# UC Irvine
## UC Irvine Previously Published Works

**Title**

Online suicide risk screening and intervention with college students: a pilot randomized controlled trial.

**Permalink**

https://escholarship.org/uc/item/8w97n3x4

**Journal**

Journal of Consulting and Clinical Psychology, 83(3)

**Authors**

Czyz, Ewa
Kramer, Anne
Horwitz, Adam
et al.

**Publication Date**

2015-06-01

**DOI**

10.1037/a0038805

Peer reviewed

# Online Suicide Risk Screening and Intervention with College Students: A Pilot Randomized Controlled Trial

**Cheryl A. King**, **Daniel Eisenberg**, **Kai Zheng**, **Ewa Czyz**, **Anne Kramer**, **Adam Horwitz**, and **Steve Chermack**

University of Michigan

## Abstract

**Objective**—This pilot randomized controlled trial examined the effect of an online intervention for college students at risk for suicide, Electronic Bridge to Mental Health Services (*e*Bridge), which included personalized feedback and optional online counseling delivered in accordance with motivational interviewing principles. Primary outcomes were readiness to seek information or talk with family and friends about mental health treatment, readiness to seek mental health treatment, and actual treatment linkage.

**Method**—Participants were 76 college students (45 women, 31 men; mean age = 22.9 years, SD = 5.0 years) at a large public university who screened positive for suicide risk, defined by at least two of the following: suicidal thoughts, history of suicide attempt, depression, and alcohol abuse. Racial/ethnic self-identifications were primarily Caucasian (n = 54) and Asian (n = 21). Students were randomized to *e*Bridge or the control condition (personalized feedback only, offered in plain report format). Outcomes were measured at 2-month follow-up.

**Results**—Despite relatively modest engagement in online counseling (29% of students posted 1 message), students assigned to *e*Bridge reported significantly higher readiness for help-seeking scores, especially readiness to talk to family, talk to friends, and see a mental health professional. Students assigned to *e*Bridge also reported lower stigma levels and were more likely to link to mental health treatment.

**Conclusions**—Findings suggest that offering students personalized feedback and the option of online counseling, using motivational interviewing principles, has a positive impact on students' readiness to consider and engage in mental health treatment. Further research is warranted to determine the robustness of this effect, the mechanism by which improved readiness and treatment linkage occurs, and the longer term impact on student mental health outcomes.

## Keywords

suicidal ideation; suicide attempt; depression; screening; online intervention

---

Correspondence concerning this article should be addressed to Cheryl A. King, Rachel Upjohn Building, 4250 Plymouth Road, Ann Arbor, MI 48109. kingca@umich.edu.

Cheryl A. King, Ewa Czyz, and Adam Horwitz, Departments of Psychiatry and Psychology; Anne Kramer and Steve Chermack, Department of Psychiatry; Daniel Eisenberg, Department of Health Management and Policy; Kai Zheng, Department of Health Management and Policy and School of Information. Dr. King, Dr. Eisenberg, Dr. Chermack, and Anne Kramer are members of the University of Michigan Depression Center.

Suicide is a substantial concern on college campuses. It is estimated that approximately 7.5 per 100,000 young adults attending college die of suicide each year (Silverman, Meyer, Sloane, Raffel, & Pratt, 1997). Furthermore, approximately 6% of undergraduate and 4% of graduate students reported seriously considering suicide and 1.1% reported a suicide attempt in the previous year (Drum, Brownson, Burton Denmark, & Smith, 2009; Kisch, Leino, & Silverman, 2005). In addition, 8% of undergraduates and 5% of graduate students reported having attempted suicide in their lifetime (Drum et al., 2009).

Among college students who seriously considered attempting suicide in the preceding year, over half had not received professional help (Drum et al., 2009). Moreover, based on data from the National Survey of College Counseling Center Directors, only 20% of students who died by suicide had sought help at the school's counseling center (Gallagher, 2011). In terms of suicide risk factors, one study reported that only 36% of university students with major depression had received mental health services in the previous year (Eisenberg, Golberstein, & Gollust, 2007); another study reported that, among students with an alcohol use disorder, only 4% had received treatment (Wu, Pilowsky, Schlenger, & Hasin, 2007). The high rate of mental health service underutilization is problematic, particularly in light of evidence that help-seeking has the potential to reduce suicidal behavior. In a large study of undergraduate and graduate students, those who sought mental health services were approximately half as likely to attempt suicide as non-help seekers (Drum et al., 2009). The substantial societal cost and personal tragedy of suicide call for more efforts to identify students who are at risk and link them to potentially helpful services.

