

## Suicide Prevention: Reducing Self-Harm in Adolescents using the Smart Phone App “Calm Harm”

Mandy Hubbard

Georgia Southern University, School of Nursing, Statesboro, GA 30460, USA

### ABSTRACT

Physical assessment skills (PAS) are a fundamental skill in caring for patients. Nurses must be able to recognize a change in a patient's condition and timely intervene to prevent negative patient outcomes. Nursing students are taught numerous skills which they often do not get an opportunity to practice while in the clinical setting. Registered nurses indicate new graduate nurses find it difficult to transition from learning physical assessment in nursing school, to deciding what and how to assess patients when they are in the clinical setting.

A quantitative cross-sectional study was conducted at a Nursing School in Georgia, USA. The Barriers for Nurses to use Physical Examination Skills, a validated scale was administered between Spring 2020 and Fall 2021. This scale focuses on reasons why student nurses say they do not practice the skills they have been taught while in nursing school. Eighty-four (n=84) questionnaires were received [1].

Physical assessment skills taught during class but never practiced include testing visual acuity (Snellen) chart.

Results indicated 57% of the students did not feel confident in knowing what physical assessment skills were indicated, and whether they could do it correctly.

### \*Corresponding author

Mandy Hubbard, Georgia Southern University, School of Nursing, Statesboro, GA 30460, USA. E-mail: mhubbard@georgiasouthern.edu

**Received:** May 19, 2022; **Accepted:** June 15, 2022; **Published:** June 20, 2022

### Introduction

Suicide among teenagers is an alarming and growing problem. “According to the Centers for Disease Control and Prevention, 2428 youth aged 12-19 died by suicide in 2015, making it the second leading cause of death with a suicide rate of 7.25 per 100,000” [1]. Because suicide is one of the top causes of death among the adolescent population, suicide prevention education is needed to help adolescents recognize symptoms of depression and what do to if they have feelings of self-harm. Providing an educational program on suicide in the school presents many challenges, but because adolescents feel safe and stable in the school environment, this offers a great opportunity for staff to develop meaningful relationships with students and identify and intervene with students who may be struggling with suicide [2]. The CDC and Surgeon General of the United States have identified reducing suicide as a public health priority. “Stressing the need for public health-based solutions emphasizing prevention, early intervention, and policy, both the 2001 and 2012 National Strategy for Suicide Prevention identified enhancing ‘connectedness’ as one means through which this agenda should be pursued”. The use of connectedness in the school was shown to reduce suicidal behavior and thoughts because adolescents have a sense of belonging, closeness, and satisfaction with the school and/or teachers that reduces the likelihood of suicidal behaviors [3]. By using a school-based suicide prevention program to educate students on suicide and mental health, “students can incorporate awareness activities, curricula, and/or skill building focused on health coping and other known protective factors for suicide, such as building problems-

solving skills and promoting connectedness” [1].

Self-harm has been linked to an increased risk of suicide. There are strong risk factors of suicide in young people who self-harm. Some of these include male gender, family history of suicide, previous self-harm, high suicide intent, mental disorders in general and psychotic disorders in particular [4]. The method of self-harm varies with age and gender and future suicide rates differ depending on the different types of self-harm methods. The more violent the method of self-harm, the higher the risk of suicide. Risk of future suicides have been compared in adolescents who self-harm by cutting and by poisoning. “While lower suicide intent was reported in adolescents who presented at hospitals with cutting compared to those who self-poisoned, those who had cut themselves were twice as likely to subsequently die by suicide compared to those who self-poisoned” [5]. Assessing the risk of self-harm by cutting is imperative to helping reduce suicide among adolescents. An app called “Calm Harm” has been developed to help teens deal with feelings of self-harm. It was developed on the principles of Dialectical Behavioral Therapy, which has been proven to reduce self-harm behavior. The app helps users learn to manage their emotions by teaching impulse control, emotional regulation, and tracking triggers and urges. The 6 categories developed by the inventor uses activities to distract the user. These categories include: 1. comfort, 2. distract, 3. express yourself, 4. release, 5. random, and 6. breathe where the user completes five to 15-minute activities to resist the urge to self-harm.

