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Suicide Among College Students in Psychotherapy: Individual Predictors and Latent Classes

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This study sought to identify predictors of suicidal behavior among college students who are psychotherapy clients, as well as to determine underlying classes of clients with suicidal ideation. Data were gathered from 101,570 clients, 391 of whom engaged in suicide behavior during treatment. Regression analyses revealed that suicide behavior was positively associated with 3 pretreatment variables: depression, prior suicide behavior, and prior nonsuicidal self-injury. Four latent classes of clients with suicidal ideation were identified that were named "prior ideation," "extensive risk," "prior treatment," and "circumscribed depression." The number of clients in each class varied widely, as did the relative risk of suicide behavior. Implications for treatment, suicide assessment, and suicide prevention are discussed.

Public Significance Statement
This study demonstrates that psychotherapists should attend to particular indicators of possible suicide behavior among their college student clients and that there are different types of suicidal college student clients, each with their own associated risk of suicide behavior.

Keywords: suicide, psychotherapy, college students, depression

Suicide represents a significant public health concern. More than 45,000 people in the United States die by suicide each year (Centers for Disease Control and Prevention [CDC], 2018). Approximately 7% of U.S. citizens have experienced the death of a friend or family member due to suicide (Berman, 2011). In addition to the obvious emotional toll of suicide for individuals, families, and communities, suicide behavior (i.e., any action intended to take one's own life) results in more than $70 billion in medical and work-related costs in the U.S. every year (CDC, 2018).

Suicide is the second leading cause of death among traditionally aged college students in the U.S., with a prevalence of approximately 14 deaths per 100,000 persons (CDC, 2018). Some studies, however, indicate that death by suicide is less common among college students than similarly aged peers (Schwartz, 2013; Silverman, Meyer, Sloane, Raffel, & Pratt, 1997), due in part to lower rates of gun ownership. Research suggests that, each year, 10% of college students seriously consider suicide and roughly 1.5% engage in suicide behavior (Schwartz, 2006; Westefeld et al., 2005; Wilcox et al., 2010); these rates have increased slightly every year since 2010 (Center for Collegiate Mental Health, 2019). Fortunately, effective programs have been developed whose goal is to direct at-risk college students to campus counseling centers to receive psychological help (Garlow et al., 2008; Haas et al., 2008). Inherent in such efforts is the recognition that university counseling centers serve high-risk students. Students attended more than a million sessions of psychotherapy on U.S. campuses during the 2016–2017 academic year (LeViness, Bershad, & Gorman, 2017), and compared with students in general, those who seek psychotherapy are more depressed, hostile, and anxious. They are also three times more likely than their classmates to report high levels of suicide ideation and five times more likely to have made a previous suicide attempt (McAleavey et al., 2012). A survey of counseling center directors indicated that, on average, four clients per year in each center engage in suicidal behavior (LeViness et al., 2017). It has been estimated that the relative risk of suicide for

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counseling center clients is 18 times greater than for students at large (Schwartz, 2006), although the risk is higher for clients seen in community mental health centers and in independent practice (Chemtob, Hamada, Bauer, Torigoe, & Kinney, 1988).

Although many studies have identified factors associated with suicide ideation among college students, fewer studies have examined actual suicide behavior in this population, and virtually no research has investigated specific risk factors for students receiving psychotherapy. The difficulties associated with accurate prediction of low frequency health events such as suicide have been well-documented (e.g., Kessler, Borges, & Walters, 1999). Nonetheless, given the serious consequences of suicide behavior, we believe that empirical data that help psychotherapists determine which clients possess elevated risk for suicide behavior would be of value to prevention and intervention efforts. It may be most efficient, clinically, to identify single, readily observed variables associated with suicide behavior. Identifying only individual variables, however, may obscure less obvious types or classes of clients who present with suicidal thoughts but have varying degrees of risk for subsequent suicide behavior while in treatment.