In an ongoing effort to address this problem, the American Foundation for Suicide Prevention (AFSP) has developed and disseminated a College Screening Program across multiple universities in the United States (http://www.afsp.org/). This initiative identifies students at risk for suicide via an email invitation offering them the opportunity to participate in an online, web-based screening. In this interactive approach, a trained counselor reviews student responses and posts a confidential personalized assessment on the website, which students can retrieve with user names and passwords. Students have the option of participating in an online dialogue with the counselor, and are encouraged to contact the counselor for an in-person evaluation. In a naturalistic study of this program's effectiveness (Haas et al., 2008), 8% of 14,500 invited undergraduate students completed the screening survey and 89% of these students viewed their personalized assessment. Among students designated as high risk and moderate risk, 34.3% and 19.6%, respectively, engaged in one or more online dialogues with the counselor. This study suggests that a web-based online screening program for college students may facilitate treatment seeking and improved outcomes among students at risk for suicide.

The present pilot randomized controlled trial examines the effectiveness of Electronic Bridge to Mental Health Services (eBridge). Extending the work of the AFSP, eBridge was designed for students at particularly elevated risk for suicide, operationalized as two or more of the following: history of suicide attempt, current suicidal ideation, depression, and alcohol abuse. Two risk factors were required to improve the specificity of the "elevated risk" designation. Past studies have indicated that a combination of risk factors, such as alcohol abuse and depression (Dvorak, Lamis, & Malone, 2013) or suicidal ideation and past

attempt (Borges et al., 2006), conveys a greater risk for suicide than when occurring singularly. This study is, to our knowledge, the first randomized controlled study of an online screening and intervention program for college students at risk for suicide and the first such intervention to be conceptualized within a health behavior theoretical model (Janz, Champion, & Strecher, 2002). Such a model emphasizes self-determination, personal beliefs, and a motivational interviewing (MI) approach (Miller & Rollnick, 2002). It is hypothesized that students assigned to *e*Bridge will report greater readiness to consider mental health treatment and be more likely to link to such treatment by 2-month follow-up than students assigned to the comparison condition. Due to previously established sex differences in several of the outcomes, such as help seeking and perceptions of stigma (e.g., Eisenberg, Downs, Golberstein, & Zivin, 2009; Eisenberg, D., Hunt, J., Speer, N., & Zivin, K. (2011), we explored the role of sex as a moderator.

# Method

## Participants

A total of 7,000 students were randomly selected from the 9,219 students in the participating university registrar's database who met study inclusion criteria ( 18 years, no prior participation in *e*Bridge feasibility study, living in university community [e.g., not studying abroad]). Students (49% women, 51% men) were invited by email in January of 2012 to participate. This sample included 59% undergraduate and 41% graduate students. Of the students invited to participate, 25% provided informed consent and began the screening survey (n = 1,744); 85% of these students (n = 1,488) completed the survey. Women were more likely than men (p<0.001) to start (30.5% versus 19.6%) and complete (26.1% versus 16.6%) the survey. Similarly, graduate students were more likely than undergraduate students (p < 0.001) to start (28.3% versus 22.5%) and complete (24.4% versus 19.1%) the survey.

A total of 116 students (7.8%) screened positive for suicide risk according to the following criteria (measures below): (a) Depression (Dep) + Suicidal Ideation and/or History of Suicide Attempt (SI/SA) (n = 57), (b) Alcohol Abuse (AA) + SI/SA (n = 15), (c) Dep + AA + SI/SA (n = 19), (d) Dep + AA (n = 23), (e) SI + SA (n = 2). Students were excluded if they were currently in mental health treatment (n = 40), leaving 76 students (45 women, 31 men) in the sample. The mean age was 22.9 years (SD = 5.02). The racial composition was Caucasian (n = 54, 71%), Asian American (n = 21, 28%), and American Indian/Alaskan Native (n = 1, 1%). Four students identified themselves as Hispanic (5%).