## Background

Suicide rates in the United States have increased over the last decade. Among adolescents aged 15-24 in the United States, suicide accounted for 6,200 deaths in 2017, making it the second leading cause of death in this age group. According to the 2017 Youth Behavioral Risk Factor Surveillance System, 17.2 percent of high school students seriously contemplated attempting suicide and 7.4 percent attempted suicide. In 2019, the suicide rate of adolescents aged 15-19 in the United States was 10.5 per 100,000 deaths. The rate of teenage suicide deaths in Georgia in 2019 was slightly lower than the national average with a total of 9.5 deaths per 100,000, ranking Georgia as 15th in the nation for teenage suicide.

Georgia is a mostly rural state with access to mental health services being a continuing issue. This study was conducted in a very rural county in south Georgia. Mental health services are often provided by telehealth from the community mental health facilities connected to the schools. The board of education in this rural county consists of five elementary schools, two middle schools, and one high school. The high school has a total of 1,497 students, which is an increase in total student population by 6% over the past five school years. The graduation rate is 87%, ranking it in the top 50% in Georgia. According to the Centers for Disease Control and data collected between 1998-2018, the suicide rate for this county in rural Georgia is 12.04 per 100,000 deaths.

Suicide prevention programs are necessary to provide information to adolescents in the school setting. Because these programs are relatively simple to implement and are cost-effective, it is a good tool to reach many adolescents at one time. Using school-based programs is sparse in the United States but can be used as a common strategy to educate adolescents on suicide. The CDC recommends general considerations when choosing a suicide prevention program but does not recommend one strategy over another. These include (1) ensure that mental health resources in the community are linked as closely as possible with the prevention programs, (2) avoid relying on one specific prevention strategy, (3) when possible, incorporate underused, but promising strategies into the program, (4) try to include young adults in the prevention efforts as this age group is often left out of prevention programs, and (5) integrate evaluation tools on the effectiveness of the program [6]. Suicide prevention programs show a promising impact on adolescents and implementation of a school-based program in the Wayne County School System is necessary to improve student's knowledge of suicide and self-harm.

The Calm Harm application for use on smartphones was developed for teenage mental health by a clinical psychologist using dialectical behavioral therapy techniques. There are six unique activities that help adolescents "ride the wave" to resist the urge to self-harm. The sections use 5 to fifteen-minute activities to distract the user from feelings of self-harm. The comfort section includes activities such as "Can you name five people who have given you warm smiles?" or "Think of a relaxing place and in your mind and run through all the comforting things you do when you are there." The express yourself section includes activities about journaling, writing down feelings, and using art to express feelings. The distraction section uses activities aimed at distracting one's negative thoughts such as saying multiplication tables, counting objects in a room, and naming movies. Physical activities included in the release section include jumping up and down, punching a pillow, and running as fast as you can. The breathe section focuses on breathing techniques to reduce stress and anxiety. The random section allows the app to choose activities from any of the other

5 sections randomly for the 5 to fifteen-minute time frame. This app has been downloaded over 920,000 times and users report a 93% reduction in self-harm behaviors after using the app.

## Literature Review

Nationwide, the suicide rate of adolescents aged 10-19 in the United States has increased by 56% between 2007 and 2016. Adolescents aged 12-19 were shown to have a higher risk of death by suicide than adults. Health risk behaviors (HRB) among teenagers put them at risk for suicide and pose negative effects on health. "The leading causes of mortality among adolescents have been identified as associated with 6 primary categories of HRBs, including unhealthy dietary behaviors, alcohol and other drug use, unsafe sexual behaviors, behaviors contributing to unintentional injuries and violence, tobacco use, and insufficient physical activity" [7]. More research is needed to discover the rates of suicide and self-harm among rural adolescent population, to investigate factors that increase suicide and self-harm risk among this population, and to learn how the use of technology can help reduce the urge to self-harm and improve coping skills.

Previously, the screening of suicidal thoughts in the adolescent population is generally thought to increase the likelihood of suicidal thoughts and behaviors. Therefore, healthcare providers and caregivers are less likely to ask questions related to suicide and self-harm in fear of exposing adolescents to thoughts of suicide. "On the contrary, a meta-analysis concluded that exposure to suicide-related content in a study is associated with a lower likelihood of attempting suicide after participation in the study, as well as a decrease in suicidal ideation" [8]. Presenting information about suicide and self-harm in the school setting with adolescents has improved outcomes for lowering statistics for suicide and self-harm among this population. Healthcare providers see suicide as a "touchy subject" amongst teenagers and will avoid the topic, but research has proven that discussing suicide and self-harm reduces these behaviors in the adolescent population.

