

# Mental health apps in a college setting: openness, usage, and attitudes

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**Background:** The ubiquity of smartphones and the development of mental health apps (MHAs) calls for evaluation of consumers' attitudes towards and usage of MHAs. Due to the increasing demand for mental health services on college campuses, research is especially needed to evaluate MHAs as a potentially viable treatment modality in that setting.

**Methods:** The study team developed survey questions related to MHAs, added these to the Healthy Minds Study, and used Qualtrics as the platform. The participants were 741 students, age 18 and older, from a large Midwest public university. Students could answer a varying number of multiple choice questions based on embedded display logic, and the survey required 20–25 minutes for most participants to complete. Based on embedded display logic in the survey and how questions were answered, students could receive anywhere from 1–20 questions. Questions were primarily categorical (e.g., “Yes”, “Maybe”, “No”), with the remaining questions in free response format. The survey was fielded in April, 2016.

**Results:** 26.1% of respondents were open to using an MHA yet only 7.3% had used an MHA. 9.0% of respondents preferred to use an MHA versus seeing a mental health professional. 13.2% of respondents felt that MHAs do have an evidence base. 23.8% of users felt that MHAs helped with their mental health. Those who reported receiving mental health services within the past 12 months were significantly more open to using MHAs than those who had not received services. Convenience, immediate availability, and confidentiality were common reasons for interest in MHAs.

**Conclusions:** There is interest in, but limited usage, of MHAs among university students, providing evidence of MHAs as a potentially untapped treatment modality for this population. Further research could help assess how best to integrate this technology into the university and college mental health system.

**Keywords:** College students; mobile apps; mental health; treatment; technology

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## Introduction

Within the last decade, the emergence and growing ubiquity of mobile smartphones has dramatically impacted the personal, social, and occupational routines of the global

population (1). Unsurprisingly, numerous mobile apps now exist to help diagnose, track, and manage health conditions, with varying degrees of success (2). The presence of mental health apps (MHAs) has also increased; there are MHAs to address depression, schizophrenia, and bipolar disorder,

among other mental health conditions (3-5). Additionally, there are treatment-related MHAs incorporating interventions such as mindfulness and Cognitive Behavioral Therapy (6-8). Further research and collaboration are needed to evaluate these tools and optimize their integration into the broader field of behavioral health care (9-11). The American Psychiatric Association and others recognize the need for a framework for evaluating MHAs and have recently provided recommendations of how to do so (12,13).

The growing American “college mental health crisis” motivates providers and administrators to find innovative solutions to meet students’ mental health needs (14). College and university students are rarely without a smartphone on hand, using them not only to communicate, but also to take photos, search the Internet, engage in social media and access mobile applications (apps).

As providers grapple with dramatic increases in the number of students seeking treatment, the supply of college and university mental health resources often fails to meet the demand, and many students struggle to cope with challenges such as long wait times and limited provider options (15). Mental health issues on campus affect many aspects of well-being and academic functioning. According to the 2015 American College Health Association (ACHA) survey, in a 12-month period, 85% of students felt overwhelmed, 35% felt so depressed that it was difficult to function, while 24%, 15%, and 20% reported anxiety, depression, and sleep difficulties, respectively (16). The traditional models of counseling and appointment management may no longer be adequate for some college students, who may prefer readily available, constantly accessible tools (17). MHAs present a theoretical augmentation strategy for managing mental health issues in college student populations.

Previous research has examined attitudes regarding MHAs in general adult samples (18,19), but attitudes of college students concerning the use of MHAs have not been previously evaluated. Furthermore, there is a paucity of literature regarding any aspect of MHAs in the college population. This article aims to contribute to the growing literature regarding MHAs by presenting outcomes of a study investigating the potential usefulness of MHAs, and attitudes toward using them, among a college student population.