Risk Factors

Risk factors for suicide behavior may be classified in terms of current psychological distress, chronic mental health problems, and demographic factors. In terms of current psychological distress, prevalent theories regarding suicide behavior implicate factors such as hopelessness, perceived burdensomeness to others, and feelings of marginalization and loneliness (Chu et al., 2017; Joiner, 2005). In addition, research suggests that disorders that are characterized by highly affective, impulsive, and aggressive symptoms tend to be positively associated with suicide behavior in the general population (Glenn & Nock, 2014; Nock & Kessler, 2006). Specifically, anxiety disorders, including generalized anxiety disorder and social phobia, have been found to be predictive of suicide behavior (Bernal et al., 2007; Glenn & Nock, 2014; Kessler et al., 1999; Sareen et al., 2005). Depression is also linked to higher rates of suicide behavior (Baalbaki, 2016; DeJong, Overholser, & Stockmeier, 2010; O'Connor, Smyth, Ferguson, Ryan, & Williams, 2013; Westefeld et al., 2006), and it is typically the leading risk factor for suicide behavior among all mental health diagnoses (Bernal et al., 2007). Substance abuse also is predictive of suicide behavior (Baalbaki, 2016; Johnson, Oxendine, Taub, & Robertson, 2013; Lamis, Malone, Langhinrichsen-Rohling, & Ellis, 2010; Mann, 2002; Nock et al., 2008; Nock & Kessler, 2006). Additional current distress-related risk factors among college students, in particular, include academic concerns (Baalbaki, 2016), hostility (Brent & Melhem, 2008), hopelessness (Furr, Westefeld, McConnell, & Jenkins, 2001; Kisch, Leino, & Silverman, 2005; Westefeld et al., 2006), interpersonal problems, and family concerns (Westefeld et al., 2005).

With regard to chronic mental health problems, suicide behavior is more common among college students who have been hospitalized for psychological reasons (Qin & Nordentoft, 2005), who have engaged in suicide behavior previously (Beautrais, 2003; Brown, Beck, Steer, & Grisham, 2000; Coryell et al., 2002; O'Connor et al., 2013), or who have engaged in nonsuicidal self-injury (Chapman & Dixon-Gordon, 2007; Cooper et al., 2005; Klonsky, May, & Glenn, 2013; Runeson, 2002). It may be that

young adults whose previous psychological problems were serious enough to warrant psychiatric hospitalization, along with those who have a history of self-harming behavior, experience an increased desperation, or numbness, that leads them to engage in more extreme self-injurious behavior in the form of suicide attempts.

In terms of demographic variables, gender, race, and sexual orientation have been found to be associated with suicide risk in the general population. In particular, males die by suicide more often than women, although women engage in suicide behaviors more frequently than men (Beautrais, 2003; Nock et al., 2008). Furthermore, non-Hispanic Whites (Nock et al., 2008) and non-heterosexuals (Figueiredo & Abreu, 2015) have been identified as having elevated risk for suicide behavior. The extent to which cultural factors predict suicide behavior in college students is not known, although research has demonstrated that students with disabilities tend to have more suicide ideation than students without disabilities (Coduti, Hayes, Locke, & Youn, 2016).

In addition to identifying risk factors, research points to several protective factors that decrease the risk of suicide behavior. In the general population, these include the importance of religion or spirituality in an individual's life (Simonson, 2008), and among college students, living with other people rather than alone (Schweitzer, Klayich, & McLean, 1995).

Limitations of Existing Research and Possible Solutions

Several common limitations impede empirical knowledge regarding college student suicide. First, studies tend to employ retrospective rather than prospective designs, resulting in potentially distorted or limited recall of important variables. Second, most research examines suicide ideation rather than actual suicide behavior. Although suicide ideation predicts suicide behavior, it does so with only limited accuracy (Klonsky, May, & Saffer, 2016), and some experts have argued that clinicians overrely on client-reported suicide ideation in assessing risk for suicide behavior (Silverman & Berman, 2014). In fact, among depressed U.S. veteran clients, as many as 85% who die by suicide deny suicide ideation at any time during treatment and nearly three-quarters report no suicide ideation within a week prior to their deaths (Smith et al., 2013). Third, research is usually conducted at a limited number of sites, typically one, which restricts the external validity of findings. Furthermore, studies of college student suicide behavior often have small samples, and as a result, statistical power is compromised. Finally, whereas studies have attempted to identify observable predictors of suicide behavior, to our knowledge, research has yet to address the question of whether there are underlying types or classes of suicidal clients. We sought to overcome these limitations by collecting a large amount of data over multiple years through a national practice-research network of university counseling centers.

