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Understanding adoption and use of digital mental health applications "apps" among college students and relation to mental health variables

THESIS

submitted in partial satisfaction of the requirements for the degree of

MASTER OF ARTS

in Social Ecology

by

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DEDICATION

To the community that stands behind me.

To my family and friends for their encouragement and love.

Especially to my parents for opening up doors of opportunities

and providing me with an education I will treasure forever.

"He who does not know how to look back at where he came from will never get to his destination."

(Jose Rizal)

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ABSTRACT OF THE THESIS

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Professor Stephen M. Schueller, Chair

Increasing rates of mental health diagnoses in college students signal the need for new opportunities to support the mental health of this population. With many mental health apps being efficacious, they may be a promising resource for college campuses to provide to their students. However, it is important to understand barriers to app adoption, hesitation, and desired features, which may inform decision making on which apps to provide as resources and how campuses can better support their use. This study aimed to understand interest and hesitation in app use, further exploring why college students may choose to use an app or not, as well as the relationship between depression, anxiety, positive mental health and app use. Using the web-based *Healthy Minds Study*, data were collected across colleges and universities and analyzed using a mixed-methods approach. Results from this study reveal that anxiety was the only significant predictor for app adoption (b = -.07, $p < .001$). Both depression (b =.03, p =.12) and positive mental health (b = -.02 , p = .17) were not significant in predicting app adoption. Findings from this study also underscore that simply providing digital mental health apps as tools may be insufficient in supporting their use in college campuses. Though many students were

open to using a mental health app, hesitation and uncertainty were common in participant responses. Working with colleges and universities to increase digital literacy and provide resources that allow students to gauge when app use is appropriate may be helpful when implementing mental health apps as resources in college campuses.

Introduction

Mental health disorders have been increasing steadily in recent years, especially among specific populations – including college students. From 2007 to 2017, rates of lifetime diagnoses of mental health disorders increased from 22% to 36% among college students (Lipson et al., 2019). College students face unique stressors including academic achievement, navigating new social environments, and financial concerns (Jones et al., 2018). For example, students may experience pressure to perform well in classes while balancing demanding work schedules necessary to pay for expenses including tuition and course materials. College campuses are equipped with unique resources and can serve as a hub for students to receive mental health services. In comparison to other health services offered on college campuses, mental health services have the highest number of visits per patient, indicating recurring service utilization and high demand for these services (Turner & Keller, 2015). With depression and anxiety being among the most prevalent mental disorders in this group (Pedrelli et al., 2015), a better understanding of college student's knowledge and use of existing mental health tools may provide insight on how these tools affect their mental health outcomes. This paper aims to explore perceptions and adoption of digital mental health apps in college students and how these apps are used and perceived.

College campuses may not be equipped with resources that meet the demand and diverse needs and desires of their students. In light of this, college campuses may need to explore new opportunities to support college student mental health. Although most campuses offer mental health services, college students with a history of mental health issues cite dissatisfaction with existing services as a prevalent barrier to help-seeking (Fullmer et al., 2021). Exploring additional tools that college students may be receptive to, such as digital mental health apps, may

allow students to explore non-traditional options and increase accessibility to mental health help. This is especially timely as during the pandemic although college students were reporting considerable and increasing mental health concerns, college counseling center directors were reporting a reduced demand for their services. A 2020 survey found that 58.3% of college counseling center directors reported a decreased demand for their services, likely due to the pandemic (Gorman et al., 2020). However, data from the Fall 2020 *Healthy Minds Study* suggested that 83% of students reported a negative impact of mental health on their academic performance (Healthy Minds Network, 2020). This signals a decrease in service utilization while mental health concerns were actually increasing among college students. Evaluating mental health resources may help college counseling centers implement effective tools. Smartphones play a key role in the lives of college students. Smartphones influence college students' perceptions of support and provide a medium to connect them with their existing social systems (Lapierre & Zhao, 2021). In addition, smartphones provide an avenue for delivering mental health support. Increased smartphone use has previously been linked to decreases in depression, anxiety, and stress (Kil et al., 2021). More specifically, digital mental health may be a promising avenue to explore smartphone use. Digital mental health is broadly defined as any form of technology used for mental health assessment, support, prevention, and/or treatment (Wies et al., 2021). Digital mental health apps in particular are often widely available to college students as many campuses offer them as resources (Lattie et al., 2020). Also, Lattie et al. (2019) call for the integration of campus environments and resources that exist in the digital lives of students, which requires a further understanding of how college students use digital mental health apps and what attitudes are around them.