## Methods

### Participants

Approximately 4,000 students from a large Midwestern

Public University were randomly selected from the entire student population and recruited to participate in the Healthy Minds Study (HMS), an annual web-based survey that examines mental health, service utilization, and related issues among undergraduate and graduate students. Those who met the inclusion criteria for the random sample were degree-seeking students ages 18 or older, and these students were compiled and randomized from the participating institution’s Registrar. Given the voluntary nature of this study, not every question was answered by every participant, resulting in some variables having incomplete data. The average time to participate in this study was 20–25 minutes, though this varied considerably due to embedded display logic in the survey (i.e., students could receive anywhere from 1–20 questions in the MHAs section depending on how they answered questions). This study was approved by the institutional review board at the participating institution and administered in April of 2016. The study number was HUM00100169.

### Measures

#### MHA questions

For this study, the HMS team created and piloted a new set of survey questions at this particular university to assess knowledge of and attitudes concerning MHAs. The new questions were administered in the spring 2016 semester. A working definition was displayed at the beginning of the MHA questions to provide a uniform understanding. The study team defined a MHA as, “*A mobile application that is designed to track or treat a mental health condition (e.g., depression, anxiety, psychosis, personality disorder, bipolar disorder, insomnia, post-traumatic stress disorder, substance use disorder, eating disorder, ADHD, etc.). This does not include an app that would relate to other aspects of wellness (diet, exercise, stress, general health). Examples of mental health apps include but are not limited to: Talkspace, SAM, Moodkit, PTSD Coach, CBT-I Coach, Operation Reach Out, Optimism.*”

#### Primary outcome measures

Select MHA questions were sorted into three categories of interest: “Openness” to MHAs, “Usage” of MHAs, and “Attitudes” toward MHAs. Given the exploratory nature and aim of this study, the researchers felt that highlighting these particular categories of questions were critical to help inform the structure of future studies. The researchers collapsed the variables’ original response options into dichotomous categories in order to better understand the

significant relationships revealed by the chi-square tests. The exact wording, display logic, and operationalization of these variables are further outlined in *Table S1*.

### Student subgroups

Gender included “Male”, “Female”, or “Other”, with “Other” including all students who endorsed a gender option other than “Male” or “Female”. There were a very small number of students in the “Other” gender category; the researchers kept those students’ data to be as inclusive as possible, but generated a binary gender variable consisting of “Male” and “Female” for purposes of analyses. Age was separated into two categories: 18–22, and 23 or older. Race/ethnicity was condensed to “White” versus “Non-white”, with “Non-white” including all students who endorsed a race/ethnicity category other than “White”. Some race/ethnicity categories were not endorsed by an adequate number of students to be able to conduct analyses, explaining the creation and utilization of binary “White” and “Non-white” categories. Student type consisted of “Undergraduate” versus “Graduate”, with “Graduate” including all students who endorsed enrollment in any graduate program.

Mental health was calculated based on students’ scores on the embedded mental health screens in HMS. The three validated screens included depression, measured by the Patient Health Questionnaire-9 (PHQ-9); anxiety, measured by the Generalized Anxiety Disorder-7 (GAD-7); and eating disorders, measured by the five item SCOFF questionnaire (20-22). The mental health screen variable was operationalized as “Positive” versus “Negative”, with “Positive” screens including students scoring over 10 on the PHQ-9, over 10 on the GAD-7, and/or over 2 on the SCOFF. Previous mental health diagnosis was categorized as “Yes” versus “No”, with “Yes” representing students who indicated being previously diagnosed with either depression, anxiety, attention disorder or learning disability, eating disorder, psychosis, personality disorder, and/or substance abuse disorder. Lastly, previous mental health treatment was structured as “Yes” versus “No”, with “Yes” including students who indicated receiving counseling or therapy for mental or emotional health from a health professional within the past 12 months.