## Measures

**Suicide risk factors**—The 9-item Patient Health Questionnaire-9 (PHQ-9; Spitzer, Kroenke, & Williams, 1999) was used to assess depression and suicidal ideation in the past two weeks. The PHQ-9 has been validated as being highly correlated with a diagnosis of depressive disorder (Henkel et al., 2004) and scores on other depression instruments (Spitzer et al., 1999). The first two items (PHQ-2), assessing anhedonia and depressed mood, were used to screen for depression. A positive screen was defined as a score of at least 3, identified as an optimal cutoff for depression (Kroenke, Spitzer, & Williams, 2003). Those

screening positive were administered the additional PHQ questions to achieve PHQ-9 scale scores. The suicidal ideation screen was positive when participants indicated any endorsement of "thoughts that you would be better off dead, or of hurting yourself" in the ninth item of the PHQ-9. The National Comorbidity Study (Kessler et al., 2004) question "In your lifetime have you ever attempted suicide?" was used dichotomously (yes/no) to determine students' lifetime history of suicide attempt. Finally, the Alcohol Use Disorders Identification Test (AUDIT; Saunders, Aasland, Babor, de la Fuente, & Grant, 1993) was used to assess alcohol abuse. The 10-item AUDIT assesses frequency, quantity, and consequences of drinking, with scores for each item ranging from 0 – 4. As an example, the response options for "How many drinks containing alcohol do you have on a typical day when you are drinking?" are 1 or 2 (0), 3 or 4 (1), 5 or 6 (2), 7 to 9 (3), and 10 or more (4). The AUDIT is a valid instrument for detecting high-risk alcohol use among college students, based on a cutoff of 6–8 (Kokotailo et al., 2004). The cutoff score for a positive screen in this study was set to be 8 or higher.

**Primary outcome measures**—Perceived Need for Help was assessed with a dichotomous variable (yes/no) based on students' responses to questions inquiring if, in the previous two months, they thought they needed help for emotional or mental health problems, or problems related to alcohol and/or substance abuse, or neither of the two. This measure was adapted from the Healthcare for Communities Study (Wells, Sturm, & Sturm, 2003), and is significantly correlated with mental health care utilization in the Healthy Minds Study at p<0.001 (Eisenberg et al., 2007; Eisenberg et al., 2011).

A dichotomous variable assessing Professional Help-Seeking was assessed by students' responses to a question (yes/no) asking if they had met with a mental health professional (such as counselor, psychologist, social worker, psychiatrist) to get help with any concerns. In addition, students were asked at baseline (for exclusion from intervention trial) and at 2-month outcome if they were currently receiving counseling or therapy (yes/no) and taking any medication (yes/no) for mental or emotional health. These measures were adapted from the Healthcare for Communities Study (Wells et al., 2003).

Perceived Public Stigma and Personal Stigma were assessed with two items: if respondents think that *most people* think less of someone who has received mental health treatment and if the *respondent him/herself* thinks less of someone who has received mental health treatment, respectively. Responses were rated on a 5-point scale, from strongly agree to strongly disagree. These items were adapted from the widely used Discrimination-Devaluation Scale (DDS; Link, Cullen, Struening, & Shrout, 1989). The adapted items have been used in a national analysis of stigma and help-seeking among university students (Eisenberg et al., 2009), have a significant negative correlation (r=0.58, p < 0.001) with the sum of other items adapted from the Discrimination-Devaluation Scale, and was a significant negative predictor of treatment use (odds-ratio = 0.65, p < 0.001).

Readiness to Access Help was assessed on an 11-point scale, with response anchors including: "Sometimes I think about doing this" (3); I have taken steps toward doing this" (7); and "I already did this" (10). The scale presents six help-seeking behaviors: seeking information about mental health services from websites, pamphlets, or other sources; talking

to a family member about seeking help from a mental health professional; talking to a friend or other non-family member about seeking help from a mental health professional; seeking help from a mental health professional; accessing self-help or support group; accessing academic support services. The scale was adapted from LaBrie, Quinlan, Schiffman, and Earleywine (2005). Internal consistency for the full scale in the present sample was 0.81 (Cronbach alpha).

**Procedures**

This study was IRB-approved. Potentially eligible students from a public university in the midwestern region of the United States were randomly selected from the registrar's database to receive email invitations. All students invited to participate in the online screening survey, regardless of whether they consented, were entered into a random drawing for gift cards (one $1000 gift card and five $100 gift cards). The email invitation included a link to a secure website where students signed the study consent form and filled out the screening survey. Each link included a numerical ID unique to each student and no identifying information was stored. Students who screened positive for suicide risk were randomly assigned (by computer) to *e*Bridge (n = 35) or the control group (n = 41) (Figure 1). All students were provided with a list of mental health resources, in addition to pop-up messages with information about emergency services if suicidal ideation or a history of suicide attempt was reported.

Two-month follow-up data were collected from students who screened positive for suicide risk (eBridge and control groups) using a similar process (email invitation, link to private and secure website). We offered $10 online gift certificates to these students as incentives, with an additional $25 for completing the follow-up. The follow-up evaluation was completed by 31 students in *e*Bridge (76%) and 29 students in the control group (83%). Study retention did not differ by group (p = 0.44), and there were no significant differences in baseline demographic or screen scores between those who were and were not retained.