Digital mental health apps are both efficacious and well-received among college students. A systematic review of mental health apps for college student mental health found that a majority of apps evaluated were either effective or partially effective in alleviating symptoms of depression and anxiety or enhancing overall psychological wellbeing (Lattie et al., 2019). Despite their overall findings of effectiveness, several open questions follow from this review. First, the reviews found moderate to severe biases in favor of digital mental health apps. Second, the review only looked at the overall evidence for or against mental health apps for college students but not the features or components that were most useful to them. In light of this, more research is necessary to understand more specifically what college students may like or dislike in digital mental health apps.

Despite the potential that digital mental health apps have to address the mental health needs of college students these apps face challenges in college communities with issues arising around accessibility, ethics, privacy, accountability, and duty of care (Lattie et al., 2019; Melcher et al., 2020; Melcher & Torous, 2020). Furthermore, one study shows that, despite 53% of students downloading a digital mental health app at one point, only 19% were currently using a digital mental health app (Melcher et al., 2020). This signals a clear interest in using and downloading the apps, but a decrease in actual use. Additionally, most digital mental health interventions show low rates of adherence in college students, signaling a lack of sustained app use (Becker & Torous, 2019).

The present study seeks to bridge the gap between interest in apps and app use, further exploring why college students may choose to use an app or not. Specifically, we explore college students' existing attitudes towards mental health apps and the relationship between depression, anxiety, positive mental health and app use. We hypothesized that we would see both positive

and negative themes and that apps will be generally well received, but will continue to encounter some hesitancy. We also hypothesized that depression and anxiety will have a significant association with mental health app adoption and frequency of app use. Few studies have looked at the association between positive mental health and app use, though we hypothesize that positive mental health will not be a significant predictor.

Methods

This study used data from the *Healthy Minds Study,* an annual web-based survey distributed to colleges and universities across the United States. The *Healthy Minds Study* addresses various topics related to college student mental health, campus climate, help-seeking, service use, and overall student experience (Healthy Minds Network, 2020). The survey is structured in two parts, standard modules and elective modules. Each college and university is required to administer the standard modules to their participants, consisting of basic demographic information (age, gender, race/ethnicity, socioeconomic status, etc), academic information, school experiences, mental health status, and mental health service utilization/help-seeking. They may also select elective modules for participants to complete. Elective modules cover topics such as substance use, sleep, eating and body image, sexual assault, overall health, and financial stress. Our analysis focuses on data collected from 2018 to 2020 after an "Attitudes About Mobile Resources" elective module was introduced.

Participants

Participants consisted of college students who completed the *Healthy Minds Study* survey from 2018 to 2020. Overall, the dataset consisted of 151,211 participants: 62,029 participants from 78 colleges and universities during the 2018-2019 academic year, and 89,182 participants from 75 colleges and universities during the 2019-2020 academic year. The 2018-2019 survey

had a 16% participation rate, while in the 2019-2020 academic year the participation rate was 13% in the Fall and 16% in the Winter. The 2018-2019 survey did not differentiate between Fall and Winter survey participation rates. Only a subset of participants completed our module of interest, "Attitudes About Mobile Resources." In the 2018-2019 academic year, 400 participants completed the module while 589 participants completed the module in the 2019-2020 academic year, resulting in a total of 989 participants.

From the standard module, we used three measures to identify the mental health status of participants. Depression was measured using the Patient Health Questionnaire (PHQ-9), anxiety was measured with the Generalized Anxiety Disorder Scale (GAD-7), and positive mental health is measured using the Diener & Diener Flourishing Scale.