### Procedure

#### Administering the study

Qualtrics was used as the survey platform, and students were recruited by email. The data collection period lasted

for approximately two and a half weeks, with up to three reminder emails for those had yet to participate or decline to participate. Of the students who consented to participate, 876 students started the survey, and 741 reached the MHA questions. Of the 741 students who arrived at the MHA questions, approximately 721 (97.3%) indicated ownership of a smartphone and were thus asked the MHAs questions. Based on embedded skip logic, the remaining 20 students who did not indicate ownership of a smartphone were not asked the MHA questions. Students with a smartphone were asked if they would be open to using a MHA. Those who answered “No” were directed to two final questions. Students who responded “Yes” or “Maybe” went on to answer 16 additional MHA questions based on embedded display logic (with the exception of the question: “Do you think mental health apps have an evidence base?”, which was asked of all students eligible to answer the remaining MHA questions, regardless of whether they were open to using a MHA). The study team selected this path of embedded logic to specifically gather more data from those students who were actually open to using a MHA. Cash sweepstakes prizes were used as incentives for participation.

### Data analysis

Analyses were conducted using Stata statistical software. Using the participating school’s administrative data (e.g., gender, age, race-ethnicity), the researchers generated probability weights to help adjust for nonresponse bias.

Applying the response weights, the study team ran univariate frequency tests to estimate the distribution of responses among all students answering MHA questions in the “Openness”, “Usage”, and “Attitudes” question categories. Bivariate analyses then examined differences across subgroups on these MHA questions through chi-square tests, displayed in *Tables 1, 2, and 3*, respectively. Given the format of the “free text” questions, which were separate from the “Openness”, “Usage”, and “Attitudes” questions, data for these responses were compiled by themes, rather than by specific answers.

## Results

### Sample characteristics

The analytic sample (see *Table 4*) included 264 males (36.6%), 445 females (61.7%), and 12 students (1.7%) identifying as something other than “Male” or “Female.” This imbalanced representation of gender (higher female response rate than male) is typical compared to other

**Table 1** Openness toward mental health apps

Variable	Would you be open to using a mental health app?		N	P
	Yes	Maybe/No		
Gender				<0.001
Male	19.3	80.7	264	
Female	32.9	67.1	445	
Race/ethnicity				–
White	28.0	72.0	494	
Non-White	22.3	77.7	221	
Age				–
18–22	27.5	72.5	455	
23+	23.7	76.3	266	
Student type				–
Undergraduate	26.6	73.4	442	
Graduate	24.0	76.0	260	
Mental health screen				–
Positive	26.3	73.7	300	
Negative	25.9	74.1	421	
Previous mental health diagnosis				–
Yes	30.9	69.1	224	
No	24.9	75.1	459	
Received mental health services in past 12 months				0.01
Yes	33.6	66.4	187	
No	23.8	76.2	533	

Refer to *Table S1* for question display criteria and operationalization of variable. Table percentages are of the weighted sample.

schools administering HMS. The majority of respondents (N=455, 63.1%) were ages 18 to 22, with 266 (36.9%) students reporting ages 23 or older. Most respondents (N=442, 63.0%) were undergraduate students, and a majority identified as White (N=494, 69.1%).

### ***Overall openness, usage, and attitudes towards MHAs***

Of the students who reported owning a smartphone, 26.1% replied “Yes” to being open to using a MHA, whereas 73.9% replied “Maybe/No”. Within the MHA “Usage” question category (among students owning smartphone and responding “Yes” or “Maybe” to being open to using MHAs), 7.3% of students indicated having used MHAs.

9.0% of students preferred a MHA over seeing a mental health professional if experiencing a mental health condition. Regarding attitudes toward MHAs, 13.2% of students felt that MHAs do have an evidence base, with 86.8% reporting “Maybe/Unsure/No”. Additionally, 17.3% replied that MHAs could possibly improve their academic performance if they were experiencing a mental health condition.