Smartphones are a common source of communication among adolescents in the United States. The use of technology presents further opportunities for providers to integrate care in the mental health field, but little research has been done to show how technology can improve mental health among adolescents. Some research has shown that adolescents are willing to engage in technology-based therapies in addition to traditional therapies and are more willing to disclose more sensitive topics to a computer rather than in person. "The use of technology to deliver health services has been shown to provide adolescents with an increased sense of privacy, as well as freedom and safety" [9]. In a study of adolescents who presented to the ED for mental health services, "50% reported they would prefer to receive a technology-based behavioral intervention over an in-person, telephone call, or paper intervention". When smartphone interventions are not used, opportunities to provide mental health services are missed. Most app-based interventions use cognitive behavioral therapy that have been shown to reduce suicide and self-harm related symptoms among adolescents. In a study by, the use of the Crisis Care app was studied in 20 adolescents with a history of suicidal thoughts. The usability, feasibility, and acceptability of this app was tested. Results show that both adolescents and parents alike rate the app as acceptable and user friendly, as well as satisfactory usability in times of crisis [9]. This app is currently being studied further for validity and reliability, but more research is needed for other apps as well.

Mobile applications may improve the effectiveness of interventions among those with suicidal thoughts and self-harm behaviors. In

a systematic review and meta-analysis by, nine web-based and smartphone applications were evaluated for effectiveness on the reduction of self-harm behaviors and suicidal thoughts. In four of the studies in this review, “post-intervention, there was suggestion of a reduction in the proportion of participants self-reporting suicidal ideation in three observational pre/post-test studies”. A significant reduction in scores of suicidal ideations was found in five of these studies at post-intervention. “Overall, this review found evidence that digital interventions may be associated with reductions in suicidal ideation, particularly at the post-intervention assessment” [10]. Therefore, the use of mobile applications in assisting with suicidal ideations and self-harm thoughts and behaviors has been proven to work well with adolescents in reducing negative thoughts and behaviors in conjunction with traditional therapies.

According to the Calm Harm application information website, there is a pilot study that has been completed using the Calm Harm app for 14 adolescents between the ages of 15 and 17. The adolescents were given the Calm Harm app to use in-between weekly meetings with a clinical psychologist and results were evaluated at 2 weeks and again at 4 weeks. The study showed an 84% reduction in self-harm behaviors between appointments and a significant reduction in depressive symptoms. As of April 1, 2019, the Calm Harm app has been downloaded over 920,000 times and 93% of Calm Harm users reported a reduction in the urge to self-harm after completion of activities available on the app (calmharm.co.uk).

Suicide and self-harm among the adolescent population is increasing in the United States today. Research shows that engaging adolescents in a program which focuses on these issues and provides them with guidance during times when these thoughts arise is beneficial and actually lowers their risk. Adolescents utilize technology more today than generations in the past. Therefore, research on smartphone-based applications geared at reducing self-harm and suicide need to take place in order to provide more information on how these technologically based applications can improve patient outcomes.

## Methods

### Participants

The goal of this project was to evaluate the effectiveness of the Calm Harm app on reducing self-harm thoughts and behaviors in adolescents aged fifteen to seventeen. Twenty-five students were chosen to participate in the study and informational packets were sent home for review with the parent for consent for participation. Packets included parental consent form, minor assent form, informational letter, and information on the Calm Harm app. Of the twenty-five students, ten of the students returned signed packets and were eligible for participation. Recruitment participants were students from a rural county in south Georgia. Inclusion criteria consisted of adolescents aged fifteen to seventeen with a past history of self-harm thoughts or behaviors. Participants must also possess a smartphone for download and usage of the Calm Harm app. Participants were recruited using a recruitment flier with information on suicide and self-harm behaviors and were asked to participate in the study. Parental consent was obtained by the student and returned to the researcher along with minor assent. The participant then met with the researcher for a pre-study questionnaire that included questions about past self-harm thoughts and behaviors and actions that met criteria for self-harm behaviors for the study. Questions such as “In the past 4 weeks, how often did you have thoughts of harming yourself?” were used to assess potential usefulness of the app and qualification for the

study. Once the questionnaire was completed, the participant was educated on the Calm Harm app and its usage and was given the opportunity to use the app for four weeks. After four weeks, the participant met with the researcher and was given a post-study questionnaire that included the same questions as the pre-study questionnaire along with three questions that pertained to the Calm Harm app usage and if the app improved or worsened self-harm thoughts or behaviors.