The PHQ-9 is a 9-item scale consisting of depressive symptoms where participants report presence of each symptom over the past two weeks (Kroenke et al., 2001). These scores ranged from not at all (0) to nearly every day (3). PHQ-9 total scores range from 0 to 27 with a PHQ-9 > 9 indicative of clinically-elevated levels of depressive symptoms (Kroenke et al., 2001). Psychometric properties of the PHQ-9 have been evaluated specifically in college students demonstrating its reliability and validity in even in diverse college student populations (Keum et al., 2018).

The GAD-7 contains 7 items measuring generalized anxiety (Spitzer et al., 2006). This scale allows respondents to report prevalence of symptoms from the past two weeks, with scores ranging from not at all (0) to nearly every day (3). Overall GAD-7 scores range from 0 to 21 (Spitzer et al., 2006). A GAD-7 of > 9 indicates clinically elevated levels of anxiety symptoms (Spitzer et al., 2006). Prior analyses of the GAD-7 suggested that it has strong reliability and validity when used as a screener for college students (Byrd-Bredbenner et al., 2020).

The Flourishing Scale measures self-perceived success in various important areas in a participant's life (Diener et al., 2010). This is an 8-item scale where participants indicate their agreement with each statement from strongly disagree (1) to strongly agree (7) (Diener et al., 2010). Higher overall scores for the Flourishing Scale indicate greater psychological resources, with scores ranging from 8 to 56 (Diener et al., 2010). The Flourishing Scale has demonstrated high reliability in measuring well-being amongst university students (Howell & Buro, 2015).

The "Attitudes About Mobile Resources" elective module included the following questions:

1. "Would you be open to using an app for wellness or mental/emotional health?" (Yes; maybe; no) "Have you ever used a smartphone app to manage your wellness or mental/emotional health?" (No, never; yes)
2. "When did you use a smartphone app to manage your wellness or mental/emotional health?" (Before starting college; since starting college; I currently use an app)
3. "What are the reasons why you have not used a mental health app?" (I have concerns about privacy and security of data; there is lack of research support available; I'm unsure about how useful the app will be; I have concerns about cost; apps seem difficult to use; I don't know if I could find a suitable app; I don't know which app to download; I don't have time to use apps; I'm not interested in using mental health apps; I don't think I need these kinds of apps; Other)
4. "Now imagine you are trying to decide which wellness or mental/emotional health app to use. How important would each of the following features be in your decision? (The app has research supporting it's benefits; the app is well designed and easy to use; the app has information about data privacy and storage policies; the app has reviews from users; the

app has reviews from experts in the field; the app developer; the cost of the app; the time commitment required by the app seems manageable to me; Something else)" (Not at all important; slightly important; moderately important; important; very important)

5. "How helpful, overall, do you think the smartphone app(s) was or has been for your mental or emotional health?" (Very helpful; helpful; somewhat helpful; not helpful)
6. "What would you hope to get out of an app for wellness or mental/emotional health?"
7. "Why would you not use a mental health app?"

Data Analysis

This study employed a mixed-methods approach, drawing from both qualitative and quantitative methods. Quantitative methods included both descriptive and inferential statistics to assess the multiple variables that may affect adoption of an app. Qualitative methods included thematic analyses between two coders. Each of the coders separately identified emergent themes, then discussed findings. Qualitative methods are used to expand on findings and understand quantitative responses. The qualitative coding process was necessary to identify where hesitancy stemmed from and what general attitudes and app use look like.

Quantitative Methods

We aimed to understand the relationship between mental health (depression, anxiety, and flourishing) and mental health app use (adoption and frequency). To do so, we conducted a binary logistic regression with mental health status predicting adoption while controlling for demographic variables including race/ethnicity, gender, age, and socioeconomic status. Independent binary logistic regressions were conducted for each mental health status variable (depression, anxiety, and flourishing). Logistic regression was used to examine the relationship between mental health and frequency of app use. To determine if clinical levels of mental health

symptoms related to app use chi-squared difference tests were conducted with clinical thresholds identified by the PHQ-9 and GAD-7 (>9 for both measures). As we were simultaneously conducting statistical tests for separate mental health variables, a bonferroni correction was employed to adjust the alpha level and address multiple comparisons. This adjusted alpha level was .017.