### ***Openness to MHAs among subgroups***

As shown in *Table 1*, a significantly higher percentage of female students (32.9%) were open to MHAs relative to males (19.3%),  $\chi^2(1, N=709) = 15.5, P < 0.001$ . Those who

**Table 2** Use of mental health apps

Variable	Have you ever used a mental health app?				Would you prefer to use a mental health app to seeing a mental health professional, if you were experiencing a mental health condition?			
	Yes	Maybe/No	N	P	Yes	Unsure/No	N	P
Gender				0.03				-
Male	4.4	95.6	180		7.1	92.9	179	
Female	9.5	90.5	382		10.6	89.4	380	
Race/ethnicity				-				0.03
White	8.7	91.3	389		7.3	92.7	386	
Non-White	5.1	94.9	179		11.9	88.1	179	
Age				-				-
18–22	8.4	91.6	369		10.2	89.8	366	
23+	5.3	94.7	204		6.7	93.3	204	
Student type				-				-
Undergraduate	7.0	93.0	361		8.4	91.6	359	
Graduate	7.6	92.4	199		9.2	90.8	199	
Mental health screen				-				-
Positive	9.4	90.6	252		9.5	90.5	250	
Negative	5.7	94.3	321		8.6	91.4	320	
Previous mental health diagnosis				<0.001				-
Yes	13.6	86.4	194		7.6	92.4	193	
No	4.2	95.8	351		9.6	90.4	349	
Received mental health services in past 12 months				<0.001				0.004
Yes	18.0	82.0	165		4.3	95.7	164	
No	3.5	96.5	407		10.7	89.3	405	

Refer to *Table S1* for question display criteria and operationalization of variables. Table percentages are of the weighted sample.

reported receiving mental health services within the past 12 months were significantly more open (33.6%) than those who had not received services (23.8%),  $\chi^2(1, N=720) = 6.56, P=0.01$ . Students with a previous mental health diagnosis were more open to using MHAs (30.9%) compared to 24.9% of students with no previous diagnoses, but the difference was not statistically significant.

**Usage of MHAs among subgroups**

Students who replied “Yes” or “Maybe” to being open to MHAs were asked whether they had ever used a MHA.

Females (9.5%) had used MHAs significantly more than males (4.4%),  $\chi^2(1, N=562) = 4.9, P=0.03$  (see *Table 2*). Students with a previous mental health diagnosis had a significantly higher usage (13.6%) compared to those with no previous mental health diagnosis (4.2%),  $\chi^2(1, N=545) = 16.5, P<0.001$ . Furthermore, only 3.5% of students who did not receive mental health services within the past 12 months had used a MHA, whereas 18.0% of those who had received services endorsed use of a MHA,  $\chi^2(1, N=572) = 36.5, P<0.001$ . Non-significant but noteworthy differences included younger students (ages 18–22) with higher use of MHAs (8.4%) versus those 23 or older (5.3%), 8.7% of

**Table 3** Attitudes toward mental health apps

Variable	Do you think mental health apps have an evidence base?				Do you think a mental health app could possibly improve your academic performance, if you were experiencing a mental health condition?			
	Yes	Maybe/I don't know/No	N	P	Yes	Unsure/No	N	P
Gender				–				–
Male	12.6	87.4	264		20.0	80.0	177	
Female	14.2	85.8	444		16.0	84.0	380	
Race/ethnicity				–				–
White	13.5	86.5	494		17.8	82.2	384	
Non-White	12.9	87.1	220		18.0	82.0	179	
Age				–				0.02
18-22	14.0	86.0	454		20.1	79.9	365	
23+	11.7	88.4	266		13.2	86.8	203	
Student type				–				0.04
Undergraduate	13.6	86.4	441		19.4	80.6	358	
Graduate	12.4	87.6	260		11.8	88.2	198	
Mental health screen				–				–
Positive	13.1	86.9	299		17.7	82.3	249	
Negative	13.2	86.8	421		17.7	82.3	319	
Previous mental health diagnosis				–				–
Yes	15.4	84.6	224		14.6	85.4	193	
No	13.2	86.8	458		18.9	81.1	348	
Received mental health Services in past 12 months				–				–
Yes	14.4	85.6	187		13.7	86.3	163	
No	12.8	87.2	532		19.0	81.0	404	

Refer to *Table S1* for question display criteria and operationalization of variables. Table percentages are of the weighted sample.

white students versus 5.1% non-white students, and 9.4% of those with a positive mental health screen versus 5.7% of those with a negative mental health screen.

