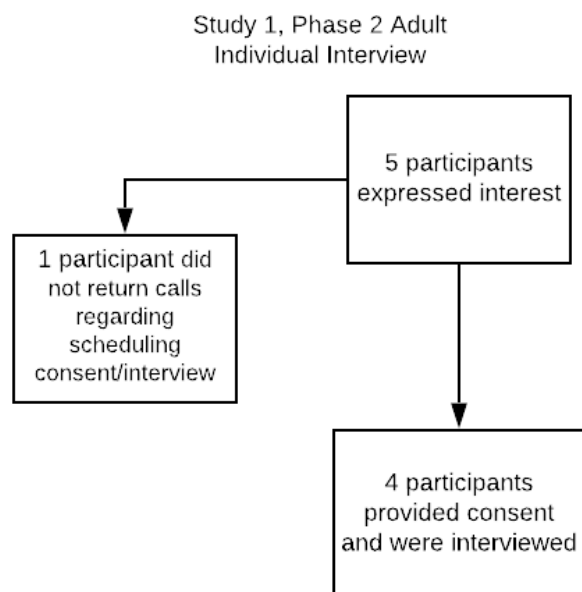
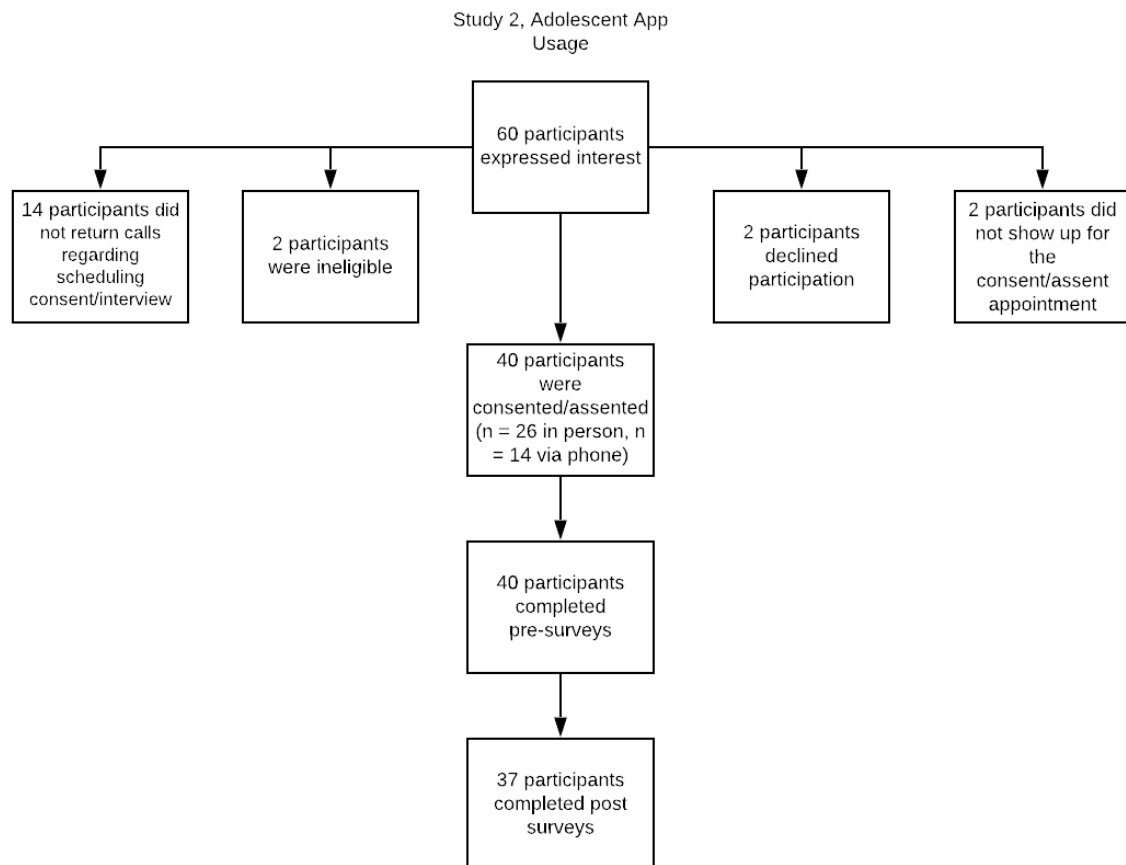


Figure 7. Study 2 Consort Diagram



Appendix 1. Interview Questions and Research Design

Individual Interview Questions for Adolescents

Study 1, Phase 1 (Before prototype)

- 1) Intro to interview: “Apps have become an important part of everyday life because they seem to be fun, enjoyable, and easy to use.” What has your experience been like using phone apps? (Apps)
- 2) What parts of phone apps do you find appealing or enjoy the most? (Apps)
- 3) What app do you enjoy using the most? (Apps)
 - a) Follow-up Question: Why do you like using that app?
- 4) (Transition topics) “So we’ve talked about general apps, but I want to switch gears for these next questions.” Would you be interested in using a mental health phone application? (Mental Health Apps)
 - a) Follow-up Questions: What would make you interested?
 - b) What would be helpful or (not helpful) about it?
 - c) Do you think other teens like you would feel the same way about a mobile app?
 - d) For instance, would you use it during the day? Would you feel comfortable using it, for example, at school if you needed to?
- 5) What would be an incentive for you to using a mental health application? (Usability and Acceptability)
- 6) How would you stay engaged when using a mental health application? (Usability and Acceptability)
- 7) What types graphics and visuals would you find helpful when using a mental health application (e.g., interactive text, video, pictures, combination, provide examples if needed)? (Usability and Acceptability)
- 8) What components/aspects would make it easy for you to use a mental health application? (Usability and Acceptability)
- 9) What are your potential concerns about using a mental health application? (Safety and Privacy)
- 10) Would you be uncomfortable about using a mental health application? (Safety and Privacy)
 - a) Follow-up Statement: Tell me more about that
- 11) Introduction of resilience application: “Some apps are fun to use; some apps make your life easier. Now that we’ve talked about that, let me introduce to you to the resilience application. The application will have 3 sections that will focus on depression, stress, and lifestyle factors (i.e. nutrition, exercise, sleeping) and will have teens/adults providing information but also involve activities that help with resilience.”
- 12) What does resilience mean to you (if you know)? (Resilience)

- 13)
 - a) Provide definition of resilience if they do not know: Resilience means the ability to “bounce back” when something bad happens
- 14) If a phone application was focused on improving resilience, what would you expect it to cover? (Resilience)
- 15) What is the single most important thing designers should focus on when making this phone application for resilience? (Mental Health App Design)

Study 1, Phase 2 (After prototype)

- 1) What are your initial thoughts after looking at this application for a short period of time? (General Feedback)
- 2) What did you like about the application? (General Feedback)
- 3) What did you dislike about the application? (General Feedback)
- 4) Do you have any concerns when using this application? (App Concerns)
 - a. Follow-up Question: What are some of those concerns?

Show Main Icon (Print this out)

- 5) Tell me what you think about this image/icon.
- 6) What kind of image would be best for the icon?
- 7) Would you suggest something else?

We'd want a teen to be able to find the icon easily but would that make it too obvious... this is also why we asked you about confidentiality. Does this change what you think about an image/icon?