Raw percentages were also calculated for students that have ever used a mental health app, students that would and would not be open to using a mental health app, hesitation in app use, and time that students initiated app use.

Qualitative Methods

A thematic analysis was conducted on the open text responses in the elective module. We used open coding to identify themes in attitudes towards mental health apps and app use for two questions:

1. What would you hope to get out of an app for wellness or mental/emotional health?
2. Why would you not use a mental health app?

Our qualitative sample sizes varied as not all students answered the open-text questions. For our first question, we had a total of 541 responses. Our second question had a total of 131 responses.

We constructed a codebook to identify these themes. Question 1 had a total of 38 codes while question 2 had a total of 12 codes. The codebook was created by doing an initial analysis of the responses from all participants, then revising the codebook iteratively after an initial subset of the data was coded. After coding 10% of the data, coders reviewed responses and identified areas where more clarity may be needed in the codebook. The two coders then coded the next 10% and continued to revise the codebook. Coding in segments also promoted increased

reliability and consistency, allowing the two coders to review discrepancies and areas where the codebook could be refined. After coding the first 20% of data, discussing, and revising the codebook, the coders then went on to code the rest of the responses independently. Percent agreement was used to determine inter-rater reliability. After coding all responses, percent agreement was 80.3% for question 1 and 91.2% for question 2. Given the high level of agreement and the goal to identify themes present in the data rather than requiring consensus, a code was counted as being present if either of the coders indicate that code for a particular response. Thus, some responses might receive two codes when coders were not in agreement.

Results

Demographic Information

Nine-hundred and sixty-one students completed the elective module. These 961 students were predominantly White (82%) and female (70%). Thirty-two point three percent of these students showed clinical signs of depression and received a score > 9. Twenty-eight point five percent of these students showed clinical signs of anxiety and received a score of > 9. Scores on the Flourishing Scale had an average of 44 out of 56, with higher scores indicating higher positive mental health. The average age of participants was 22.63 years old (SD = 4.92).

Quantitative

Results of the binary logistic regression for depression, anxiety, and flourishing as predictors of app use found that, after controlling for gender, age, socioeconomic status, and race/ethnicity, anxiety was the only significant predictor for app adoption (b = -.07, $p < .001$). Both depression (b =.03, p = .12) and positive mental health (b= -.02, p = .17) were not significant in predicting app adoption. However, our resulting model showed a small pseudo-R^2 value. We used McFadden's pseudo-R^2 (ϱ^2) to calculate goodness of fit (ϱ^2 = .03), which

indicated a small effect size. However, a small pseudo-R^2 is relatively common in larger sample sizes. Nonetheless, we can reasonably conclude that a relationship exists between anxiety and app adoption, though it is small.

We also examined whether depression, anxiety, and positive mental health would predict greater app use. The resulting model did not significantly show a relation between our mental health variables and frequency of app use ($R^2 = .05$, $F(13, 230) = .9$, $p = .56$). Investigation of the coefficients showed that presence of depression ($b = .02$, $p = .63$) anxiety ($b = -.003$, $p = .91$), and positive mental health ($b = .01$, $p = .57$) had no significant relationship with frequency of app use.

We employed a chi-squared test of independence to analyze whether those that met clinical thresholds of depression and anxiety tend to display increased app adoption. No relation was found for anxiety (X^2 (1, $N = 961$) = 2.77. $p = .10$) and depression (X^2 (1, $N = 961$) =.89. $p = .34$) and app adoption. This indicates that there is no significant relation between clinical levels of depression and anxiety.

Raw percentages were calculated for a variety of different factors. Table 1 presents values for questions related to app use and hesitation.