### Instruments

The pre- and post- study questionnaires were designed using questions from the Youth Risk Behavior Survey conducted by the CDC and from the Alexian Brothers Urge to Self-Injure Scale (ABUSI). Questions were used to assess thoughts about suicide and self-injuring behaviors within the four weeks prior to the pre-test questionnaire and during the four weeks while using the Calm Harm app using the post-study questionnaire. Students responses were identified by a unique four-digit code that was given on the pre- and post-study questionnaires allowing the researcher to pair pre- and post-study questionnaires for each student. Questions for the pre-test questionnaire included questions pertaining to thoughts and behaviors in the past four weeks

1. How often have you thought about injuring yourself or about how you want to injury yourself?
2. At the most severe point, how strong was your urge to self-injure in the last 4 weeks?
3. How much time have you spent thinking about injuring yourself or about how you want to injure yourself?
4. How difficult was it to resist injuring yourself the past 4 weeks?
5. Keeping in mind your responses to the previous questions, please rate your overall average urge or desire to injure yourself in the past 4 weeks.
6. During the past 4 weeks, did you ever feel so sad or hopeless almost every day for two weeks or more in a row that you stopped doing some usual activities?
7. During the past 4 weeks, did you every seriously consider attempting suicide?
8. During the past 4 weeks, did you make a plan about how you would attempt suicide?
9. During the past 4 weeks, how many times did you actually attempt suicide?
10. If you attempted suicide during the past 4 weeks, did any attempts results in an injury, poisoning, or overdose that had to be treated by a doctor or nurse?  
Question responses were measured on a Likert-scale or yes/no choices for both the pre- and post-study questionnaires. The post-study questionnaire included the same questions listed above and three additional questions relating to the Calm Harm App.
11. Did you use the Calm Harm app within the past 4 weeks?
12. If you used the Calm Harm app within the past 4 weeks, how many times did you use the app?
13. If you used the Calm Harm app within the past 4 weeks, do you feel it helped reduce the thoughts of self-harm?

### Data analysis

Self-harm thoughts and behaviors were discussed with participants to distinguish what behaviors met criteria for self-harm behaviors before the study was conducted. Participant data from the pre- and post-tests were gathered during the study. A total of ten adolescents met criteria for participation and returned consent forms. The pre- and post-study questionnaires were completed and compared using descriptive percentages and chi square test to determine if

use of the Calm Harm app improved, worsened, or had no effect on self-harm behaviors while using the app. Two participants did not use the app and were excluded from the study.

Data was collected from eight adolescents aged fifteen to seventeen with a history of self-harm thoughts and behaviors. Two participants were male and six were female. There were three adolescents that were 15 years old, two that were 16 years old, and three that were 17 years old. Caucasian participants accounted for six of the eight adolescents, one participant was African American, and one was biracial.

## Results

### Question 1

The first question inquired about how often the adolescent wanted to injure themselves. The choices were never (0), rarely (1), occasionally (2), sometimes (3), often (4), most of the time (5), and nearly all of the time (6). Forty percent of the participants reported never thinking about injuring themselves during the four weeks prior to the study compared to 50% post-study. Two adolescents reported rarely having thoughts of self-injurious behavior prior to the study versus three adolescents' post-study. Three participants report occasionally having thoughts of self-injurious behavior and one reports having these thoughts sometimes in the pre-study questionnaire compared to one participant for both categories in the post-study questionnaires. Of the eight participants, 20% showed an improvement in having thoughts of self-harm behavior while the other 80% showed no change in self-harm thoughts.

### Question 2

The urge to self-injure was measured in question two using the values of none (0), slight (1), mild urge (2), moderate urge (3), strong urge/easily controlled (4), strong urge/difficult to control (5), and strong urge/would have self-injured if able to (6). Of the eight participants, two reported no urge, two reported a slight urge, one reported a mild urge, one reported a strong urge but easily controlled and two reported a strong urge but difficult to control on the pre-study questionnaire. The post-study results showed four participants with no urge to self-injure and one in each category of slight urge, mild urge, moderate urge, and strong urge in the post-study questionnaire, showing that one-fourth of the participants showed an improvement in behaviors.