Show Main Menu (Print out screenshot)

- 8) What were your thoughts about the main menu?
- 9) What would you suggest to add / change?
- 10) Are there strategies that you use that are not on this menu?

Show Sub Menus (Print out screenshot)

- 11) Do you think these strategies would be helpful to you?
- 12) What would you suggest to add / change?
- 13) Are there strategies that you use that are not on this menu?
- 14) What do you think about the design and graphics? What about the game?

Show picture of teen actor (Print out screenshot)

- 15) Did you like the teen actor? Why or why not?
- 16) Is she relatable? Why or why not?

Show picture of doctor (Print out screenshot)

- 17) Did you like the doctor? Why or why not?
- 18) Is she relatable? Why or why not?

Usability:

- 19) Would you feel comfortable using this app? Why or why not?
- 20) When would you use it?
- 21) What would help you to make this part of your daily life for the period of time you and your doctor think you need it?
- 22) Would you recommend this application to teens? (App Recommendation)
 - a. Follow-up Question: Why would you choose to recommend or not recommend the application to others?

Individual Interview Questions for Adults

Study 1, Phase 1 (Before prototype)

- 1) Intro to interview: “Apps have become an important part of everyday life because they seem to be fun, enjoyable, and easy to use.” What has your experience been like using phone apps? (Apps)
- 2) What parts of phone apps do you find appealing or enjoy the most? (Apps)
- 3) What app do you enjoy using the most? (Apps)
 - b) Follow-up Question: Why do you like using that app?
- 4) (Transition topics) “So we’ve talked about general apps, but I want to switch gears for these next questions.” Would youth be interested in using a mental health phone application? (Mental Health Apps)
 - e) Follow-up Questions: What would make youth interested?
 - f) What would be helpful or (not helpful) about it?
 - g) Do you think most youth would feel the same way about a mobile app?
 - h) For instance, would youth use it during the day? Would teens feel comfortable using it, for example, at school if you needed to?
- 5) What would be an incentive for youth to using a mental health application? (Usability and Acceptability)
- 6) How would youth stay engaged when using a mental health application? (Usability and Acceptability)
- 7) What types graphics and visuals would youth find helpful when using a mental health application (e.g., interactive text, video, pictures, combination, provide examples if needed)? (Usability and Acceptability)
- 8) What components/aspects would make it easy for youth to use a mental health application? (Usability and Acceptability)
- 9) What are your potential concerns about youth using a mental health application? (Safety and Privacy)
- 10) Would youth be uncomfortable about using a mental health application? (Safety and Privacy)
 - b) Follow-up Statement: Tell me more about that
- 11) Introduction of resilience application: “Some apps are fun to use, some apps make your life easier. Now that we’ve talked about that,

let me introduce to you to the resilience application. The application will have 3 sections that will focus on depression, stress, and lifestyle factors (i.e. nutrition, exercise, sleeping) and will have teens/adults providing information but also involve activities that help with resilience.”

- 12) What does resilience mean to you (if you know)? (Resilience)
 - b) Provide definition of resilience if they do not know: Resilience means the ability to “bounce back” when something bad happens
- 13) If a phone application was focused on improving resilience, what would you expect it to cover? (Resilience)
- 14) What is the single most important thing designers should focus on when making this phone application for resilience? (Mental Health App Design)

Study 1, Phase 2 (After prototype)

- 1) What are your initial thoughts after looking at this application for a short period of time? (General Feedback)
- 2) What did you like about the application? (General Feedback)
- 3) What did you dislike about the application? (General Feedback)
- 4) Do you have any concerns when using this application? (App Concerns)
 - a. Follow-up Question: What are some of those concerns?

Show Main Icon (Print this out)

- 5) Tell me what you think about this image/icon.
- 6) What kind of image would be best for the icon?
- 7) Would you suggest something else?

We’d want a teen to be able to find the icon easily, but would that make it too obvious... this is also why we asked you about confidentiality. Does this change what you think about an image/icon?

Show Main Menu (Print out screenshot)

- 8) What were your thoughts about the main menu?
- 9) What would you suggest to add / change?
- 10) Are there strategies that should be added to the menu?

Show Sub Menus (Print out screenshot)

- 11) Do you think these strategies would be helpful to youth?
- 12) What would you suggest to add / change?
- 13) Are there strategies that should be added to the menu?
- 14) What did you think about the game? Things you liked/disliked?

Show picture of teen actor (Print out screenshot)

- 15) Did you like the teen actor? Why or why not?
- 16) Is she relatable? Why or why not?

Show picture of doctor (Print out screenshot)

17) Did you like the doctor? Why or why not?

18) Is she relatable? Why or why not?

Usability:

19) Would youth feel comfortable using this app? Why or why not?

20) When would youth use it?

21) What would help youth to make this part of their daily life for the period of time they would need it?

22) Would you recommend this application to youth? (App Recommendation)

a. Follow-up Question: Why would you choose to recommend or not recommend the application to youth?

Adolescent Focus Group Questions

Study 1, Phase 1 (Before prototype)

- 1) What has your experience been like using phone apps? (Apps)
- 2) What aspects of phone apps do you find appealing or enjoy the most? (Apps)
- 3) What phone apps do you use the most? (Apps)
 - a. Follow-up Question: Why do you like using that app?
- 4) Would teens/adolescents be interested in using a mental health phone application? (Mental Health Apps)
 - a. Follow-up Question: What would make you interested?
- 5) If an application was focused on improving mental health, what would you expect it to cover? (Mental Health Apps)
- 6) What would the benefits be for teens in using a mental health application? (Mental Health Apps)
- 7) What would be an incentive to using an application like this, how would teens become engaged? (Usability and Acceptability)
- 8) What graphics and visuals would be helpful when using a mental health application? (Usability and Acceptability)
- 9) What components/aspects would make it easy for you to use a mental health application? (Usability and Acceptability)
- 10) What are your concerns about using a mental health application? (Safety and Privacy)
 - a. Follow-up Question: What would make you worried about using a mental health application?
- 11) Would you be self-conscious about using a mental health application? (Safety and Privacy)
 - a. Follow-up Question: What would make you self-conscious?
- 12) What is the single most important thing designers should focus on when making this application? (Mental Health App Design)

13) Out of these suggestions, what would you want to prioritize? (Mental Health App Design)

a. Follow-up Question: Why is that your number one suggestion?

Study 1, Phase 2 (After prototype)

- 1) What are your initial thoughts after looking at this application for a short period of time? (General Feedback)
- 2) What did you like about the application? (General Feedback)
- 3) What did you dislike about the application? (General Feedback)
- 4) Do you have any concerns when using this application? (App Concerns)
 - a. Follow-up Question: What are some of those concerns?

Show Main Icon (Print this out)

- 5) Tell me what you think about this image/icon.
- 6) What kind of image would be best for the icon?
- 7) Would you suggest something else?

We'd want a teen to be able to find the icon easily, but would that make it too obvious... this is also why we asked you about confidentiality. Does this change what you think about an image/icon?

Show Main Menu (Print out screenshot)

- 8) What were your thoughts about the main menu?
- 9) What would you suggest to add / change?
- 10) Are there strategies that you use that are not on this menu?

Show Sub Menus (Print out screenshot)

- 11) Do you think these strategies would be helpful to you?
- 12) What would you suggest to add / change?
- 13) Are there strategies that you use that are not on this menu?