**Description of *e*Bridge Intervention and Control Group**

After completing the baseline assessment, students in each group had the opportunity to review personalized feedback (PF), which included a brief summary of reported emotional distress and alcohol use, and their impact on functioning. Graphics displayed how each student's scores compared to college students in general. Students in the control group completed the screening survey and received this feedback only. Although information was provided to both groups on all online pages regarding mental health resources (with contact information), students in the control group did not have the option of making contact with the study team (online counseling or otherwise) related to their feedback or mental health resources. This condition was modeled after the online screening and feedback surveys that are relatively common on university websites.

For students in the *e*Bridge condition, the PF was provided in keeping with MI principles: (1) students could choose which, if any, feedback domain they wanted to view; (2) PF statements were in MI-consistent language; and (3) students had a choice to link directly with the *e*Bridge counselor. These students could click on any of three topics to start a

confidential online exchange with the counselor (who had no information about student identities): "More about my concerns or my survey feedback;" "More about available resources;" or "Other." In addition, they had an opportunity to initiate a real-time chat session with the *e*Bridge counselor during specified hours, which corresponded to peak student usage times observed in feasibility trials. Outside of these hours, they had an opportunity to send a private message to the counselor via a "dialogue page," a private and secure page where students could initiate and respond to counselor communications in an asynchronized manner as well as view transcripts of their chat sessions. Counselors had access to students' personalized feedback and responded to student messages within 24 hours. Counselors used MI-consistent language (e.g., asking permission, affirming statements, statements supporting choice and autonomy), and had access to MI rulers for students to consider and scale their readiness for change and help seeking. In addition, counselors used the "dialogue page" to initiate communication with students who had not originally elected to communicate or with students who became inactive; up to three messages were sent to encourage student involvement.

*e*Bridge counselors were master's level mental health professionals who participated in MI training provided by a member of the Motivational Interviewing Network of Trainers in addition to multiple mock *e*Bridge counseling sessions. Additional opportunities to enhance skills were provided in supervision sessions where online transcripts were reviewed.

### Data Analyses

Unadjusted differences in means between the intervention and control group were tested using two tailed t-tests for continuous measures and chi-square tests for binary measures. Differences between groups at two month follow-up also adjusted for covariates (gender, age; baseline PHQ-9 score, AUDIT score, suicidal ideation/attempt), and were estimated using logistic regressions for binary outcomes and linear regressions for other outcomes.

## Results

The baseline demographic and clinical characteristics of *e*Bridge and control groups were not statistically different (Table 1). As expected in a sample that screened positive for suicide risk, depressive symptoms were high (average PHQ-9 scores above 13 in each group, corresponding to moderate depression), and the majority of students (n = 27, 77% in control; n = 33, 80% in intervention) had recent suicidal ideation or a lifetime suicide attempt.

Following completion of the screening survey, the personalized feedback was viewed by almost all students in the control group (for whom it was automatically presented on the next screen), and the vast majority of those in the *e*Bridge group (for whom it was a choice to review) (Table 2). Among those in *e*Bridge, 71% (n = 29) did not correspond with the counselor, 17% (n = 7) sent a single correspondence, 5% (n = 2) sent two correspondences, and 7% (n = 3) sent three or more.

Despite the modest level of engagement in online counseling, at two-month follow-up the *e*Bridge group had significantly higher readiness scores (Table 3), especially readiness to

talk to family and friends about seeing a mental health professional, and to see a mental health professional. The *e*Bridge group also reported lower stigma levels. Most importantly, the *e*Bridge group was more likely to have received mental health treatment. This pattern remained when students who engaged in online counseling (n = 12) were removed from the sample. The effects were similar by gender for readiness and reported knowledge of where to seek help; however, the effects on reducing stigma were significantly larger for males (Table 4). There were no differences in intervention effects for undergraduate versus graduate students.

## Discussion

This pilot randomized controlled trial examined the effectiveness of *e*Bridge, a web-based screening and intervention program designed to identify college students at elevated risk for suicide and increase their readiness for, and actual linkage with, mental health treatment. At two-month follow-up, the students randomized to the *e*Bridge group reported significantly higher readiness scores, particularly readiness to talk to family and friends about seeing a mental health professional, and readiness to see a mental health professional. They also were more likely to have received mental health treatment during the two month study period. These promising findings have substantial public health significance given the numbers of college students who have made suicide attempts or seriously considered doing so (Kisch et al., 2005), and the low levels of professional help-seeking within this population (Drum et al., 2009).