The Center for Collegiate Mental Health (CCMH)

CCMH (ccmh.psu.edu) is a collaborative, multidisciplinary network of clinicians, psychotherapy researchers, university administrators, and industry partners whose common aim is to gather data on the mental health of students receiving treatment at campus

counseling centers. CCMH was established in 2005 and currently has more than 550 member institutions across the United States. Data from students seeking treatment at the counseling centers of these institutions are de-identified, pooled, and sent to researchers who clean, store, and analyze data for a variety of purposes (e.g., research, training, policy, advocacy). CCMH member institutions collect data using standardized instruments, described below, as part of routine clinical practice. All schools contributing data to CCMH receive institutional review board approval (Hayes, Locke, & Castonguay, 2011).

This study utilized data collected by CCMH to identify individual predictors of suicide behavior among college student clients, as well as latent classes of clients who have suicidal thoughts. Given the lack of existing research on categories of clients who engage in suicidal ideation, we took an exploratory approach to identifying latent classes. The strength of this approach is that it distills the potentially vast number of possible responses to a set of grouping variables into several typifying patterns. From there, these identifying patterns can be analyzed in relation to suicide behavior. Regarding specific, individual predictors of suicide behavior, four sets of hypotheses were forwarded:

1. In terms of psychological distress, we predicted that students' pretreatment levels of depression, general anxiety, social anxiety, academic concerns, hostility, and alcohol abuse each would directly predict suicide behavior.

2. In terms of chronic mental health, we expected that previous suicide behavior, previous nonsuicidal self-injury, previous psychiatric hospitalization, and previous alcohol or drug treatment each would directly predict suicide behavior.

3. We also hypothesized that specific demographic variables, namely sexual orientation and race, would directly predict suicide behavior; we also explored whether gender and disability status were related to suicide behavior.

4. In terms of protective factors, we predicted that the importance of spirituality or religion in one's life and living with others each would be inversely related to suicide behavior.

Method

Participants

Data for this study were gathered by CCMH from 2012 to 2018. Before analyses, client data were coded into specific courses of treatment, as clients often return to counseling centers for multiple episodes of psychotherapy. Consistent with previous research (e.g., Hayes, McAleavey, Castonguay, & Locke, 2016; Minami et al., 2009), a new course of treatment was considered to have started after a client had no contact with the counseling center for longer than 90 days. For the purpose of analyses, courses of treatment were considered independent to reflect the fact that clients who return for a subsequent course may present with different amounts and types of distress, as well as varying protective factors.

Of the 809,875 clients in the archival data set, 101,570 reported suicide ideation at some point during treatment and had information available regarding whether or not they engaged in suicide behavior. We decided to focus only on clients with nonzero levels of suicide ideation to help improve predictive accuracy. That is, because suicide behavior is a relatively low-frequency event, we thought that limiting the sample to clients who reported suicide ideation at some point during treatment would increase the proportion of true positives in the data set (clients who reported suicide ideation and engaged in suicide behavior), at the risk of excluding false negatives (clients who did not report suicide ideation but engaged in suicide behavior). The 101,570 clients were primarily women (62.5%) who were White (67.0%) and heterosexual (75.0%). Nearly a fifth of the sample (18.6%) reported engaging in suicide behavior at some point prior to the onset of treatment.

During the period that data were gathered, 9,810 therapists treated clients, and 3,728 of these therapists provided demographic information. A total of 2,679 (71.9%) of the therapists were women, 1,012 (27.1%) were men, 15 (0.4%) were transgender, and 22 (0.6%) preferred not to indicate their gender. Most of the therapists (72.5%) identified as White, 8.5% as Black or African American, 7.3% as Asian or Asian American, 5.7% as Latina, Latino, or Hispanic, 3.4% as multiracial, and 2.6% as "other." The highest degree for 45.0% of therapists was a master's, 37.9% held a PhD or PsyD, and for 10.6% of therapists, the highest degree was a bachelors. Approximately two thirds of the therapists were trainees or licensed psychologists in either clinical (33.9%) or counseling psychology (31.7%). On the whole, full-time staff comprised 53.3% of the sample of therapists and trainees comprised 41.5%.