Table 1. App Use and Hesitation

Response	Percentage
Students That Have Used a Mental Health App	
Yes	25.4%
No	74.6%
Students That Would be Open to Using a Mental Health App	
Yes	38.02%

No	14.88%
Maybe	47.11%

When Students Used a Mental Health App

Before starting college	26.12%
Since starting college	70.2%
Currently using	34.69%

Hesitation to Use a Mental Health App

I'm unsure about how useful the app will be	48.8%
I don't know which app to download	40.3%
I don't need these kinds of apps	36.4%
I don't know if I could find a suitable app	26.8%
I'm not interested in using mental health apps	26.6%
I have concerns about privacy and security of data	19.3%
I don't have time to use apps	14.1%
I have concerns about cost	11.4%
I don't have a suitable device/enough space to download apps	4.7%
There is a lack of research support available	9.5%
Apps seem difficult to use	2.1%
Other	5.7%

Qualitative

The first question we qualitatively analyzed asked students what they would like to see in a mental health app. We categorized the codes into two categories as shown in Table 2. The first was "what they want" and the second was "how they want it." The "what they want" category consisted of codes that addressed specific app features. Upon calculating the frequency of codes, we found that the three features that students were most interested in were related to tips and advice. The third most prominent code was also closely related to this, with many asking for "relaxation/calming tips," which describe apps that may have features for calming or reducing

stress in the user. Some examples of student responses within this theme are “Tips and tools for when feeling anxious…” and “Tips/strategies for dealing with stressors in my life.”

“Access to resources and information” was also a prominent code. Example responses included, “information to read, resources listed” and “…find in-person resources.” This seems to suggest that there is a larger theme in which students have a desire for advice and resources to point them in the direction to seek mental health help outside of the app. However, many respondents indicated that they were not sure or do not know, revealing an additional theme of uncertainty surrounding mental health apps. Additionally, another larger theme seems to suggest that students want features that exist in real time and involve interaction throughout the day. Students wanted “tracking and documenting/journaling” features along with “reminders and check-ins.” Examples of responses included, “tracking factors that contribute to emotional wellbeing” and “reminders of how to not be anxious or deal with situations, or just reminders.” This could mean that apps that have daily reminders, check-ins, and features to track progress may be of interest to college students.

For the “how they want it” category, students showed an overwhelming desire for “communication and real-time support” features. This code had two subcodes of “professional support” and “peer support,” which were both also prominent codes in our analysis. Example responses included, “An anonymous peer-peer chat group or access to a mental health professional” and “convenience of a mental health professional anywhere and anytime.” This would suggest that one theme of these responses is the overall desire for human interaction integrated into an app. Students wanted the ability to communicate in real time with both peers and professionals. Surprisingly, features such as affordability, anonymity, and confidentiality were less frequently identified by respondents, revealing that access to devices and tools required

to access apps is not a prominent theme for most students. Very few responses indicated that students do not own or have limited access to a smartphone, with only 4 responses being coded in this category.

Our second question aimed to explore reasons why students may not use a mental health app, providing insight on hesitation in mental health app adoption. The most prominent responses were coded under "not helpful/ineffective/not useful," reflecting a theme of mistrust in efficacy and lack of interest in mental health apps. "I don't need it" and "I would not use it" were also prominent codes, which also reflects a lack of interest. Examples of responses included, "i dont think talking to a computer could help", "worried about the ability of such an app", and "I do not think that it could provide realistic or helpful information". These three aforementioned responses may provide insight into how resources in college and university settings may not be well received by some students. In addition, responses indicated a preference for face-to-face counseling or in-person interaction, adhering to more traditional methods of mental health help-seeking. This seems to reveal that there is a misconception that students must choose between mental health apps and other resources.