Show picture of teen actor (Print out screenshot)

- 14) Did you like the teen actor? Why or why not?
- 15) Is she relatable? Why or why not?

Show picture of doctor (Print out screenshot)

- 16) Did you like the doctor? Why or why not?
- 17) Is she relatable? Why or why not?

Usability:

- 18) Would you feel comfortable using this app? Why or why not?
- 19) When would you use it?
- 20) What would help you to make this part of your daily life for the period of time you and your doctor think you need it?
- 21) Would you recommend this application to teens? (App Recommendation)

- a. Follow-up Question: Why would you choose to recommend or not recommend the application to others

Appendix 2. Study 1, Phase 2 Interview/Focus Group Handouts

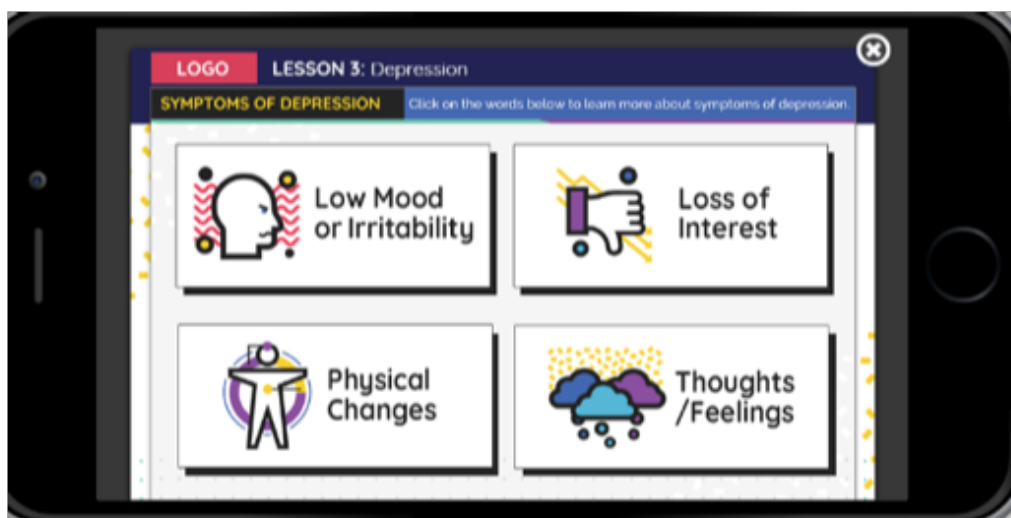
Main Logo



Homepage



Submenu



Video Graphics























Teen Vlogger



Doctor



Appendix 3. Measures

 Data Collection Instrument	Study 1, Phase 1	Study 1, Phase 2	Pre Study 2	Post Study 2
Demographics (survey)				
Computer System Usability Questionnaire (survey)				
Mobile App Rating Scale (MARS) (survey)				
Adolescent Resilience Questionnaire (ARQ) (survey)				
General Self-Efficacy Scale (GSE) (survey)				
General Happiness Scale (GHS) (survey)				
Emotion Awareness Questionnaire (survey)				
Brief COPE (survey)				
Interpersonal Support Evaluation List - 12 Item (ISEL) (survey)				
Delete all data on event:				

Measure: Computer System Usability Questionnaire


11/1/2018

Computer System Usability Questionnaire

Computer System Usability Questionnaire

Based on: Lewis, J. R. (1995) IBM Computer Usability Satisfaction Questionnaires: Psychometric Evaluation and Instructions for Use. *International Journal of Human-Computer Interaction*, 7:1, 57-78. [Abstract](#) | [About quest.cgi](#)

















Please rate the usability of the system.

- Try to respond to all the items.
- For items that are not applicable, use: **NA**
- Make sure these fields are filled in: **System:** **Email to:**
- Add a comment about an item by clicking on its  icon, or add comment fields for all items by clicking on **Comment All**.
- To mail in your results, click on: **Mail Data**

System: **Email to:**

Optionally provide comments and your email address in the box.

[Mail Data](#) [Comment All](#) [RETURN TO REFERRING PAGE](#)

		1	2	3	4	5	6	7	NA
1. Overall, I am satisfied with how easy it is to use this system 	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree <input type="radio"/>
2. It was simple to use this system 	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree <input type="radio"/>
3. I can effectively complete my work using this system 	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree <input type="radio"/>
4. I am able to complete my work quickly using this system 	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree <input type="radio"/>
5. I am able to efficiently complete my work using this system 	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree <input type="radio"/>
6. I feel comfortable using this system 	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree <input type="radio"/>
7. It was easy to learn to use this system 	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree <input type="radio"/>
8. I believe I became productive quickly using this system 	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree <input type="radio"/>
9. The system gives error messages that clearly tell me how to fix problems 	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree <input type="radio"/>
10. Whenever I make a mistake using the system, I recover easily and quickly 	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree <input type="radio"/>
11. The information (such as online help, on-screen messages, and other documentation) provided with this system is clear 	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree <input type="radio"/>
12. It is easy to find the information I needed 	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree <input type="radio"/>
13. The information provided for the system is easy to understand 	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree <input type="radio"/>
14. The information is effective in helping me complete the tasks and scenarios 	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree <input type="radio"/>
15. The organization of information on the system screens is clear 	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree <input type="radio"/>
16. The interface of this system is pleasant 	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree <input type="radio"/>

11/1/2018

Computer System Usability Questionnaire

17. I like using the interface of this system 📄	disagree								agree
	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
18. This system has all the functions and capabilities I expect it to have 📄	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
19. Overall, I am satisfied with this system 📄	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
		1	2	3	4	5	6	7	NA

List the most **negative** aspect(s):

1.	
2.	
3.	

List the most **positive** aspect(s):

1.	
2.	
3.	

Mail Data

Comment All

[Top of Form](#) | [RETURN TO REFERRING PAGE](#)

Measure: Mobile Application Rating Scale

Mobile Application Rating Scale (MARS)

Instructions for use:

Raters should:

1. Use the app and trial it thoroughly for at least 10 minutes;
2. Determine how easy it is to use, how well it functions and does it do what it purports to do;
3. Review app settings, developer information, external links, security features, etc.

Scoring

SECTION

A: Engagement Mean Score = _____

B: Functionality Mean Score = _____

C: Aesthetics Mean Score = _____

D: Information Mean Score* = _____

* Exclude questions rated as "N/A" from the mean score calculation.

App quality mean score _____ = A + B + C + D

/ 4

E: App subjective mean quality Score = _____

F: Perceived impact mean Score = _____

The *App subjective quality* scale can be reported as individual items or as a mean score, depending on the aims of the research.

The *Perceived impact* items can be adjusted and used to obtain information on the perceived impact of the app on the user's knowledge, attitudes and intentions related to the target health behaviour.

Mobile Application Rating Scale (MARS) App

Classification

The Classification section is used to collect descriptive and technical information about the app. Please review the app description in iTunes / Google Play to access this information.