### Question 3

Question three discussed the time spent thinking about injuring oneself using the values none (0), less than 20 minutes (1), 21-45 minutes (2), 46-90 minutes (3), 91 minutes to 3 hours (4), 3-6 hours (5), and more than 6 hours (6). Twenty-five percent of participants reported spending no time thinking about injuring themselves in the pre-study questionnaire versus 37.5% in the post-study questionnaire. In the pre-study questionnaire, two participants reported spending less than 20 minutes or 21-45 minutes thinking about self-injuring, three participants reported spending less than 20 minutes on the thought, and three participants reported spending 46-90 minutes on thoughts of self-harm. Results show that 75% of participants showed a reduction of time spent thinking about self-harm in the post-study questionnaire.

### Question 4

The difficulty of resisting self-injuring was assessed in question 4. The scale used was not difficult at all (0), very mildly difficult (1), mildly difficult (2), moderately difficult (3), very difficult (4), extremely difficult (5), and was not able to resist (6). Pre-study results showed that 37.5% of participants had no difficulty resisting

the urge to self-injure versus 62.5% post-study. Two participants showed a very mild difficulty in both the pre- and post-study questionnaires and one participant showed a mild difficulty in both questionnaires as well. A moderate difficulty to self-injure was shown in 25% of participants in the pre-study questionnaire versus 12.5% post-study.

### Question 5

Question five helped rate the overall average urge or desire to self-injure using the scale of never (0), rarely (1), occasionally (2), sometimes (3), often (4), most of the time (5), and nearly all of the time (6). Two participants reported never having the urge to self-harm in the pre-study questionnaire compared to 3 participants in the post-study. The pre-study results of rarely having the urge to self-injure applied to 25% of participants versus 37.5% post-study. Three participants in the pre-study questionnaire reported occasionally having the overall desire to self-harm versus one participant post-study and one participant reported sometimes having the urge to self-injure versus one participant post-study. Overall there was a 37.5% reduction in feelings of desire to self-injure.

### Questions 6

Feelings of hopelessness and sadness were assessed in question six using a yes (1) or no (2) scale. Six participants reported feeling hopeless and worthless in the pre-study results compared to four participants in the post-study results. Two participants reported not having feelings of worthlessness in the pre-study results versus four participants in the post-study results. Thirty-seven percent of participants show a reduction of feelings of hopeless and sadness post-study.

### Questions 7 & 8

Questions seven and eight inquired about seriously considering suicide and having a plan to commit suicide using a yes (1) or no (2) scale. Two participants reported having thoughts of seriously considering suicide in the pre-study questionnaire versus all eight participants reporting no serious consideration of attempting suicide in the post-study results, showing a 100% reduction of suicidal consideration in those who had thoughts of suicide pre-study. All eight participants reported not having a plan to commit suicide in question eight in both the pre-and post-study.

### Question 9

Assessment of frequency of suicide attempts was investigated in question nine using a scale of 0 times (0), 1 time (1), 2-3 times (2), 4-5 times (3), and 6 or more times (4). All eight participants reported attempting suicide 0 times in both the pre- and post-study questionnaire.

### Question 10

Question ten asked about seeking treatment from a doctor or nurse if an overdose, injury, or poisoning occurred in the past four weeks using a scale of yes (1), no (2), or no suicide attempts (3) in the past four weeks. All eight participants reported that they did not have any suicide attempts in both the pre- and post-study questionnaire.

Questions eleven through thirteen were only included in the post-study questionnaire and asked about usage of the Calm Harm app. After using the app for four weeks, the post-study questionnaire was given to the participants and results were analyzed to include the same questions that were used on the pre-study questionnaire along with these three questions.