Students who reported “Yes” or “Maybe” to being open to MHAs were also asked if they would prefer to use a MHA over seeing a mental health professional if experiencing a mental health condition (see *Table 2*). Non-white students had a significantly higher preference (11.9%) towards using a MHA compared to white students (7.3%),  $\chi^2(1, N=565) = 4.66, P=0.03$ . 4.3% of students who received mental health services in the past 12 months preferred to use MHAs, which was significantly less than those who

had not received services (10.7%),  $\chi^2(1, N=569) = 8.33, P=0.004$ . Another finding, though not significant, was that males (7.1%) were less partial to using MHAs over a mental health professional compared to females (10.6%), which was also the trend for older students, ages 23 or older (6.7%), compared to younger students, ages 18–22 (10.2%).

#### *Attitudes toward MHAs among subgroups*

For the first question in this category, students who answered “Yes” to having a smartphone were asked, “Do you think mental health apps have an evidence base?” There

**Table 4** Sample characteristics

Characteristic	Count	%
Gender		
Male	264	36.6
Female	445	61.7
Other	12	1.7
Age		
18-22	455	63.1
23+	266	36.9
Race		
White	494	69.1
Non-White	221	30.9
Student type		
Graduate	260	37.0
Undergraduate	442	63.0
Mental health screen		
Positive	300	41.6
Negative	421	58.4
Previous mental health diagnosis		
Yes	224	32.8
No	459	67.2
Past 12 months mental health treatment		
Yes	187	26.0
No	533	74.0

Table values are among students responding “Yes” to having a smartphone. Percentages are not weighted; they represent the percentage of the raw counts provided. Count does not add up to 721 (total number of respondents) for some variables as some respondents did not answer all the survey questions.

were no significant differences among subgroups for this question (see *Table 3*), though younger students (ages 18–22, 14.0%) believed MHAs have an evidence base somewhat more so than older students (ages 23 or older, 11.7%).

The second question in this category, “Do you think a mental health app could possibly improve your academic performance, if you were experiencing a mental health condition?”, was asked to students who answered “Yes” to having a smartphone, and replied “Yes” or “Maybe” to being open to MHAs (see *Table 3*). Both age and student

type showed significant differences for this question. 20.1% of students ages 18–22 felt a MHA could improve academic performance if experiencing a mental health condition versus 13.2% of students ages 23 or older,  $\chi^2(1, N=568) = 5.11, P=0.02$ . As for student type, significantly more undergraduate students (19.4%) than graduate students (11.8%) felt MHAs could help academic performance,  $\chi^2(1, N=556) = 4.41, P=0.04$ . There were no differences based on race/ethnicity or presence of a positive mental health screen.

#### *Other notable findings (non-category and free response questions)*

Among those reporting “Yes” or “Maybe” to openness to a MHA, 54.3% reported using apps for other aspects of their well-being. Among the respondents who were at least “Maybe” open to MHAs, the most common responses for why they would use a MHA were: To track mood and/or anxiety, accessibility, confidentiality, and immediate availability (see *Table 5*). Those who reported they would prefer use of a MHA to meeting with a mental health professional cited reason of convenience, anonymity and reduced stigma, immediate availability, treatment of milder mental health issues, and affordability (see *Table 5*). 36.1% of respondents answered “Yes” when asked if they would be worried about privacy issues when using a MHA.

Those who stated they were not open to using a MHA were asked why. The most common reason was that these students do not have current mental health issues (see *Table 5*). Some felt a MHA would be too impersonal, while others stated a desire to reduce use of their smartphones.

Of the students at least “Maybe” open to MHAs who also reported use of MHAs (7.3%), the design and reliability of the app were important factors in whether they liked the MHA. 3.7% of these students used the apps multiple times daily, 22.2% used them daily, and 74.1% used them weekly or less. Regarding the length of time that they used the MHA, 26.7% of students used them for one week or less, 49.5% used them for between one and four weeks, and 23.8% used them for more than four weeks. Finally, 23.7% of MHA users felt MHAs helped with their mental health symptoms, 48.9% felt MHAs maybe helped, and 27.4% felt they did not help.