Measures

Counseling Center Assessment of Psychological Symptoms-62 (CCAPS-62; Locke, Buzolitz et al., 2011). The CCAPS-62 assesses a range of psychological symptoms that are common among college students. It has eight subscales: depression, generalized anxiety, social anxiety, substance use, hostility, academic distress, eating concerns, and family concerns. Students respond to items on a Likert-type scale (0 = *not at all*, 4 = *extremely*) indicating how much distress they experienced during the previous 2 weeks. Subscale scores have demonstrated acceptable internal consistency and retest reliability estimates, as well as evidence of construct validity (Locke, Buzolitz et al., 2011; McAleavey et al., 2012). A 34-item version of the CCAPS-62 was developed to facilitate assessment of treatment progress and outcome by easing the time constraints associated with multiple administrations of an instrument. Scores for the CCAPS-34 can be derived from administrations of the CCAPS-62, and these scores demonstrate solid psychometrics qualities (Locke, McAleavey et al., 2011). The substance use subscale is renamed alcohol use in the CCAPS-34 because all of the items refer to drinking. The CCAPS-34 includes one item on the depression subscale that assesses suicide ideation ("I have thoughts of ending my life"). In the present study, the internal consistency estimates (α) for the CCAPS-34 subscales that were pertinent to the study were .82 for depression, .79 for generalized anxiety, .79 for social anxiety, .84 for alcohol use, .83 for hostility, and .79 for academic distress.

Standardized data set (SDS). The SDS contains demographic, cultural, and mental health history questions that are typically asked of students during an initial appointment at a university counseling center (Center for Collegiate Mental Health, 2019). For example, items ask students to identify their sexual orientation, gender, living arrangements, recent binge drinking (the number of times in the previous 2 weeks men had consumed five or more drinks in a row, or four or more drinks in a row for women), prior mental health treatment, and the extent to which spirituality or religion plays an important role in the student's life (with responses ranging from 1 = *very important* to 5 = *very unimportant*). In addition, the SDS assesses whether clients ever "purposely injured yourself without suicidal intent," "seriously considered attempting suicide," or "made a suicide attempt." These questions on self-harm and suicide are formatted so that students indicate "how many times" they had engaged in the behavior (never, one time, 2–3 times, 4–5 times, or more than 5 times). Responses were dichotomized to indicate whether a student had ever, or never, engaged in the behavior.

Critical Incident Tracking Form. This instrument contains 12 items that are completed by therapists when a specific event has occurred during their work with a client. The items include "psychiatric hospitalization," "withdrawal from school," and relevant to the present study, "suicide attempt during treatment" and "death of client due to suicide"; these last two items were combined to indicate whether a client engaged in suicide behavior during treatment. Therapists simply indicate on the Critical Incident Tracking Form when an event has occurred. This instrument was in use for the first 5 years of data collection (2012–2017), when it was replaced by the Case Closure Form.

Case Closure Form. This form is completed by therapists at the end of treatment to indicate the reasons a case was closed, as well as events that occurred during treatment. Included in the latter are the events "suicide attempt" and "death of client: suicide." This form was in use for the last year of data collection (2017–2018).

Procedure

Clients completed the CCAPS-62 or CCAPS-34 and the SDS at their initial appointment, and they were asked to provide consent to have their de-identified data sent to CCMH; approximately 95% of clients chose to do so. Therapists were assigned anonymous codes, and these codes were paired with client data, which were de-identified. Therapists completed the Critical Incident Tracking Form or Case Closure form to indicate whether a client did or did not engage in suicide behavior during treatment. This information was embedded in the client's electronic medical record, along with CCAPS and SDS data, which was sent from each participating counseling center to CCMH.

Statistical Analyses

Logistic regression. A mixed-effects logistic regression model was used to evaluate the effects of the hypothesized predictors on suicide behavior, accounting for the nesting of clients within counseling centers. An intraclass correlation (ICC) for centers was calculated to represent the proportion of variance in suicide behavior that was explained by between-center differences. It should be noted that an ICC for a logistic regression is not the exact equivalent of an ICC in a linear regression, because there is no within-group variance in a logistic regression equation. Furthermore, the ICC derived from a logistic regression can be biased when sample sizes vary significantly between groups, as was the case in the current study. Models were fit using the lme4 package in R (Bates, Maechler, Bolker, & Walker, 2015).