App Name: _____

Rating this version: _____ Rating all versions: _____

Developer: _____

N ratings this version: _____ N ratings all versions: _____

Version: _____ Last update: _____

Cost - basic version: _____ Cost - upgrade version: _____

Platform: ☐ iPhone ☐ iPad ☐ Android ☐ Other _____

Brief description: _____

Focus: what the app targets (select all that apply)

- ☐ Increase Happiness/Well-being
- ☐ Mindfulness/Meditation/Relaxation
- ☐ Reduce negative emotions
- ☐ Depression
- ☐ Anxiety/Stress
- ☐ Anger
- ☐ Behaviour change
- ☐ Alcohol /Substance Use
- ☐ Goal Setting
- ☐ Entertainment
- ☐ Relationships
- ☐ Physical health
- ☐ Other _____

Theoretical background/Strategies (all that apply)

- ☐ Assessment
- ☐ Feedback
- ☐ Information/Education
- ☐ Monitoring/Tracking
- ☐ Goal setting
- ☐ Advice /Tips /Strategies /Skills training
- ☐ CBT - Behavioural (positive events)
- ☐ CBT – Cognitive (thought challenging)
- ☐ ACT - Acceptance commitment therapy
- ☐ Mindfulness/Meditation
- ☐ Relaxation
- ☐ Gratitude
- ☐ Strengths based
- ☐ Other _____

Affiliations:

- ☐ Unknown ☐ Commercial ☐ Government ☐ NGO ☐ University

Age group (all that apply)

- ☐ Children (under 12)
- ☐ Adolescents (13-17)
- ☐ Young Adults (18-25)
- ☐ Adults
- ☐ General

Technical aspects of app (all that apply)

- ☐ Allows sharing (Facebook, Twitter, etc.)
- ☐ Has an app community
- ☐ Allows password-protection
- ☐ Requires login
- ☐ Sends reminders
- ☐ Needs web access to function

App Quality Ratings

The Rating scale assesses app quality on four dimensions. All items are rated on a 5-point scale from “1.Inadequate” to “5.Excellent”. Circle the number that most accurately represents the quality of the app component you are rating. Please use the descriptors provided for each response category.

SECTION A

Engagement – fun, interesting, customisable, interactive (e.g. sends alerts, messages, reminders, feedback, enables sharing), well-targeted to audience

1. **Entertainment: Is the app fun/entertaining to use? Does it use any strategies to increase engagement through entertainment (e.g. through gamification)?**
 - 1 Dull, not fun or entertaining at all
 - 2 Mostly boring
 - 3 OK, fun enough to entertain user for a brief time (< 5 minutes)
 - 4 Moderately fun and entertaining, would entertain user for some time (5-10 minutes total)
 - 5 Highly entertaining and fun, would stimulate repeat use

2. **Interest: Is the app interesting to use? Does it use any strategies to increase engagement by presenting its content in an interesting way?**
 - 1 Not interesting at all
 - 2 Mostly uninteresting
 - 3 OK, neither interesting nor uninteresting; would engage user for a brief time (< 5 minutes)
 - 4 Moderately interesting; would engage user for some time (5-10 minutes total)
 - 5 Very interesting, would engage user in repeat use

3. **Customisation: Does it provide/retain all necessary settings/preferences for apps features (e.g. sound, content, notifications, etc.)?**
 - 1 Does not allow any customisation or requires setting to be input every time
 - 2 Allows insufficient customisation limiting functions
 - 3 Allows basic customisation to function adequately
 - 4 Allows numerous options for customisation
 - 5 Allows complete tailoring to the individual's characteristics/preferences, retains all settings

4. **Interactivity: Does it allow user input, provide feedback, contain prompts (reminders, sharing options, notifications, etc.)? Note: these functions need to be customisable and not overwhelming in order to be excellent.**
 - 1 No interactive features and/or no response to user interaction
 - 2 Insufficient interactivity, or feedback, or user input options, limiting functions
 - 3 Basic interactive features to function adequately
 - 4 Offers a variety of interactive features/feedback/user input options
 - 5 Very high level of responsiveness through interactive features/feedback/user input options

5. **Target group: Is the app content (visual information, language, design) appropriate for your target audience?**
 - 1 Completely inappropriate/unclear/confusing
 - 2 Mostly inappropriate/unclear/confusing
 - 3 Acceptable but not targeted. May be inappropriate/unclear/confusing
 - 4 Well-targeted, with negligible issues
 - 5 Perfectly targeted, no issues found

A. Engagement mean score = _____

SECTION B

Functionality – app functioning, easy to learn, navigation, flow logic, and gestural design of app

6. **Performance: How accurately/fast do the app features (functions) and components (buttons/menus) work?**
 - 1 App is broken; no/insufficient/inaccurate response (e.g. crashes/bugs/broken features, etc.)
 - 2 Some functions work, but lagging or contains major technical problems
 - 3 App works overall. Some technical problems need fixing/Slow at times
 - 4 Mostly functional with minor/negligible problems
 - 5 Perfect/timely response; no technical bugs found/contains a 'loading time left' indicator

7. Ease of use: How easy is it to learn how to use the app; how clear are the menu labels/icons and instructions?

- 1 No/limited instructions; menu labels/icons are confusing; complicated
- 2 Useable after a lot of time/effort
- 3 Useable after some time/effort
- 4 Easy to learn how to use the app (or has clear instructions)
- 5 Able to use app immediately; intuitive; simple

8. Navigation: Is moving between screens logical/accurate/appropriate/ uninterrupted; are all necessary screen links present?

- 1 Different sections within the app seem logically disconnected and random/confusing/navigation is difficult
- 2 Usable after a lot of time/effort
- 3 Usable after some time/effort
- 4 Easy to use or missing a negligible link
- 5 Perfectly logical, easy, clear and intuitive screen flow throughout, or offers shortcuts

9. Gestural design: Are interactions (taps/swipes/pinches/scrolls) consistent and intuitive across all components/screens?

- 1 Completely inconsistent/confusing
- 2 Often inconsistent/confusing
- 3 OK with some inconsistencies/confusing elements
- 4 Mostly consistent/intuitive with negligible problems
- 5 Perfectly consistent and intuitive

B. Functionality mean score = _____

SECTION C

Aesthetics – graphic design, overall visual appeal, colour scheme, and stylistic consistency

10. Layout: Is arrangement and size of buttons/icons/menus/content on the screen appropriate or zoomable if needed?

- 1 Very poor design, cluttered, some options impossible to select/locate/see/read. Device display not optimised
- 2 Poor design, random, unclear, some options difficult to select/locate/see/read
- 3 Satisfactory, few problems with selecting/locating/seeing/reading items or with minor screen-size problems
- 4 Mostly clear, able to select/locate/see/read items
- 5 Professional, simple, clear, orderly, logically organised, device display optimised. Every design component has a purpose

11. Graphics: How high is the quality/resolution of graphics used for buttons/icons/menus/content?

- 1 Graphics appear amateur, very poor visual design - disproportionate, completely stylistically inconsistent
- 2 Low quality/low resolution graphics; low quality visual design – disproportionate, stylistically inconsistent
- 3 Moderate quality graphics and visual design (generally consistent in style)
- 4 High quality/resolution graphics and visual design – mostly proportionate, stylistically consistent
- 5 Very high quality/resolution graphics and visual design - proportionate, stylistically consistent throughout

12. Visual appeal: How good does the app look?

- 1 No visual appeal, unpleasant to look at, poorly designed, clashing/mismatched colours
- 2 Little visual appeal – poorly designed, bad use of colour, visually boring
- 3 Some visual appeal – average, neither pleasant, nor unpleasant
- 4 High level of visual appeal – seamless graphics – consistent and professionally designed
- 5 As above + very attractive, memorable, stands out; use of colour enhances app features/menus

C. Aesthetics mean score = _____

SECTION D

Information – Contains high quality information (e.g. text, feedback, measures, references) from a credible source. Select N/A if the app component is irrelevant.