Table 2. Desired Mental Health App Features

Code	Percentage
What They Want	
Tips and Advice (General)	16.7%
Anxiety and Mental Wellness Tips	12.6%
Relaxation/Calming Tips	10.8%
Not Sure/I Don't Know	10.8%
Access to Resources and Information	10.6%
Tracking and Documenting/Journaling	9.6%
Reminders and Check-Ins	7.8%

Guided Meditation	7.6%
Access to Medical Help and Appointments	5.6%
Encouragement and Motivation	3.7%
Daily Tasks/Routines and Goal Setting	3.3%
Positive Affirmations	3%
Holistic Wellbeing	2.8%
Activities	2.4%
An Emotional Outlet	2.4%
Confidence and Empowerment	2.2%
Breathing Exercises	2%
Health and Physical Exercise Tips	1.9%
Productivity and Time Management	1.7%
Clarity and Perspective	1.5%
Comfort	1.5%
Stability	1.5%
Depression Help	0.7%
Self care Tips	0.6%
Sleeping Tips	0.6%
Help with Suicidal Thoughts	0.2%

How They Want It

Communication/Real-time Support	12.6%
Professional support	4.5%
Peer support	4.3%
Convenience in accessibility	4.3%
Affordability	1.3%
Anonymity	1.3%
Similarity to Other Applications	1.3%
Usability	1.1%
Confidentiality	0.9%
Unique to Existing Resources	0.7%
No Judgment	0.6%

Hesitation in Using Mental Health Apps

Not helpful/Ineffective/Not useful	22.3%
I don’t need it	19.2%
I would not use it	19.2%
Prefers face to face counseling/in-person interaction	12.3%

Privacy and confidentiality concerns	10.8%
Dislike for applications	9.2%
Smartphone worsens mental health	8.5%
Impersonal	6.2%
Already using a mental health app	3.8%
I don't own/have limited access to a smartphone	3.1%
Not sure/I don't know	3.1%
Religious and family support	2.3%

Discussion

Our findings suggest that simply providing digital mental health apps as tools may not be enough to support their use in college students. Rather, we identified considerable hesitation and uncertainty towards using mental health apps and various factors that related to app adoption. As mental health apps are often provided as resources on college campuses, our findings suggest numerous considerations that should be taken into account including the interests and hesitation of college students looking to use mental health apps. Despite numerous studies examining perceptions and outcomes of mental health app use, few studies give students the space to openly discuss and identify desired individual app features and hesitation and barriers to app use in college students. Our findings provide information regarding how college students are using mental health apps, their interest in particular app features or capabilities, and hesitation that may affect app adoption.

Contrary to our hypothesis which suggested that anxiety and depression would both be significant predictors of app adoption, our quantitative findings suggested that anxiety was the only significant predictor of app adoption while depression and positive mental health did not significantly predict app use. When considering why students may turn to mental health apps, it is important to note that students with symptoms of anxiety may be more inclined to these apps as tools. Apps with features that address anxiety may appeal to college students. This aligns with

our qualitative findings that one prominent features students wanted were in mental health apps tips and advice related to anxiety and relaxation. These results align with our quantitative findings which suggested that anxiety is a predictor for app use. Students want apps that directly address how to reduce symptoms of anxiety and promote relaxation, which may also explain why students with anxiety are more likely to download a digital mental health app in hopes of finding anxiety reducing content. Prior literature suggests that meditation apps are among the most commonly downloaded mental health apps and meditation is largely popular in those with anxiety (Carlo et al., 2019; Cramer et al, 2016). With meditation apps being so popular and appealing to those with anxiety, college campuses should consider them as a potentially valuable resource.

Our findings suggest that anxiety was a significant predictor for mental health app use, whereas depression was not. Prior studies have suggested that symptoms of depression and anxiety were reduced upon mental health app adoption (Chandrashekar, 2018), yet only those with anxiety seemed to be more inclined to use a mental health app. Surprisingly, the qualitative analysis also found very few responses indicating that students wanted to see features that directly address depression as a part of a digital mental health app. As for positive mental health, our findings suggest that it does not factor into app use. One explanation for these findings is that negative emotions, and the desire to reduce them, might be driving adoption of mental health app use among college students rather than positive emotions. Some conceptualizations of depression and anxiety characterize the two by presence of absence of positive and negative emotions (Watson et al., 1988). In such conceptualizations, depression is characterized by low positive affect and low negative affect, while anxiety is characterized by low positive affect and high negative affect. This would be consistent with the lack of significant findings for positive mental

health which would be thought of as consisting of high positive affect and low negative affect (Diener et al. 2017).