### Questions 11-13

Question eleven asked if the participant used the Calm Harm app over the four weeks allotted during the study using a yes (1) or no (2) scale. Eight participants reported that they used the app. Question twelve discussed how many times the participant used the app using the scale of 1-2 times (1), 3-5 times (2), 6-8 times (3), 8-10 times (4), and more than 10 times (5). One participant used the app one to two times, two participants used the app three to five times, two participants used the app six to eight times, and three participants used the app more than ten times. Of the eight participants, two reported having a strong urge to self-injure with difficulty controlling these feelings in question 2 of the questionnaire. One participant used the app 6-8 times during the study, and one utilized the app more than 10 times. Both participants showed a reduction in the urge to self-injure after using the app, showing an improvement in strong thoughts to self-injure. Question thirteen asked if the participant felt that the app helped reduce thoughts of self-harm using a yes (1) or no (2) scale. Of the eight participants, seven stated that the app was helpful and one did not feel the app was useful. This showed a  $p$  value of 0.045 showing statistically significant results.

Test Statistics			
	Question 11	Question 12	Question 13
Chi-Square	3.600 <sup>a</sup>	1.000 <sup>b</sup>	6.200 <sup>c</sup>
df	1	4	2
Asymp.Sig.	.058	.910	.045

### Discussion

The use of the Calm Harm app in adolescents with a history of self-harm thoughts and behaviors showed a change to healthier behaviors in post-study results. The post-study question of “Do you feel the Calm Harm app helped reduce thoughts of self-harm?” showed that usage of the app by adolescents helped reduce thoughts and behaviors of self-harm according to 87.5% of the participants. Downloading the app and using it during times of negative thoughts was useful for adolescents experiencing feelings of self-harm. However, many limitations should be considered. Small sample size was limited to eight participants. The participants were only given four weeks to use the app, limiting the full benefits of using all categories of the app. Due to the COVID-19 pandemic, the researcher was also only given a short time period to spend with adolescents to discuss the study and the app. The atmosphere of the school was also altered due to the pandemic, which may cause alterations in behaviors and results.

The COVID-19 pandemic has affected the mental health of millions of Americans. More importantly the rates of depression and suicide have increased during the period of the pandemic. The Centers for Disease Control released a survey looking at findings from June 24-30, 2020. “The CDC survey found that, 40.9% of 5470 respondents reported an adverse mental or behavioral health condition, including symptoms of anxiety disorder or depressive disorder, trauma-related symptoms, new or increased substance use, or thoughts of suicide” [11]. The study also concluded that the rates of suicidal ideation increased during the pandemic showing “approximately twice as many respondents reported serious consideration of suicide in the previous 30 days than did adults in the United States in 2018” [12].

Adolescents in particular have shown a decline in mental health status during the pandemic. This population thrives on social interaction, extracurricular activities, and classroom education to

have a healthy mental status. Unfortunately, the closure of schools and colleges nationwide have negatively impacted over 91% of the world’s student population [13]. Adolescents are a vulnerable population and are having a difficult time adjusting to life during lockdown. “The COVID 19 outbreak and lockdown may have multiple consequences on the lives of adolescents: chronic and acute stress, worry for their families, unexpected bereavements, sudden school break, and home confinement in many countries, increased time of access to the internet and social media, and worry for the economic future of their family and country”. Time away from school routine has also led to alterations in normal sleep schedules, increased screen time, less physical activity, and less nutritious diets. Isolation due to the pandemic has caused negative repercussions on psychiatric disorders that have an onset during adolescence. Because of this new period of insecurity, adolescents worry about the health of themselves and relatives, separation from their peers suddenly, disruption of school schedule, and the pervasive issues of death, leading to increasing rates of mental health disorders in the adolescent population [14].

Studies have been conducted to measure how the pandemic has affected adolescent mental health. In a study of 8079 Chinese adolescents aged 12-18, “Zhou et al. reported a high prevalence of symptoms of depression (43%), anxiety (37%) and combined depression and anxiety (31%) during the COVID-19 outbreak”. Post-traumatic stress disorder has also increased during the pandemic among adolescents. Studies during pandemics, such as the H1N1 and SARS-CoV viruses “reported PTSD in 30% of children exposed to quarantine measures”, where girls are twice as likely to suffer from PTSD than their male counterparts. In a study by, Chinese undergraduate students showed having a relative or acquaintance with COVID-19 increased their risk for anxiety [15].

Access to mental health care for adolescents during the pandemic has also been a challenge. Children and adolescents receive mental health services at school, such as counseling and telehealth services for therapy or medications. Due to school closures, children and adolescents have had lack of access to these services that impact their mental health. Among 2111 participants with mental illness in the UK, 83% of participants reported a worsening of mental health symptoms during the pandemic. “26% said they were unable to access mental health support; peer support groups and face-to-face services have been cancelled, and support by phone or online can be challenging for some people”. Not receiving appropriate treatment for their mental illness leads to relapses, worsening of symptoms, and increases in stress associated with symptoms [13].