## Discussion

The results of this study demonstrate appreciable interest among college students in the use of MHAs (with over one-

**Table 5** Free text responses categorized by the most popular themes

Variable and response theme	Count (%)
<i>Why would you use a mental health app?</i>	
To track mood/anxiety	41 (10.3)
Accessibility	39 (9.8)
Privacy/confidentiality	23 (5.8)
Immediate availability	19 (4.8)
For mental health information	17 (4.3)
Total	400 (100.0)
<i>Why would you not use a mental health app?</i>	
No current mental health needs	46 (36.5)
Too impersonal	15 (11.9)
Too inundated with technology already	15 (11.9)
Unsure of efficacy	10 (7.9)
Fear of privacy breach	8 (6.3)
Total	126 (100.0)
<i>Explain why you would prefer to use a mental health app to seeing a mental health professional.</i>	
Convenience	79 (40.7)
Anonymity/reduced stigma	41 (21.1)
Immediate availability	16 (8.2)
To deal with milder mental health issues	8 (4.1)
Cost savings	7 (3.6)
Total	194 (100.0)

These only include students eligible to fill out the Mental Health Apps module (responding “Yes” to having a smartphone). Percentages for each question do not add up to 100% because these answers reflect the most popular themes. Not all of the answers are listed.

quarter of respondents indicating that they would be open to using a MHA). Among student subgroups, the results demonstrated trends towards younger students both using and being more open to using MHAs, which correlates with previous surveys about MHA usage (23). When examining gender differences, females both used and were more open to using MHAs. Several studies have demonstrated that females have reported utilizing more mental health services than males, both in the general population and among college students (24,25). However, only a small proportion of students in the present study reported actually using MHAs. The gap between the interest in and actual use of MHAs points to a need for further research, improved app development, and empirical validation of MHAs.

When considering race/ethnicity in the lens of White

versus Non-White students, there were non-significant trends towards White students having higher percentages of openness and usage. Despite less openness and usage among Non-White students, they significantly preferred using an MHA to seeing a mental health professional more than White students. While it would be speculative to propose reasons for this difference, other studies have demonstrated less utilization of mental health services among racial and ethnic minority groups, both in the college and general population (24,25). Whether other factors such as stigma among racial and ethnic minority groups or lack of mental health providers of racial and ethnic minority backgrounds play a role in this would require further examination.

Among students who reported using a MHA, most used them weekly or less and for a relatively short period of time



(less than 4 weeks). Further investigation into why use was infrequent and short would be valuable when considering potential applications of this technology. For example, one cannot know whether this limited use could be explained by something such as poor MHA design or something quite different such as student workload and/or distraction. Implementing a team approach to using a MHA, involving both the mental health provider and the patient, may increase the efficacy and longevity of its use (26). Despite the short-term nature of MHA use in this study, nearly one-in-four respondents felt that their mental health was improved by MHA use.

Students commonly cited the convenience, immediate availability, and confidentiality of MHAs as motivators for use. These attitudes may reflect a broader cultural shift in the desire for convenient, immediate, and constant availability of all services, health related or otherwise. MHAs may also appeal to students who grapple with the stigma associated with mental illness and its treatment. Although stigma among college students has declined in recent years, it is still a barrier to mental health services (27). The data shows that a small cohort of students may prefer to use MHAs versus in-person visits with a mental health professional due to what they consider greater convenience and availability. In order to reach those students, innovative non-traditional modes of treatment warrant further consideration. A minority of students indicated disinterest in using a MHA. Most of the disinterested respondents stated they did not have a mental health problem (i.e., that MHAs were not relevant to them). Others would prefer a more personal interaction with a mental health provider, and this attitudinal disparity suggests that if MHAs are to be optimally incorporated into care, then it could be useful to first briefly screen students regarding treatment preferences prior to recommending MHA use. Within this emerging field of wellness-related applications, validating their evidence base, user-friendliness and confidentiality seem essential (28). One study suggested that limiting the use of text and maximizing multimedia in a MHA could help engage users (29). Another study found benefits to incorporating target users in the development of MHAs (30).