These positive findings are particularly notable given the relatively modest level of student engagement in *e*Bridge's online counseling component. This suggests that being given the option of online counseling (implemented in a manner consistent with MI principles in this study) may have been critical to the intervention's effectiveness for some students whether or not these students actually engaged in the online counseling. It is also notable that *e*Bridge resulted in a significant reduction in perceived stigma regarding mental health treatment among male students, which is particularly promising given that college student males tend to report higher levels of stigma (e.g., Eisenberg et al., 2009) and are also are less likely to seek mental health services (e.g., Eisenberg et al., 2011); lowering stigma about mental health treatment among males might encourage more help seeking behavior.

If found to be effective in a larger and more definitive efficacy trial, *e*Bridge has the potential to be cost-effective because it is delivered online and involves only brief counseling. The 29% rate of student engagement in online counseling found in this study is comparable to previously reported rates for high and moderate risk students (Haas et al., 2008). A higher level of participation may be possible with a more engaging website design and possibly more real-time communication, which we are currently working on. However, it is also important to consider the available counseling resources of colleges and universities wishing to implement suicide screens, as past feasibility studies have noted that counseling staffs may not be equipped to meet the demand of suicide-screen identified students (e.g., Hallfors et al., 2006). Further cost effectiveness research is recommended.

Study findings should be viewed as preliminary as this study has several limitations. Its sample size is relatively small and consists entirely of students from one public university, which limits the potential generalizability of findings. In addition, data regarding readiness for professional treatment and perceived stigma are only available from students at two-month follow-up, enabling only a group comparison at this point in time. Although the random assignment to *e*Bridge and comparison groups offers some protection against this threat to internal validity, it was not possible to control for any group differences in readiness that may have existed at baseline. In addition, although we reached a large sample of students with 25% responding to the online survey invitation, which is similar to the participation rate in a national web survey of college student mental health (Eisenberg et al., 2011), this was a minority of students. Further increases in survey participation may require institutional engagement (e.g., actively promoting the program to students), which could occur after effectiveness is established. A final study weakness is the relatively short follow-up period of two months. Haas et al. (2008) reported a span of time of several weeks to more than one year between students' online screening and their in-person evaluation session, which suggests that this study may undercount the number of students who sought treatment in response to one or both study conditions.

In conclusion, findings suggest that offering students personalized feedback and the option of online counseling in a manner consistent with motivational interviewing principles has a positive impact on students' readiness to consider and engage in professional mental health treatment. This positive impact is particularly encouraging considering that utilization of mental health services can be effective in reducing risk of suicidal behavior among students (Drum et al., 2009). However, further research is warranted to determine the robustness of this effect, the mechanism by which improved readiness and treatment linkage occurs, and the longer term impact on student well-being, including depression, alcohol abuse, and suicidal ideation and behavior. Further research with a larger sample of college students and enhanced statistical power is warranted to determine if an online treatment linkage intervention, such as eBridge, can lead to improved outcomes, in addition to facilitating treatment linkage.

## Acknowledgments

## References

Borges G, Angst J, Nock MK, Ruscio AM, Walters EE, Kessler RC. A risk index for 12-month suicide attempts in the National Comorbidity Survey Replication (NCS-R). Psychological Medicine. 2006; 36(12):1747–1757. [PubMed: 16938149]

Drum DJ, Brownson C, Burton Denmark A, Smith SE. New data on the nature of suicidal crises in college students: Shifting the paradigm. Professional Psychology: Research and Practice. 2009; 40(3):213–222.

Dvorak RD, Lamis DA, Malone PS. Alcohol use, depressive symptoms, and impulsivity as risk factors for suicide proneness among college students. Journal of Affective Disorders. 2013; 149(1–3):326–334. [PubMed: 23474093]

Eisenberg D, Downs MF, Golberstein E, Zivin K. Stigma and help seeking for mental health among college students. Medical Care Research and Review. 2009; 66(5):522–541. [PubMed: 19454625]

Eisenberg D, Golberstein E, Gollust SE. Help-seeking and access to mental health care in a university student population. Medical Care. 2007; 45(7):594–601. [PubMed: 17571007]

Eisenberg D, Hunt J, Speer N, Zivin K. Mental health service utilization among college students in the United States. Journal of Nervous and Mental Disease. 2011; 199(5):301–308. [PubMed: 21543948]

Gallagher, RP. National Survey of Counseling Center Directors 2011, from http://www.iacsinc.org/2011%20NSCCD.pdf. 2011.