Latent class analysis. In order to identify latent groups of clients who reported suicide ideation, we conducted latent class analysis (LCA; Collins & Lanza, 2010; McCutcheon, 2002). In LCA, the response patterns of a set of categorical variables (referred to as manifest variables) are analyzed to identify subgroups of a latent categorical variable that explains the relationships among the manifest variables. In this sense, LCA is an analogue of factor analysis, specifically tailored for categorical manifest and latent variables. Because the number of categories present in the latent variable is generally not known a priori, a separate model is fit for each plausible number of categories and model selection criteria are used to select the best model (and thus the optimal number of classes in the latent variable). In latent class models, the number of manifest variables and the number of categories present in each variable determine the complexity of the model, because adding a variable causes the number of total combinations of all categories to grow exponentially. Therefore, based on the empirical literature reviewed earlier in this article, we limited ourselves to seven dichotomized manifest variables that have been linked to the likelihood of future suicide behavior: previous counseling for mental health concerns, previous medication for mental health concerns, previous psychiatric hospitalization, previous nonsuicidal self-injury, previous serious consideration of suicide behavior, previous suicide behavior, and depression. The depression score on the CCAPS was dichotomized according to whether or not it exceeded a previously established threshold of 1.92 that distinguishes college student clients with and without a diagnosis of depression (McAleavey et al., 2012).

Latent class models were fit using the poLCA package in R (Linzer & Lewis, 2011). Models were compared based on standard model information criteria, including Akaike information criterion (AIC), Bayesian information criterion (BIC), adjusted Bayesian information criterion (ABIC), and consistent Akaike information criterion (CAIC), where lower values indicate a preferable model in terms of balancing model fit with parsimony. The G^2 likelihood ratio chi-square statistic and associated p value were also calculated for each model, testing the null hypothesis that the chosen model fits the data. Thus, smaller G^2 values and larger p values indicate a greater likelihood that the model fits the data and should be preferred. Finally, the models were also compared based on stability/identifiability of the fitted model and its interpretability (Lanza & Rhoades, 2013). To assess model identifiability, each model was fit with 100 different sets of random starting values for the model parameters, allowing us to calculate the percentage of these runs that resulted in the same optimal value of the model likelihood function.

To assess the replicability of our latent class results, the data set was randomly divided into two roughly equal samples, a derivation and a validation sample, with the stipulation that half of all clients who engaged in suicide behavior were assigned to each sample. A split-sample cross-validation procedure was then performed (Masyn, 2013). In this procedure, the derivation sample was first used to identify a preferred latent class model. Then, the same

model was fit to the validation sample, constraining the parameter values to those found in the model based on the derivation sample. The fit of this model was then assessed absolutely. Finally, the same model was fit to the validation sample with unconstrained parameter values. A likelihood ratio test was then used to determine whether the unconstrained validation sample model provides a significantly different fit than the constrained validation sample model. A nonsignificant result provides evidence that the parameter estimates in the derivation and validation samples are consistent and, thus, validates the results of the derivation sample.

Once a model was determined, its class separation and classification uncertainty—the model's ability to correctly classify individuals into appropriate latent categories—were assessed. One measure of class separation is classification entropy (Dziak, Lanza, & Tan, 2014; Muthén, 1998–2004). Values nearer to 1 indicate a better class separation while values closer to 0 indicate that the estimated latent classes are not very distinct. In addition to entropy, the average posterior probability (AvePP) and the odds of correct classification (OCC) are two other measures of class separation that can be separately calculated for each class (Masyn, 2013). Values closer to 1 are preferred for the AvePP of each class as this indicates that individuals are classified into their latent classes with greater certainty. For the OCC, the minimum achievable value is 1 and larger values indicate higher classification accuracy. It has been suggested that values above 0.70 for AvePP and above 5 for OCC indicate strong latent class separation (Nagin, 2005).

Results

Three-hundred and 91 clients engaged in suicide behavior during treatment, 12 of whom died by suicide. A total of 50,598 clients from 58 counseling centers provided complete data on the predictor variables included in the logistic regression analyses that were conducted to test the study's hypotheses; of these students, 212 engaged in suicide behavior.

The ICC from the mixed effects model was .12 (random effects variance = .42), indicating that 12% of the variance in client suicide behavior during treatment was attributable to centers. (A model accounting for nesting of clients within therapists would not converge.) After including the hypothesized predictors, the model resulted in an R^2 of .255 with an area under the curve of .798 (95% CI [.769, .827]). A cutoff value of .004 was selected for predicting suicide behavior, resulting in an accuracy of .72, sensitivity of .75, and specificity of .72. Although the model at this threshold correctly predicted 74% of the 212 instances of suicide behavior, the level of sensitivity also resulted in a high false positive rate (cf. Hill, Oosterhoff, & Kaplow, 2017). Coefficients for this model are reported in Table 1.