13. Accuracy of app description (in app store): Does app contain what is described?

- 1 Misleading. App does not contain the described components/functions. Or has no description
- 2 Inaccurate. App contains very few of the described components/functions
- 3 OK. App contains some of the described components/functions
- 4 Accurate. App contains most of the described components/functions
- 5 Highly accurate description of the app components/functions

14. Goals: Does app have specific, measurable and achievable goals (specified in app store description or within the app itself)?

N/A Description does not list goals, or app goals are irrelevant to research goal (e.g. using a game for educational purposes)

- 1 App has no chance of achieving its stated goals
- 2 Description lists some goals, but app has very little chance of achieving them
- 3 OK. App has clear goals, which may be achievable.
- 4 App has clearly specified goals, which are measurable and achievable
- 5 App has specific and measurable goals, which are highly likely to be achieved

15. Quality of information: Is app content correct, well written, and relevant to the goal/topic of the app?

N/A There is no information within the app

- 1 Irrelevant/inappropriate/incoherent/incorrect
- 2 Poor. Barely relevant/appropriate/coherent/may be incorrect
- 3 Moderately relevant/appropriate/coherent/and appears correct
- 4 Relevant/appropriate/coherent/correct
- 5 Highly relevant, appropriate, coherent, and correct

16. Quantity of information: Is the extent coverage within the scope of the app; and comprehensive but concise?

N/A There is no information within the app

- 1 Minimal or overwhelming
- 2 Insufficient or possibly overwhelming
- 3 OK but not comprehensive or concise
- 4 Offers a broad range of information, has some gaps or unnecessary detail; or has no links to more information and resources
- 5 Comprehensive and concise; contains links to more information and resources

17. Visual information: Is visual explanation of concepts – through charts/graphs/images/videos, etc. – clear, logical, correct?

N/A There is no visual information within the app (e.g. it only contains audio, or text)

- 1 Completely unclear/confusing/wrong or necessary but missing
- 2 Mostly unclear/confusing/wrong
- 3 OK but often unclear/confusing/wrong
- 4 Mostly clear/logical/correct with negligible issues
- 5 Perfectly clear/logical/correct

18. Credibility: Does the app come from a legitimate source (specified in app store description or within the app itself)?

- 1 Source identified but legitimacy/trustworthiness of source is questionable (e.g. commercial business with vested interest)
- 2 Appears to come from a legitimate source, but it cannot be verified (e.g. has no webpage)
- 3 Developed by small NGO/institution (hospital/centre, etc.) /specialised commercial business,

- funding body
- 4 Developed by government, university or as above but larger in scale
 - 5 Developed using nationally competitive government or research funding (e.g. Australian Research Council, NHMRC)

19. Evidence base: Has the app been trialled/tested; must be verified by evidence (in published scientific literature)?

- N/A The app has not been trialled/tested
- 1 The evidence suggests the app does not work
 - 2 App has been trialled (e.g., acceptability, usability, satisfaction ratings) and has partially positive outcomes in studies that are not randomised controlled trials (RCTs), or there is little or no contradictory evidence. **Strongly Agree 5**
 - 3 App has been trialled (e.g., acceptability, usability, satisfaction ratings) and has positive outcomes in studies that are not RCTs, and there is no contradictory evidence.
 - 4 App has been trialled and outcome tested in 1-2 RCTs indicating positive results
 - 5 App has been trialled and outcome tested in ≥ 3 high quality RCTs indicating positive results

D. Information mean score = _____ *

Strongly Agree 5

* Exclude questions rated as "N/A" from the mean score calculation.

App subjective quality

SECTION E

Strongly Agree 5

20. Would you recommend this app to people who might benefit from it?

- | | | | |
|---|-------------------|---|-------------------------|
| 1 | Not at all | I would not recommend this app to anyone | |
| 2 | | There are very few people I would recommend this app to | |
| 3 | Maybe | There are several people whom I would recommend it to | |
| 4 | | There are many people I would recommend this app to | |
| 5 | Definitely | I would recommend this app to everyone | Strongly Agree 5 |

21. How many times do you think you would use this app in the next 12 months if it was relevant to you?

- | | | | |
|---|-------------|--|-------------------------|
| 1 | None | | |
| 2 | 1-2 | | |
| 3 | 3-10 | | Strongly Agree 5 |
| 4 | 10-50 | | |
| 5 | >50 | | |

22. Would you pay for this app?

Strongly Agree 5

- 1 Definitely not
- 2
- 3
- 4
- 5 Definitely yes

23. What is your overall star rating of the app?

- | | | |
|---|-------|---------------------------------|
| 1 | ★ | One of the worst apps I've used |
| 2 | ★★ | |
| 3 | ★★★ | Average |
| 4 | ★★★★ | |
| 5 | ★★★★★ | One of the best apps I've used |

Perceived impact

These added items can be adjusted and used to assess the perceived impact of the app on the user's knowledge, attitudes, intentions to change as well as the likelihood of actual change in the target health behaviour.

SECTION F

1. **Awareness: This app is likely to increase awareness of the importance of addressing [insert target health behaviour]**

Strongly disagree

1 2 3 4

2. **Knowledge: This app is likely to increase knowledge/understanding of [insert target health behaviour]**

Strongly disagree

1 2 3 4

3. **Attitudes: This app is likely to change attitudes toward improving [insert target health behaviour]**

Strongly disagree

1 2 3 4

4. **Intention to change: This app is likely to increase intentions/motivation to address [insert target health behaviour]**

Strongly disagree

1 2 3 4

5. **Help seeking: Use of this app is likely to encourage further help seeking for [insert target health behaviour] (if it's required)**

Strongly disagree

1 2 3 4

6. **Behaviour change: Use of this app is likely increase/decrease [insert target health behaviour]**

Strongly disagree

1 2 3 4

Measure: Adolescent Resilience Questionnaire

- ❖ Your answers to this questionnaire are confidential. YOU DO NOT NEED TO WRITE YOUR NAME.
- ❖ There are no right or wrong answers. We are interested in your experiences.
- ❖ Please be as truthful as you can.
- ❖ Please read each line carefully and circle the number that most closely tells us how often each statement is true for you.

For example, if you like the hot weather *most of the time* you should circle number 2.

	All the time	Most of the time 2	Some of the time	Not often	Never
I like hot weather	1		3	4	5

If you don't like hot weather at all, you should circle 5 (*Never*).

Thank you very much for taking the time to complete this questionnaire.



This questionnaire is about you, your family, friends, school and neighbourhood. The following statements may or may not be true for you. Circle the number closest to **how it is for you**.

About you...