Haas A, Koestner B, Rosenberg J, Moore D, Garlow SJ, Sedway J, Nemeroff CB. An interactive web-based method of outreach to college students at risk for suicide. Journal of American College Health. 2008; 57(1):15–22. [PubMed: 18682341]

Hallfors D, Brodish PH, Khatapoush S, Sanchez V, Cho H, Steckler A. Feasibility of screening adolescents for suicide risk in "real-world" high school settings. American Journal of Public Health. 2006; 96(2)

Henkel V, Mergl R, Kohnen R, Allgaier A-K, Maller H-J, Hegerl U. Use of brief depression screening tools in primary care: Consideration of heterogeneity in performance in different patient group. General Hospital Psychiatry. 2004; 26(3):190–198. [PubMed: 15121347]

Janz, NK.; Champion, VL.; Strecher, VJ. The health belief model. In: Glanz, K.; Rimer, BK.; Lewis, FM., editors. Health Behavior and Health Education. San Francisco: John Wiley and Sons; 2002.

Kessler RC, Berglund P, Chiu WT, Demler O, Heeringa S, Hiripi E, Zheng H. The US National Comorbidity Survey Replication (NCS-R): Design and field procedures. International Journal of Methods in Psychiatric Research. 2004; 13(2):69–92. [PubMed: 15297905]

Kisch J, Leino EV, Silverman MM. Aspects of Suicidal Behavior, Depression, and Treatment in College Students: Results from the Spring 2000 National College Health Assessment Survey. Suicide and Life-Threatening Behavior. 2005; 35(1):3–13. [PubMed: 15843320]

Kokotailo PK, Egan J, Gangnon R, Brown D, Mundt M, Fleming M. Validity of the alcohol use disorders identification test in college students. Alcoholism: Clinical & Experimental Research. 2004; 28(6):914–920.

Kroenke K, Spitzer RL, Williams JB. The Patient Health Questionnaire-2: validity of a two-item depression screener. Medical Care. 2003; 41(11):1284–1292. [PubMed: 14583691]

LaBrie JW, Quinlan T, Schiffman JE, Earleywine ME. Performance of Alcohol and Safer Sex Change Rulers Compared With Readiness to Change Questionnaires. Psychology of Addictive Behaviors. 2005; 19(1):112–115. [PubMed: 15783287]

Link BG, Cullen FT, Struening EL, Shrout PE. A modified labeling theory approach to mental disorders: An empirical assessment. American Sociological Review. 1989; 54(3):400–423.

Miller, WR.; Rollnick, S. Motivational interviewing: Preparing people to change addictive behavior. 2nd ed.. New York: Guilford Press; 2002.

Saunders JB, Aasland OG, Babor TF, de la Fuente JR, Grant M. Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO Collaborative Project on Early Detection of Persons with Harmful Alcohol Consumption--II. Addiction. 1993; 88(6):791–804. [PubMed: 8329970]

Silverman MM, Meyer PM, Sloane F, Raffel M, Pratt DM. The Big Ten Student Suicide Study: A 10-year study of suicides on midwestern university campuses. Suicide & Life-Threatening Behavior. 1997; 27(3):285–303. [PubMed: 9357084]

Spitzer RL, Kroenke K, Williams JBW. Validation and utility of a self-report version of PRIME-MD: The PHQ Primary Care Study. Journal of the American Medical Association. 1999; 282(18):1737–1744. [PubMed: 10568646]

Wells, KB.; Sturm, R.; Sturm, A. Healthcare for Communities Household Survey public use files: Revised codebook. Ann Arbor, MI: Inter-university Consortium for Political and Social Research; 2003.