We also found that elevated anxiety was not a predictor of more frequent app use. Therefore, although anxiety relates to the decision to start using an app, it does not relate to the sustainment of that use overtime. Prior literature has suggested that stress may inhibit sustained mental health app use (Melcher et al., 2020). As college students face stressors associated with academics, financial issues, and peer relationships, using a mental health app may not fit into their already busy lives. This may also be due to uncertainty surrounding app use and perhaps a lack of digital literacy on use of an app. Students may be unsure of how to use the app or identify how often to use it. This could explain why students with elevated anxiety are not likely to use a mental health app more frequently, even though they are more likely to download a digital mental health app. Even if a student with anxiety were to download a mental health app, they may be unable to identify how often they should use it based on their symptoms.

With other methods such as traditional in person therapy or prescribed medications, patients receive direct instruction and are given a schedule for therapy sessions or medication dosage. When using a digital mental health app, students must independently decide what a "healthy" amount of app use looks like and what apps would be useful in relation to their symptoms. The second largest point of hesitation was uncertainty about which apps they should download. Increasing digital literacy and providing tools that allow students to gauge when app use is appropriate may be helpful when implementing digital mental health apps as resources in college campuses. Working with ecosystems that already exist in a student's life may be especially beneficial. For example, Kaiser Permanente created a set of mental health apps to provide to their members. In order to support delivery and integration, healthcare providers

within the Kaiser Permanente network were trained to provide an online mental health tool as a resource (Histon et al., 2018). Similar efforts could benefit college campuses by training counseling center staff or other providers, peers, or students to increase digital literacy and find effective, evidence-based mental health apps. Digital navigators, or people designated to evaluate and recommend apps, set up technology, and collect data within the organization, can work with counseling center staff to implement mental health apps on campus (Wisniewski & Torous, 2020). In addition, factors that predict a student's decision to begin using an app may not predict sustained use. It is possible that those with higher anxiety did not experience enough improvement to continue using the app. However, it is also important to note that this data is cross-sectional, so data was collected at a single time point. As a result, it is difficult to know the full scope of discovery, adoption, and sustainment.

With students often seeking mental health resources in college, understanding their use of resources is imperative. Around the time that students attend college, they often experience increased autonomy in their decision making towards mental health. This may lead to an uptick in mental health help seeking. In addition, college students may experience the onset of mental health disorders at this time, further increasing the need to seek out resources. Because colleges and universities are resource hubs, many students may begin exploring mental health apps during their time there. However, in students that had used a mental health app since starting college, only about half were still using one at the time the survey was completed. In line with findings from Kern et al. (2018), students have a clear interest in mental health apps, but do not sustain use. It is possible that, as students experience better mental health outcomes, the need for a mental health app no longer exists, leading them to delete the app. However, it is also possible that uncertainty around app use may prevent students from using an app or continuing use.

In addition, it is not surprising that an overarching theme was that students wanted apps to provide resources and increased mental health access. Access to resources and information along with access to medical help and appointments ranked highly on the list of desired app features. The most common theme for the "how they want it" section suggested that students wanted apps that provided real time support and connected them with both peers and professionals. Most mental health apps seem to have similar features, with mood tracking and journaling being the most common (Lagan et al., 2021). Apps that connect students to resources and increases access to medical care, professional support, and peer support may be worthwhile in this population. Yet, none of these features are mentioned in the list of top five most common offerings of mental health apps (Lagan et al., 2021). Very few apps in Lagan et al.'s (2021) analysis offered peer support and connection to a coach or therapist, while none of them offered access to resources and information or access to medical care. In addition, no themes emerged around cultural competency, though our sample was predominantly White.