The act of remaining connected during the pandemic has been a challenge for adolescents. Cancelled classes and academic events, as well as extracurricular activities have increased anxiety for American youth. There is much controversy about complete closures of schools and colleges for a prolonged period of time. Being that only 2-4% of COVID-19 related deaths can be prevented using complete school shutdowns, other social distancing measures should be considered for adolescents to help students remain connected during the pandemic [16]. Remaining connected during the pandemic can have long-term protective factors for adolescents. In a study by, “school connectedness in adolescence had independent associations in adulthood, reducing emotional distress and odds of suicidal ideation, physical violence victimization and perpetration, multiple sex partners, STI diagnosis, prescription drug misuse, and other illicit drug use” (p.1). The article goes on to say that there is a 48% to 66% lower chance of health risk behaviors and experiences in adulthood

when high levels of both family and school connectedness are present [16].

The COVID-19 pandemic has been termed the “pandemic of loneliness,” showing an increase in loneliness among young people aged 16-25 and seniors over the age of 70. Increased time of loneliness during the quarantine has increased anxiety, feelings of helplessness, and increased social isolation. To help with tackling loneliness during the pandemic, “digital technology has become vital for addressing loneliness during the pandemic because other means of addressing loneliness have become difficult if not impossible to access during the lockdowns” [15]. Feelings of loneliness during the pandemic have increased feelings of depression and anxiety, especially among teenagers who no longer have face-to-face peer interactions. Mobile applications have been designed to help reduce anxiety and depression and these applications can be extremely beneficial to reducing feelings of depression and anxiety associated with loneliness in adolescents, therefore improving mental health. The Flowy app was developed to reduce anxiety by providing a game to users to help deliver breathing retraining exercises for anxiety, panic and hyperventilation management. “Intent-to-treat analysis revealed a reduction in anxiety, panic, and self-report hyperventilation scores in trial arm, compared to the control condition”. Another app, The AIMhi Stay Strong app was developed to reduce mental illness and stress among Aboriginal and Torres Strait Islander community residents. This app was shown to reduce suicidal thoughts and behaviors among users of the app [18]. Use of technology in the adolescent population has shown much promise in improving mental health and reducing symptoms.

Adolescents in the Calm Harm app study reported that the app helped with thoughts of self-harm and reduced the urge to self-harm. Having this app during the pandemic possibly had protective qualities for these participants to help deter self-harm thoughts therefore leading to a lesser risk of suicide.

### Conclusion and Implications for Practice

Adolescents are in a vulnerable stage of development leading to alterations of feelings. Suicide is one of the top leading causes of death in adolescents in the United States. Self-harm thoughts and behaviors can be influenced by environmental and psychological factors which may put the adolescent at risk for suicide. Because of the risk factors associated with self-harm in adolescents, more education is needed to inform teenagers about suicide and self-harm and how the Calm Harm app may help reduce negative feelings associated with self-harm. Adolescents use technology frequently. This study shows that introducing the Calm Harm app to adolescents with a history of self-harm can help reduce negative outcomes of these behaviors. More importantly, twenty-five percent of the participants reported having a strong urge to self-injure with difficulty controlling these thoughts pre-study, used the app more than six times during the study, and had a reduction or complete eradication of self-injurious thoughts post-study.

Nurses and other providers that interact with adolescents frequently are at an advantage to improve the mental health of the adolescent population. Because this study shows an improvement in reducing self-harm behaviors among adolescents by using the Calm Harm app, healthcare providers and counselors can introduce adolescents to the Calm Harm app, for use during times of distress. Studies show that teenagers utilize mobile devices frequently and most prefer to use mobile apps for mental health treatment.

By introducing youth to the Calm Harm app, along with regular therapy and provider visits, self-harm thoughts and behaviors can be reduced among the adolescent population [19-24].