	Almost Never	Not Often	Some times	Most of the time	Almost Always
My life has a sense of purpose	1	2	3	4	5
I worry about the future	1	2	3	4	5
I am easily frustrated with people	1	2	3	4	5
I take it easy on myself when I am not feeling well	1	2	3	4	5
My feelings are out of my control	1	2	3	4	5
I feel good about myself	1	2	3	4	5
If I have a problem I can work it out	1	2	3	4	5
I dwell on the bad things that happen	1	2	3	4	5
I am patient with people who can't do things as well as I can	1	2	3	4	5
I look for what I can learn out of bad things that happen	1	2	3	4	5
I tend to think the worst is going to happen	1	2	3	4	5
I feel helpless when faced with a problem	1	2	3	4	5
I feel hopeful about my life	1	2	3	4	5
When I am feeling down, I take extra special care of myself	1	2	3	4	5
I can express my opinions when I am in a group	1	2	3	4	5
If I can't handle something I find help	1	2	3	4	5
I get frustrated when people make mistakes	1	2	3	4	5
I am confident that I can achieve what I set out to do	1	2	3	4	5
I am a person who can go with the flow	1	2	3	4	5
I can't stop worrying about my problems	1	2	3	4	5
I find it hard to express myself to others	1	2	3	4	5
I feel confident that I can handle whatever comes my way	1	2	3	4	5
I am able to let go of things I can't control	1	2	3	4	5
I have trouble explaining how I am feeling	1	2	3	4	5
I push myself too hard to do what everyone else does	1	2	3	4	5
I can change my feelings by changing the way I see things	1	2	3	4	5
I try to find meaning in the things that happen to me	1	2	3	4	5
I expect people to live up to my standards	1	2	3	4	5
I find it easy talking to people my age	1	2	3	4	5
When things go wrong, I tend to give myself a hard time	1	2	3	4	5
I am a shy person	1	2	3	4	5
I just can't let go of bad feelings	1	2	3	4	5
I can share my personal thoughts with others	1	2	3	4	5
I find it hard to make important decisions	1	2	3	4	5
I think about other people's feelings before I say things	1	2	3	4	5

If I have a problem, I know there is someone I can talk to	1	2	3	4	5
Other people's feelings are easy for me to understand	1	2	3	4	5
If something upsets me it affects how I feel about everything	1	2	3	4	5
I feel confident to do things by myself	1	2	3	4	5
I think things through carefully before making decisions	1	2	3	4	5

About family...

	Almost Never	Not Often	Some times	Most of the time	Almost Always
I do fun things with my family	1	2	3	4	5
I get to spend enough time with my family	1	2	3	4	5
My family understands my needs	1	2	3	4	5
We do things together as a family	1	2	3	4	5
My family listens to me	1	2	3	4	5
People in my family expect too much of me	1	2	3	4	5
There is someone in my family that I feel particularly close to	1	2	3	4	5
I enjoy spending time with my family	1	2	3	4	5
My family helps me to believe in myself and my abilities	1	2	3	4	5
There is someone in my family I can talk to about anything	1	2	3	4	5
If I have a problem there is someone in my family I can talk to	1	2	3	4	5

About friends...

	Almost Never	Not Often	Some times	Most of the time	Almost Always
When I am down I have friends that help cheer me up	1	2	3	4	5
I find it hard making friends	1	2	3	4	5
I have a group of friends that I keep in touch with regularly	1	2	3	4	5
Making new friends is easy	1	2	3	4	5
I feel left out of things	1	2	3	4	5
I have friends who make me laugh	1	2	3	4	5
I am happy with my friendship group	1	2	3	4	5
I find it hard to stay friends with people	1	2	3	4	5
I prefer to do things on my own	1	2	3	4	5
I get to spend enough time with my friends	1	2	3	4	5
I wish I had more friends I felt close to	1	2	3	4	5
I enjoy being around people my age	1	2	3	4	5
I feel shy around people my age	1	2	3	4	5
I have a friend I can trust with my private thoughts and feelings	1	2	3	4	5
I feel confident around people my age	1	2	3	4	5

About school...

	Almost Never	Not Often	Some times	Most of the time	Almost Always
My teachers are caring and supportive of me	1	2	3	4	5
I have a teacher that I feel looks out for me	1	2	3	4	5

I hate going to school	1	2	3	4	5
I try hard in school	1	2	3	4	5
My teachers provide me with extra help if I need it	1	2	3	4	5
I join in class discussions	1	2	3	4	5
There is an adult at school I could talk to if I had a personal problem					
My teachers expect too much of me	1	2	3	4	5
I participate in class	1	2	3	4	5
I enjoy going to school	1	2	3	4	5
I get involved with school activities	1	2	3	4	5
I feel that what I say counts at school	1	2	3	4	5
At school students help to decide and plan things like school activities and events	1	2	3	4	5
I am bored at school	1	2	3	4	5
My teachers notice when I am doing a good job and let me know	1	2	3	4	5
Getting good marks is important to me	1	2	3	4	5

About the area you live in, your neighbourhood or community...

	Almost Never	Not Often	Some times	Most of the time	Almost Always
I trust the people in my neighbourhood	1	2	3	4	5
I like my neighbourhood	1	2	3	4	5
There is an adult in my neighbourhood I could talk to about a problem	1	2	3	4	5
People in my neighbourhood are caring	1	2	3	4	5
The people in my neighbourhood treat other people fairly	1	2	3	4	5
The people in my neighbourhood look out for me	1	2	3	4	5

Finally, some questions about you...

- How old are you? _____
- Are you:

☐ Male
 ☐ Female
- What are you currently doing? (Tick as many as apply)

☐ Attending school
 ☐ Working part time
☐ Attending university/TAFE
 ☐ Working full time
☐ Unemployed
 ☐ Other _____
- Are your parents:

☐ Living together
 ☐ Have never lived together
☐ Separated or divorced
 ☐ Something else _____
☐ One or both my parents have died

5. In your family, are you the:

- | | |
|---------------------------------------|---|
| <input type="checkbox"/> First child | <input type="checkbox"/> Third child |
| <input type="checkbox"/> Second child | <input type="checkbox"/> Fourth child or higher |

6. What level of school did your mother complete?

- | | |
|---|--|
| <input type="checkbox"/> Primary School | <input type="checkbox"/> Technical /TAFE |
| <input type="checkbox"/> Secondary School | <input type="checkbox"/> Apprenticeship |
| <input type="checkbox"/> University | <input type="checkbox"/> Other _____ |

If you don't know, what is or was her job?

Thank you very much!

The Generalized Self-Efficacy Scale (GSE)

English version by Ralf Schwarzer & Matthias Jerusalem, 1995

Circle the Appropriate Number 1 = Not at all true 2 = Hardly true 3 = Moderately true 4 = Exactly true

	Not at all true	Hardly true	Moderately true	Exactly True
1. I can always manage to solve difficult problems if I try hard enough.	1	2	3	4
2. If someone opposes me, I can find the means and ways to get what I want.	1	2	3	4
3. It is easy for me to stick to my aims and accomplish my goals.	1	2	3	4
4. I am confident that I could deal efficiently with unexpected events.	1	2	3	4
5. Thanks to my resourcefulness, I know how to handle unforeseen situations.	1	2	3	4
6. I can solve most problems if I invest the necessary effort.	1	2	3	4
7. I can remain calm when facing difficulties because I can rely on my coping abilities.	1	2	3	4

Measure: The Generalized Self-Efficacy Scale

Measure: Subjective Happiness Scale

SUBJECTIVE HAPPINESS SCALE (also known as General Happiness Scale)

Reference:

Lyubomirsky, S. & Lepper, H. S. (1999). A measure of subjective happiness: Preliminary reliability and construct validation. *Social Indicators Research*, 46, 137-155.