Integrating on campus resources with the mental health app resources may be of particular interest to this group (Lattie et al., 2019). Fortunately, some products exist that demonstrate these features. For example, YOU at College is a "full continuum of campus care" that provides multiple apps meant for college students. Their "YOU" app connects students to resources available on their campus along with additional resources and content related to mental health. Additionally, their "NOD" app connects students to their peers for support while also providing prompts and reflection opportunities. Though research is scarce for their "YOU" app, the "NOD" app is evidence based and has been shown to reduce loneliness in vulnerable students (Bruehlman-Senecal et al., 2020). This system of apps would also provide reminders and check-ins along with tracking and journaling features, which students identified as features they

would like to see in a digital mental health app. However, colleges and universities must invest resources into this system. Students are unable to simply download the apps as campuses must purchase a partnership and load their data and resources into the app. Resources like these may be useful for campuses to consider, especially as students are unable to use these tools without cooperation from their respective colleges or universities. Students were also generally open to downloading a mental health app and, amongst those who had already downloaded an app, most had done so since starting college.

In students that have not used a mental health app, a number of factors led to their hesitancy. It was most common for students to indicate that they were unsure of how useful the app would be. The second largest point of hesitation was uncertainty around which app to download. With so many apps existing in the app store, it is understandable why it might be difficult for students to select one. The app store houses thousands of mental health apps with very few actually having empirical support (Wang et al., 2020). Therefore, it may be confusing for many students to make informed decisions about which app to download. Providing empirical evidence and helping students identify whether the app is useful for them may be especially helpful. Teaching students how to identify a suitable, evidence-based mental health app in the app store may also help in clearing uncertainty around whether a mental health app could actually be useful, which may be done through the *One Mind Psyberguide* (Neary et al., 2021). Interestingly, very few students were concerned about costs associated with the app and access to technology in both our quantitative and qualitative findings. This suggests that students do feel they have sufficient resources to be able to access the app, but are unsure of whether it would be useful or which they should select.

Qualitative findings around hesitancy suggested that many students simply feel that they do not need a mental health app or it would not be effective. Although there are mental health apps that are effective, many mental health apps are not evidence-based. So, student's perceptions about mental health apps may be accurate overall and may reflect the amount of ineffective apps that exist. This also aligns with prior findings on mental health service utilization on college campuses. College students seem to face a lack of urgency when addressing mental health issues or may be skeptical of the effectiveness of existing services (Eisenberg et al., 2011). Therefore, our findings that students may feel mental health apps are ineffective or that they do not need them may not be unique to mental health apps. Rather, hesitancy towards mental health service utilization in college campuses may be a more pervasive issue that exists even outside the digital realm. Additionally, qualitative findings suggest that there seems to be a preference towards face-to-face counseling, which also exhibits the assumption that using a mental health app would mean abandoning in-person therapy. Rather than thinking about mental health apps as a replacement for traditional forms of therapy, it should be noted that they may be used as adjuncts to care. Preference for face-to-face counseling and in-person interaction was the fourth largest point of hesitation in using mental health apps, with about 1 in 8 students mentioning this preference. It may be useful for campuses to market mental health apps as additional resources rather than a replacement for traditional forms of therapy. Although campuses do not directly suggest that they should be a replacement, it may be helpful to reiterate to students that the app should be used in addition to other resources to combat the misconception that many students have.

Our findings reflected a need for college campuses to provide resources tailored to the needs of students. Campuses should not only provide mental health apps as a resource, but

should also provide resources that clear uncertainty regarding available apps. It is essential to consider why people use or do not use mental health apps and what is needed in addition to the apps to support their use. Based on the responses of students, plenty of hesitation continues to inhibit app adoption, with many students experiencing uncertainty about using a mental health app. In students that do choose to use a mental health app, presence of anxiety in these students seems to predict app adoption. As students tend to begin using a mental health app in college, it has become more imperative to provide the resources necessary to promote mental wellbeing on campus.

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