### References

1. Singer JB, Erbacher TA, Rosen P (2018) School-based suicide prevention: A framework for evidence-based practice. *School Mental Health*. Published online January 11: 54-71.
2. Johnson LA, Parsons ME (2012) Adolescent suicide prevention in a school setting: Use of a gatekeeper program. *NASN School Nurse* 27: 312-317.
3. Whitlock J, Wyman PA, Moore SR (2014) Connectedness and suicide prevention in adolescents: Pathways and implications. *Suicide and Life-Threatening Behavior* 44: 246-272
4. Beckman K, Mittendorfer-Rutz E, Lichtenstein P, Larsson H, Almqvist C, et al. (2016) Mental illness and suicide after self-harm among young adults: Long-term follow-up of self-harm patients, admitted to hospital care, in a national cohort. *Psychological Medicine* 46: 3397-3405.
5. Beckman K, Mittendorfer-Rutz E, Waern G, Larsson H, Runeson B, et al. (2018) Methods of self-harm in adolescents and young adults and risk of subsequent suicide. *Journal of Child Psychology and Psychiatry* 59: 948-956.
6. O Carroll PW, Potter LB, Mercy JA (1994) Programs for the prevention of suicide among dolescents and young adults. *MMWR Recommendations and Reports* 43: 1-7.
7. Xiao Y, Lu W (2019) Cumulative health risk behaviors and adolescent suicide: The moderating role of future orientation. *American Journal of Health Behavior* 43: 1086-1102.
8. Heinz A, Catunda C, Van Duin C, Willems H (2019) Suicide prevention: Using the number of health complaints as an indirect alternative for screening suicidal adolescents. *Journal of Affective Disorders* 260: 61-66.
9. O Brien KH, LeCloux M, Ross A, Cirona C, Wharff EA (2017) A pilot study of the acceptability and usability of a smartphone application intervention for suicidal adolescents and their parents. *Archives of Suicide Research* 21: 254-264.
10. Witt K, Spittal MJ, Carter G, Pirkis J, Hetrick S, et al. (2017) Effectiveness of online and mobile telephone applications (“apps”) for the self-management of suicidal ideation and self-harm: A systematic review. *BMC Psychiatry* 17: 297-315.
11. Pies RW (2020) Is the country experiencing a mental health pandemic? *Psychiatric Times* 37: 20-25.
12. Czeisler ME, Lane RI, Petrosky E, Wiley JF, Christensen A, et al. (2020) Mental health, substance use, and suicidal ideation during the COVID-19 pandemic-United States, June 24-30, 2020. *Morbidity and Mortality Weekly Report* 69: 1049-1057.
13. Lee J (2020) Mental health effects of school closures during COVID-19. *Lancet* 395: 912-920.
14. Guessoum SB, Lachal J, Radjack R, Carretier E, Minassian S, et al. (2020) Adolescent psychiatric disorders during the COVID-19 pandemic and lockdown. *Psychiatry Research* 291: 113264.
15. Cao W, Fang Z, Hou G, Han M, Xu X, et al. (2020) The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatry Research* 287: 112934
16. Steiner RJ, Sheremenko G, Lesesne C, Dittus PJ, Sieving RE, et al. (2019) Adolescent connectedness and adult health outcomes. *Pediatrics* 144: e20183766.
17. Shah SG, Noguera D, Woerden HC, Kiparoglou V (2020) The COVID-19 pandemic: A pandemic of lockdown loneliness and the role of digital technology. *JMR Publications* 22: e22287.

18. Wang K, Varma DS, Prospero M (2018) A systematic review of the effectiveness of mobile apps for monitoring and management of mental health symptoms or disorders. *Journal of Psychiatric Research* 107: 73-78.
19. Aseltine RH, James A, Schilling EA, Glanovsky J (2007) Evaluating the SOS suicide prevention program: A replication and extension. *BioMed Central Public Health* 7: 161-168.
20. Schilling EA, Aseltine RH, James A (2016) The SOS suicide prevention program: Further evidence of efficacy and effectiveness. *Prevention Science: The Official Journal of the Society for Prevention Research*, 17: 157-166.
21. Singh S, Roy D, Sinha K, Parveen G, Joshi G et al. (2020) Impact of COVID-19 and lockdown on mental health of children and adolescents: A narrative review of recommendations. *Psychiatry research* 293: 113429.
22. <https://americashealthrankings.org>
23. <https://calmharm.co.uk>
24. <https://www.cdc.gov>

**Copyright:** ©2022 Mandy Hubbard. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.