Our first hypothesis was that, in terms of current psychological distress, depression, general anxiety, social anxiety, academic concerns, hostility, alcohol use, and binge drinking would be directly related to suicide behavior. Only scores on depression were directly associated with suicide behavior ($b = .38$, $OR = 1.47$).

The second hypothesis was that, in terms of chronic mental health problems, previous suicide behavior, previous nonsuicidal self-injury, previous psychiatric hospitalization, and previous alcohol or drug treatment each would predict suicide behavior. Previous suicide behavior ($b = 1.26$, $OR = 3.51$) and prior

Table 1

Generalized Linear Mixed Model Predicting Suicide Behavior During Treatment

Variable	Beta	OR	SE	Z	p
(Intercept)	−6.55	0	.29	−22.29	<.001
Depression	.38	1.47	.09	4.14	<.001
Hostility	.04	1.04	.07	.56	.578
Generalized anxiety	−.05	.95	.08	−.65	.514
Alcohol	.04	1.04	.09	.47	.639
Social anxiety	.02	1.02	.08	.26	.798
Academics	−.07	.93	.08	−.87	.384
Prior attempts	1.26	3.51	.15	8.11	<.001
Prior hospitalizations	.07	1.07	.17	.40	.692
Drug/alcohol treatment	−.26	.77	.37	−.70	.485
Previous nonsuicidal self-injury	.67	1.95	.16	4.07	<.001
Importance of spirituality	−.05	.95	.07	−.72	.474
Living with others	−.17	.84	.19	−.92	.355
Sexual orientation	.15	1.17	.15	1.01	.315
Ethnicity	−.09	.92	.15	−.58	.560
Gender—male versus female	−.04	.96	.08	−.56	.574
Gender—male and female versus transgender and gender nonconforming	−.13	.88	.13	−.98	.327
Disability	.15	1.17	.22	.70	.485
Binge drinking	−.11	.90	.09	−1.17	.244

Note. OR = odds ratio.

nonsuicidal self-injury ($b = .67$, $OR = 1.94$) were the only variables found to be associated with suicide behavior. The odds ratios for these predictors indicate that clients with prior suicide behavior or prior self-injury are, respectively, about 3.5 and two times more likely than clients without such histories to engage in suicide behavior during treatment.

Our third hypothesis, that sexual orientation and race would predict suicide behavior, was not supported by the data. We also explored whether gender and disability status were related to suicide behavior; neither variable was significant. The fourth hypothesis was that viewing spirituality or religion as important and living with others would be inversely related to suicide behavior, but neither was significantly related to suicide behavior during treatment.

The final goal of our work was to use latent class analysis to partition clients with suicide ideation into distinct types based on their response patterns to seven manifest variables. The 101,570 clients in the data set were divided into a derivation sample of 50,786 clients and a validation sample of 50,784 clients. The derivation sample was used first to fit latent class models for one to eight different latent classes. After identifying the preferred model, results were then compared to those from the validation sample.

Table 2 summarizes model fit criteria for each of the different models from the derivation sample. Both BIC and CAIC were minimized for the six-class model while AIC and ABIC were minimized for the eight-class model. The G^2 value indicated that the eight-class model was preferred, although the associated p value is extremely low, indicating a lack of fit in an absolute sense, for each model. Also significant is the fact that each of the models beyond the four-class model were highly unstable, as indicated by their low values for percent identified. Of those models that were reasonably well-identified (the one-, two-, three-,

Table 2
Summaries and Selection Criteria for Latent Class Models Based on Derivation Sample

Classes	Log-likelihood	df	BIC	ABIC	AIC	CAIC	G^2	p-value	Entropy	Percent identified
1	−182202	120	364480.0	364407.3	364418.1	364487	30833.5	0	—	100%
2	−169260	112	338682.3	338526.5	338549.8	338697.3	10029.5	0	.6144	100%
3	−166043	104	332334.7	332095.9	332131.5	332357.7	4644.3	0	.6027	15%
4	−163727	96	327790.7	327468.8	327516.8	327821.7	744.2	7.4E-101	.5943	100%
5	−163529	88	327479.7	327074.8	327135.1	327518.7	411.4	2.88E-43	.6035	1%
6	−163434	80	327378.2	326890.1	326962.9	327425.2	244.7	1.36E-18	.5539	1%
7	−163395	72	327386.6	326815.4	326900.6	327441.6	171.9	3.77E-10	.5805	1%
8	−163372	64	327427.0	326772.8	326870.4	327490	126.4	5.57E-06	.5482	1%