Description of Measure:

A 4-item scale designed to measure subjective happiness. Each of item is completed by choosing one of 7 options that finish a given sentence fragment. The options are different for each of the four questions (see below for actual items).

Abstracts of Selected Related Articles:

Lyubomirsky, S. & Tucker, K. L. (1998). Implications of Individual Differences in Subjective Happiness for Perceiving, Interpreting, and Thinking About Life Events. *Motivation and Emotion*, 22, 155-186.

Both anecdotal and empirical evidence suggest that characteristically happy and daily situations. This paper reports two questionnaire studies and a laboratory study testing the hypothesis that happy people perceive, interpret, and think about the same events in more positive ways than do unhappy ones. The results of Study 1 showed that students nominated by their peers as "very happy" reported experiencing similar types of both positive and negative life events, as did peer-nominated "unhappy" students. However, self-rated happy students tended to think about both types of events more favorably and adaptively—e.g., by seeing humor in adversity and emphasizing recent improvement in their lives. This pattern of results was conceptually replicated in Study 2 using hypothetical events. In Study 3, self-rated happy students interacted with a female confederate in the laboratory, then watched a series of videotapes depicting a fellow (but unfamiliar) student in three different situations. Happy individuals liked the person they met, and recalled her in more favorable terms, more than did unhappy ones. The same pattern of results, albeit weaker, was found for liking of the videotaped target. Implications of our

findings for the question of how happiness (or unhappiness) is maintained are discussed.

Seligman, M. E. P., Steen, T. A., Park, N., & Peterson, C. (2005). Positive psychology progress: Empirical validation of interventions. *American Psychologist*, 60, 410-421.

Positive psychology has flourished in the last 5 years. The authors review recent developments in the field, including books, meetings, courses, and conferences. They also discuss the newly created classification of character strengths and virtues, a positive complement to the various editions of the Diagnostic and Statistical Manual of Mental Disorders (e. g., American Psychiatric Association, 1994), and present some cross-cultural findings that suggest a surprising ubiquity of strengths and virtues. Finally, the authors focus on psychological interventions that increase individual happiness. In a 6-group, random-assignment, placebo-controlled Internet

study, the authors tested 5 purported happiness interventions and 1 plausible control exercise. They found that 3 of the interventions lastingly increased happiness and decreased depressive symptoms. Positive interventions can supplement traditional interventions that relieve suffering and may someday be the practical legacy of positive psychology.

Schwartz, B., Ward, A., Monterosso, J., Lyubomirsky, S., White, K., & Lehman, D. R. (2002). Maximizing versus satisficing: Happiness is a matter of choice. *Journal of Personality and Social Psychology*, 83, 1178-1197.

Can people feel worse off as the options they face increase? The present studies suggest that some people—maximizers—can. Study 1 reported a Maximization Scale, which measures individual differences in desire to maximize. Seven samples revealed negative correlations between maximization and happiness, optimism, self-esteem, and life satisfaction, and positive correlations between maximization and depression, perfectionism, and regret. Study 2 found maximizers less satisfied than nonmaximizers (satisficers) with consumer decisions, and more likely to engage in social comparison. Study 3 found maximizers more adversely affected by upward social comparison. Study 4 found maximizers more sensitive to regret and less satisfied in an ultimatum bargaining game. The interaction between maximizing and choice is discussed in terms of regret, adaptation, and self-blame.

Scale:

Instructions: For each of the following statements and/or questions, please circle the point on the scale that you feel is most appropriate in describing you.

1. In general, I consider myself:

not a very happy person 1 2 3 4 5 6 7 a very happy person

2. Compared to most of my peers, I consider myself:

less happy 1 2 3 4 5 6 7 more happy

3. Some people are generally very happy. They enjoy life regardless of what is going on, getting the most out of everything. To what extent does this characterization describe you?

not at all 1 2 3 4 5 6 7 a great deal

4. Some people are generally not very happy. Although they are not depressed, they never seem as happy as they might be. To what extent does this characterization describe you?

not at all 1 2 3 4 5 6 7 a great deal

Scoring:

Sum the scores for each item together. Keep scores continuous

Measure: Emotion Awareness Questionnaire

The way I feel

Please fill out your first name.....

And your date of birth

And whether you are a boy or a girl.....

On the next pages, you will find 30 short sentences. Every sentence is a statement about how you can feel or think about your feelings. You can mark each sentence if this is true, sometimes true or not true for you. Choose the answer that best fits you. You can only mark one answer. If you find that difficult, choose the answer that fits you most of the time. Different children have different feelings and ideas about their feelings. Therefore, there are no right or wrong answers, because it is just about what you think.

For example the sentence

“When I feel upset, I try to forget about it”

If this statement is true for you, then mark “true”

not true	sometimes true	true
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

If this statement is sometimes true for you, then mark “sometimes true”

not true	sometimes true	true
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

If this statement is not true for you, then mark “not true”

not true	sometimes true	true
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

		not true	sometimes true	true
1	I am often confused or puzzled about what I am feeling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	I find it difficult to explain to a friend how I feel	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Other people don't need to know how I am feeling.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	When I am scared or nervous, I feel something in my tummy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	It is important to know how my friends are feeling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	When I am angry or upset, I try to understand why	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	It is difficult to know whether I feel sad or angry or something else	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	I find it hard to talk to anyone about how I feel	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	When I am upset about something, I often keep it to myself	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	When I feel upset, I can also feel it in my body	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	I don't want to know how my friends are feeling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	My feelings help me to understand what has happened	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	I never know exactly what kind of feeling I am having	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	I can easily explain to a friend how I feel inside	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	When I am angry or upset, I try to hide this	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

		not true	sometimes true	true
16	I don't feel anything in my body when I am scared or nervous	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17	If a friend is upset, I try to understand why	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18	When I have a problem, it helps me when I know how I feel about it	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19	When I am upset, I don't know if I am sad, scared or angry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20	When I am upset, I try not to show it	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21	My body feels different when I am upset about something	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22	I don't care about how my friends are feeling inside	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23	It is important to understand how I am feeling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24	Sometimes, I feel upset and I have no idea why	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25	When I am feeling bad, it is no one else's business	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26	When I am sad, my body feels weak	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27	I usually know how my friends are feeling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28	I always want to know why I feel bad about something	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29	I often don't know why I am angry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30	I don't know when something will upset me or not	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*Please check
that you have marked all of the sentences.*

Thank you!

Measure: BRIEF COPE

BRIEF COPE

The items below are an abbreviated version of the COPE Inventory. We have used it in research with breast cancer patients, with a community sample recovering from Hurricane Andrew, and with other samples as well. The citation for the article reporting the development of the Brief COPE, which includes information about factor structure and internal reliability from the hurricane sample is below. The Brief COPE has also been translated into several other languages, which have been published separately by other researchers (see below).

We created the shorter item set partly because earlier patient samples became impatient at responding to [the full instrument](#) (both because of the length and redundancy of the full instrument and because of the overall time burden of the assessment protocol). In choosing which items to retain for this version (which has only 2 items per scale), we were guided by strong loadings from previous factor analyses, and by item clarity and meaningfulness to the patients in a previous study. In creating the reduced item set, we also "tuned" some of the scales somewhat (largely because some of the original scales had dual focuses) and omitted scales that had not appeared to be important among breast cancer patients. In this way the positive reinterpretation and growth scale became positive reframing (no growth); focus on and venting of emotions became venting (focusing was too tied to the experiencing of the emotion, and we decided it was venting we were really interested in); mental disengagement became self-distraction (with a slight expansion of mentioned means of self-distraction). We also added one scale that was not part of the original inventory--a 2-item measure of self-blame--because this response has been important in some earlier work.