There are several limitations to consider in the context of this study. The survey response rate was 18.5%. Although nonresponse weights were used to ensure the results were representative in terms of demographic characteristics, it is possible that the participant sample was biased in terms of interest or usage of MHAs. There is also the potential for a selection bias, as participants self-selected to participate

in the MHA module. The survey questions were also not part of a measure validated for reliability, and there was not a definition provided to guide respondents on what being “open” to using an MHA meant. Additionally, the sample only included students at one large, public university. Given the diversity of students across regions, types of colleges and universities attended, and other potential variables, it would be premature to assume these findings would be generalizable to the nation’s college and university students as a whole. Future research would ideally include samples from other sites including a variety of geographically diverse campuses, community and junior colleges, and smaller private schools. The use of yes/no responses versus a Likert scale reduced the specificity of the responses. Finally, the survey questions did not address MHAs for specific psychiatric diagnoses. It is possible that student attitudes towards MHAs might vary based on the specific mental health issues they face; further inquiry into this could be valuable.

## Conclusions

Given the context of not only the ubiquity of smartphones, but also the growing demand for college mental health services, the use of MHAs could theoretically help to bolster mental health prevention and intervention efforts for college students. Some have proposed that MHA use could also reduce the costs of providing treatment services, an important consideration given that demand for mental health services exceeds availability at many colleges and universities (31). It is notable that over half of respondents in this study had previously used an app for other health reasons, suggesting that wellness-related apps are not foreign to the college and university student community. Certainly, MHAs need to be empirically validated prior to their integration into the delivery of behavioral health care on campuses. However, it is important to recognize that there are inherent challenges in researching mobile mental health treatments, including the demand for apps to be developed and released quickly (32). Furthermore, treatment providers would need to learn more about these tools to sufficiently educate and guide their patients in proper use (33). The college campus environment serves as an ideal setting for the dissemination and use of MHAs as a potential treatment modality, and this study supports that there is student interest. Further research could help assess whether MHAs have a sufficient foothold with students such that integrating this technology into their behavioral

health care could be feasible and beneficial.

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None.

## Footnote

*Conflicts of Interest:* The authors have no conflicts of interest to declare.

*Ethical Statement:* This study was approved by the institutional review board at the participating institution and administered in April of 2016. The study number was HUM00100169.

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## Supplementary

**Table S1** Primary outcomes: definitions from survey questions

Domain	Survey item
Openness <sup>1</sup>	Would you be open to using a mental health app? <sup>a</sup>
Usage <sup>2</sup>	Have you ever used a mental health app? <sup>a</sup>
	Would you prefer to use a mental health app to seeing a mental health professional, if you were experiencing a mental health condition? <sup>b</sup>
Attitudes	Do you think mental health apps have an evidence base? <sup>1,c</sup>
	Do you think a mental health app could possibly improve your academic performance, if you were experiencing a mental health condition? <sup>2,b</sup>

Notes: <sup>1</sup>, measured for students responding “Yes” to having a smartphone; <sup>2</sup>, measured for students responding “Yes” to having a smartphone, as well as responding “Maybe” or “Yes” to being open to using a mental health app; <sup>a</sup>, response categories are “Yes”, “Maybe”, “No”, but operationalized as dichotomous measure (“Yes” and “Maybe/No”); <sup>b</sup>, response categories are “Yes”, “Unsure”, “No”, but operationalized as dichotomous measure (“Yes” and “Unsure/No”); <sup>c</sup>, response categories are “Yes”, “Maybe”, “I don’t know”, “No”, but operationalized as dichotomous measure (“Yes” and “Maybe/I don’t know/No”).