Note. BIC = Bayesian information criterion; ABIC = adjusted Bayesian information criterion; AIC = Akaike information criterion; CAIC = consistent Akaike information criterion.

and four-class models), the four-class model was preferred by all of the other model selection criteria and it clearly offered utility over the models with fewer classes. Further evidence for the selection of a four-class model is provided by the elbow plots in Figure 1. These plots reveal that, while each of the information criteria continued to decrease in value beyond the four-class model, only negligible improvements were realized beyond the four-class solution.

The validation sample provided further support for the four-class model. For the constrained validation sample model, a $G^2 = 714.4$ with 96 degrees of freedom and corresponding p value of $< 1.0 \times 10^{-94}$ indicates a lack of model fit. However, as similarly miniscule p values were found for each of the models with the derivation sample, this is unsurprising and not very telling. More importantly, there was virtually no detectable

difference between the parameters estimated in the derivation sample and those in the validation sample. The likelihood ratio statistic was computed to be 6.60×10^{-7} on 96 degrees of freedom, yielding a p value of approximately 1. This provides very strong evidence that the results of the four-class model were replicated across samples.

Class separation for the four-class model was fairly strong, as measured by its entropy, AvePP, and OCC values. Shown in Table 2, the entropy of 0.594 indicates that whereas the model has far-from-perfect class separation, it is large enough to still offer considerable utility in distinguishing the latent groups. AvePP and OCC values for each class are reported in Table 3. That the AvePP for each class is high, especially for Class 2, is a sign of low uncertainty when classifying individuals to each class. Finally, the OCC values are all quite large except that of Class 4, indicating
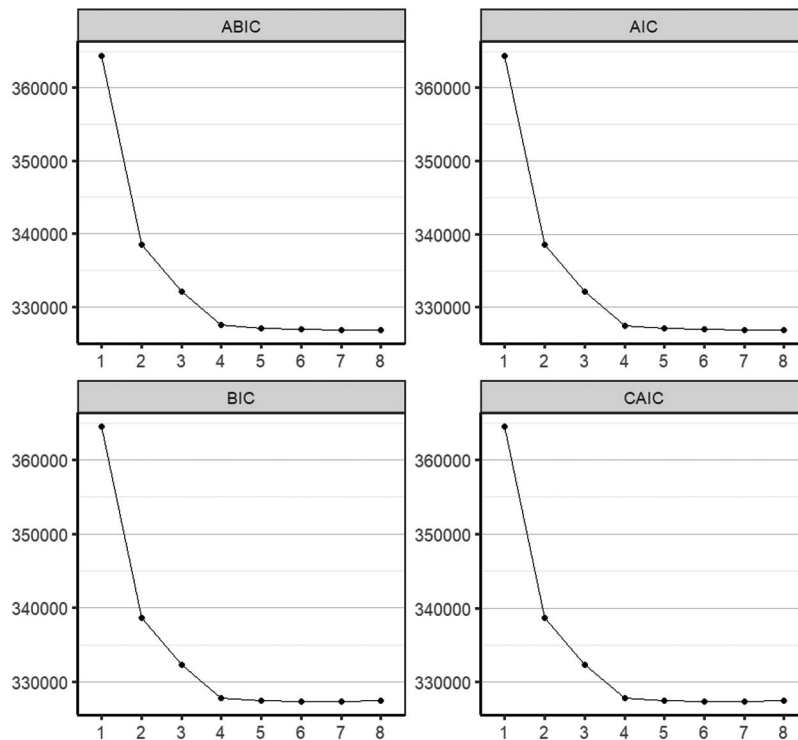

Figure 1. Information criterion plots for LCA.