You are welcome to use all scales of the Brief COPE, or to choose selected scales for use. Feel free as well to adapt the language for whatever time scale you are interested in.

Citation: Carver, C. S. (1997). You want to measure coping but your protocol's too long: Consider the Brief COPE. *International Journal of Behavioral Medicine*, 4, 92-100. [\[abstract\]](#)

Following is the BRIEF COPE as we are now administering it, with the instructional orientation for a presurgery interview (the first time the COPE is given in this particular study). Please feel free to adapt the instructions as needed for your application.

Scales are computed as follows (with no reversals of coding):

Self-distraction, items 1 and 19
 Active coping, items 2 and 7
 Denial, items 3 and 8
 Substance use, items 4 and 11
 Use of emotional support, items 5 and 15
 Use of instrumental support, items 10 and 23
 Behavioral disengagement, items 6 and 16
 Venting, items 9 and 21
 Positive reframing, items 12 and 17
 Planning, items 14 and 25
 Humor, items 18 and 28
 Acceptance, items 20 and 24
 Religion, items 22 and 27
 Self-blame, items 13 and 26

I have had many questions about combining scales into "problem focused" and "emotion focused" aggregates, or into an "overall" coping index. I have never done that in my own use of the scales. There is no such thing as an "overall" score on this measure, and I recommend no particular way of generating a dominant coping style for a given person. Please do NOT write to me asking for instructions to for "adaptive" and "maladaptive" composites, because I do not have any such instructions. I generally look at each scale separately to see what its relation is to other variables. An alternative is to create second-order factors from among the scales (see the 1989 article) and using the factors as predictors. If you decide to do that, I recommend that you use your own data to determine the composition of the higher-order factors. Different samples exhibit different patterns of relations.

If you cannot figure out from these instructions how to examine your data, please consult with your own statistical person rather than sending me questions.

If you are interested in a [Spanish version](#) of the Brief COPE.

If you are interested in a [French version](#) of the Brief COPE.

If you are interested in a [German version](#) of the Brief COPE.

If you are interested in a [Greek version](#) of the Brief COPE.

If you are interested in a [Korean version](#) of the Brief COPE.

Brief COPE

These items deal with ways you've been coping with the stress in your life since you found out you were going to have to have this operation. There are many ways to try to deal with problems. These items ask what you've been doing to cope with this one. Obviously, different people deal with things in different ways, but I'm interested in how you've tried to deal with it. Each item says something about a particular way of coping. I want to know to what extent you've been doing what the item says. How much or how frequently. Don't answer on the basis of whether it seems to be working or not—just whether or not you're doing it. Use these response choices. Try to rate each item separately in your mind from the others. Make your answers as true FOR YOU as you can.

- 1 = I haven't been doing this at all
- 2 = I've been doing this a little bit
- 3 = I've been doing this a medium amount
- 4 = I've been doing this a lot

1. I've been turning to work or other activities to take my mind off things.
2. I've been concentrating my efforts on doing something about the situation I'm in.
3. I've been saying to myself "this isn't real."
4. I've been using alcohol or other drugs to make myself feel better.
5. I've been getting emotional support from others.
6. I've been giving up trying to deal with it.
7. I've been acting to try to make the situation better.
8. I've been refusing to believe that it has happened.
9. I've been saying things to let my unpleasant feelings escape.
10. I've been getting help and advice from other people.
11. I've been using alcohol or other drugs to help me get through it.
12. I've been trying to see it in a different light, to make it seem more positive.
13. I've been criticizing myself.
14. I've been trying to come up with a strategy about what to do.
15. I've been getting comfort and understanding from someone.
16. I've been giving up the attempt to cope.
17. I've been looking for something good in what is happening.
18. I've been making jokes about it.

19. I've been doing something to think about it less, such as going to movies, watching TV, reading, daydreaming, sleeping, or shopping.
20. I've been accepting the reality of the fact that it has happened.
21. I've been expressing my negative feelings.
22. I've been trying to find comfort in my religion or spiritual beliefs.
23. I've been trying to get advice or help from other people about what to do.
24. I've been learning to live with it.
25. I've been thinking hard about what steps to take.
26. I've been blaming myself for things that happened.
27. I've been praying or meditating.
28. I've been making fun of the situation.

<http://www.psy.miami.edu/faculty/ccarver/sclBrCOPE.html>

Measure: Interpersonal Support Evaluation

5/25/2016

Untitled Document

ISEL-12

Instructions: This scale is made up of a list of statements each of which may or may not be true about you. For each statement circle "definitely true" if you are sure it is true about you and "probably true" if you think it is true but are not absolutely certain. Similarly, you should circle "definitely false" if you are sure the statement is false and "probably false" if you think it is false but are not absolutely certain.

1. If I wanted to go on a trip for a day (for example, to the country or mountains), I would have a hard time finding someone to go with me.

1. definitely false 2. probably false 3. probably true 4. definitely true

2. I feel that there is no one I can share my most private worries and fears with.

1. definitely false 2. probably false 3. probably true 4. definitely true

3. If I were sick, I could easily find someone to help me with my daily chores.

1. definitely false 2. probably false 3. probably true 4. definitely true

4. There is someone I can turn to for advice about handling problems with my family.

1. definitely false 2. probably false 3. probably true 4. definitely true

5. If I decide one afternoon that I would like to go to a movie that evening, I could easily find someone to go with me.

1. definitely false 2. probably false 3. probably true 4. definitely true

6. When I need suggestions on how to deal with a personal problem, I know someone I can turn to.

1. definitely false 2. probably false 3. probably true 4. definitely true

7. I don't often get invited to do things with others.

1. definitely false 2. probably false 3. probably true 4. definitely true

8. If I had to go out of town for a few weeks, it would be difficult to find someone who would look after my house or apartment (the plants, pets, garden, etc.).

1. definitely false 2. probably false 3. probably true 4. definitely true

9. If I wanted to have lunch with someone, I could easily find someone to join me.

1. definitely false 2. probably false 3. probably true 4. definitely true

10. If I was stranded 10 miles from home, there is someone I could call who could come and get me.

1. definitely false 2. probably false 3. probably true 4. definitely true

11. If a family crisis arose, it would be difficult to find someone who could give me good advice about how to handle it.

1. definitely false 2. probably false 3. probably true 4. definitely true

12. If I needed some help in moving to a new house or apartment, I would have a hard time finding someone to help me.

1. definitely false 2. probably false 3. probably true 4. definitely true

Appendix 4. Potential Post-Study 2 Interview Questions

- 1) What did you like about the application after using it for 30 days?
- 2) What did you dislike about the application after using it for 30 days?
- 3) You logged into the application about X number of times. What was the reason for using the application X number of times?
- 4) What was your favorite module of the application?
- 5) What was your least favorite module of the application?
- 6) Which sub-section of the application did you enjoy the most?
- 7) Which sub-section of the application did you enjoy the least?
- 8) Did the weekly reminder emails have any effect on your application usage?
- 9) What would have increased your application usage?
- 10) What is the most important improvement designers should focus on for the next version of the application?
- 11) Would you recommend this application to other teens

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