Wu L-T, Pilowsky DJ, Schlenger WE, Hasin D. Alcohol use disorders and the use of treatment services among college-age young adults. Psychiatric Services. 2007; 58(2):192–200. [PubMed: 17287375]
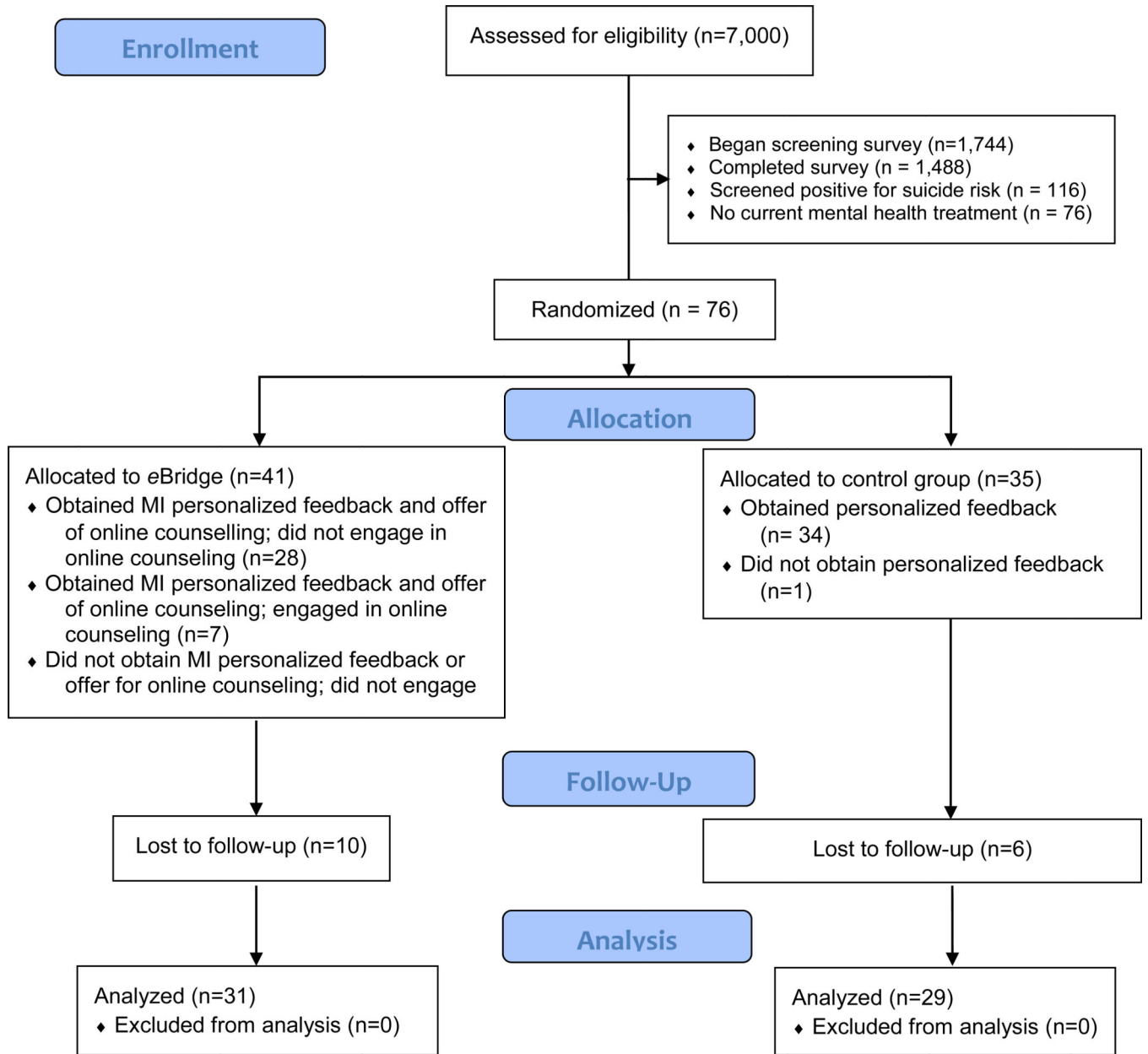
## Public Health Significance Statement

This study suggests that completion of an online mental health screen, accompanied by personalized feedback and the option of brief online counseling, may facilitate readiness to consider and obtain mental health services among college students at elevated risk for suicidal behavior.

**Figure 1.**
*e*Bridge Intervention Consortium Flow-Chart

**Table 1**

Baseline characteristics of intervention and control groups

| | Control (N = 35) | | Intervention (N = 41) | | $p^a$ |
|---|---|---|---|---|---|
| | Mean (SD) | % | Mean (SD) | % | |
| Female | | 51 | | 66 | .20 |
| Undergraduate | | 54 | | 68 | .21 |
| Age | 23.3 (5.3) | | 22.5 (4.8) | | .51 |
| PHQ-9 score | 13.3 (4.3) | | 13.9 (4.9) | | .61 |
| Positive screen (PHQ-2 ≥ 3) | | 82 | | 80 | .80 |
| AUDIT score | 7.7 (6.7) | | 7.4 (5.7) | | .87 |
| Positive screen (AUDIT ≥ 8) | | 51 | | 46 | .66 |
| Suicidal ideation (past 2 weeks) | | 60 | | 75 | .15 |
| Suicide attempt (lifetime) | | 31 | | 15 | .08 |
| At least one of the above | | 77 | | 80 | .72 |

[a] p-values for two-tailed tests (t-test for continuous variables, chi-square for binary variables) of the null hypothesis that the baseline means are equal across groups.

**Table 2**

Engagement in intervention

| | Control | Intervention |
|---|---|---|
| | **(N = 35)** | **(N = 41)** |
| Viewed personalized feedback related to: | | |
|   Distress/depression | 97% | 85% |
|   Alcohol | 91% | 76% |
| Student messages to counselor | | |
|   0 messages | -- | 71% |
|   1 message | -- | 17% |
|   2 messages | -- | 5% |
|   3+ messages | -- | 7% |

*Note.* Control group was not offered online counseling.

**Table 3**

Effects of the intervention (outcomes for the intervention versus control group)

| | Unadjusted means | | | | Regression-adjusted[a,b,c] | |
|---|---|---|---|---|---|---|
| | Control | Intervention | Difference | p | Effect | p |
| | (N = 29) | (N = 31) | | | | |
| Outcomes on Likert/rating scales | | | | | | |
| Readiness: seek information (0–10) | 3.52 | 5.35 | 1.84 | .050 | 1.60 | .100 |
| Readiness: talk to family (0–10) | 2.38 | 5.35 | 2.98 | .002 | 2.74 | .007 |
| Readiness: talk to friend (0–10) | 2.55 | 5.35 | 2.80 | .002 | 2.48 | .010 |
| Readiness: see MH professional (0–10) | 2.45 | 5.71 | 3.26 | .000 | 3.16 | .001 |
| Readiness: self-help or support group (0–10) | 1.10 | 1.87 | 0.77 | .240 | 0.50 | .460 |
| Readiness: academic support services (0–10) | 2.07 | 1.68 | −0.39 | .550 | −0.44 | .520 |
| Readiness: AVERAGE (0–10) | 2.34 | 4.22 | 1.88 | .002 | 1.67 | .008 |
| Perceived public stigma score (0–4) | 3.21 | 2.71 | −0.50 | .080 | −0.59 | .040 |
| Personal stigma score (0–4) | 2.00 | 0.90 | 1.10 | .003 | −1.07 | .004 |
| PHQ-9 score (0–27) | 11.0 | 11.39 | 0.39 | .755 | 0.29 | .811 |
| AUDIT score (0–40) | 6.00 | 6.84 | 0.84 | .600 | 0.51 | .527 |
| Binary outcomes | | | | | | |
| Perceived a need for help (2 mos.) | 62% | 72% | 0.10 | .660 | OR = 1.51 | .480 |
| Met w/ MH professional (2 mos.) | 0% | 28% | 0.28 | .002 | ** | |
| Therapy/counseling (current) | 0% | 13% | 0.13 | .050 | ** | |
| Psychiatric medication (current) | 0% | 9% | 0.09 | .090 | ** | |

*Note.* OR = Odds Ratio

[a] Linear regressions were estimated for Likert/rating scale outcomes, logistic regressions for binary outcomes

[b] Covariates include: age, gender, and baseline suicide risk factors (PHQ-9 score, AUDIT score, suicidal ideation or previous attempt).

[c] In a Bonferroni adjustment for multiple hypothesis testing, we have nine outcomes (with average readiness a composite outcome); therefore, the unadjusted p-values shown above would only be significant at the standard 0.05 level if they are less than 0.0056. With this adjustment, effects remain significant for average readiness, met with a mental health professional, and personal stigma.

** Cannot be estimated because no variation in outcome in control group.

**Table 4**

Regression-adjusted intervention effects within each gender

| Outcomes | Females (N = 38) | | Males (N = 22) | | Difference |
|---|---|---|---|---|---|
| | Effect | p | Effect | p | p |
| PHQ-9 score (0–27) | 1.82 | .28 | −3.48 | .06 | .10 |
| AUDIT score (0–40) | −0.09 | .94 | 1.37 | .25 | .37 |
| Readiness: AVERAGE (0–10) | 1.87 | .04 | 1.63 | .08 | .98 |
| Perceived stigma (0–4) | −0.17 | .65 | −1.33 | < .01 | **.04** |
| Personal stigma (0–4) | −0.75 | .10 | −1.96 | .01 | .20 |

*Note.* Binary outcomes are not shown because subgroup sample sizes are too small to estimate regressions. Difference by gender is tested using an interaction (female*intervention) in a regression with the full sample. Direction of effect is intervention group minus control group.