Table 3

Classification Summary of Four-Class Latent Class Model Based on Derivation Sample

Class	Class size (%)	AvePP	OCC
1	22.72%	.74	9.78
2	16.10%	.90	47.04
3	23.37%	.78	11.76
4	37.81%	.74	4.58

Note. AvePP = average posterior probability; OCC = odds of correct classification. Class 1 = prior ideation; Class 2 = extensive risk; Class 3 = prior treatment; Class 4 = circumscribed depression.

that classifying individuals into Classes 1 through 3 is very accurate and into Class 4 is reasonably accurate.

In light of the above evidence, the four-class model was chosen as the preferred latent class solution. Because the results from the validation sample were so similar to those in the derivation sample, only results based on the derivation sample are included. The class-conditional probabilities (i.e., the probability of exhibiting a particular manifest variable given membership in that class) for the four-class model are displayed in Figure 2. From Figure 2, it is evident that members of Class 1 are characterized, relative to other classes, by a high probability of endorsing previous serious consideration of suicide behavior. We therefore named this class "prior ideation." Members of Class 2 had a high probability of endorsing each of the manifest variables, and we decided to name this class "extensive risk." The defining features of Class 3 were

having been in counseling previously and having taken psychotropic medication in the past. Consequently, this class was named "prior treatment." The only factor that characterized members of Class 4 was having high depression scores at the outset of treatment. As a result, we decided to name Class 4 "circumscribed depression." Table 3 shows the proportion of the sample estimated to be in each of the classes.

Table 4 provides some descriptive statistics, including a breakdown of gender and the mean scores of several CCAPS-34 subscales, for the members of each latent class, where members were assigned to latent classes by their maximum posterior probabilities. First of all, it is evident that whereas females constitute a majority of each class, they represent a markedly smaller proportion of the circumscribed depression group than the other groups. Also noticeable is that the circumscribed depression group has the smallest average scores across all CCAPS-34 subscales, a trait that is consistent with the group's latent class structure. In contrast, the prior ideation group as well as the extensive risk group tended to exhibit the highest average CCAPS scores across all subscales.

Table 5 reflects the number and percent of clients from each class who engaged in suicide behavior during treatment. Although members of each class engaged in suicide behavior, these behaviors occurred at much higher rates for members of the prior ideation and extensive risk groups (0.55% and 0.99%, respectively) than the prior treatment and circumscribed depression groups (0.18% and 0.25%, respectively).
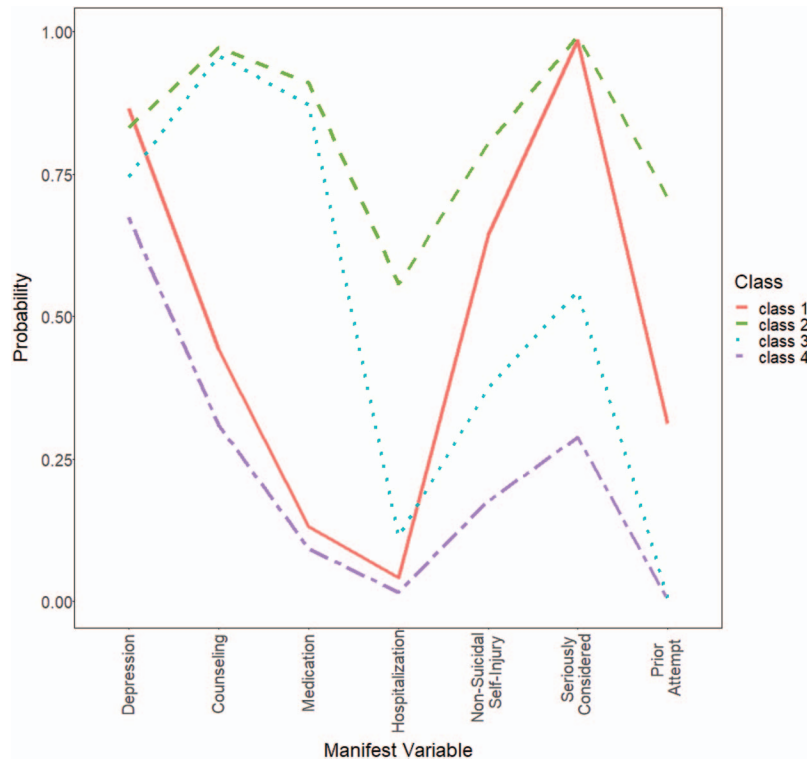

Figure 2. Class conditional probabilities for manifest variables. See the online article for the color version of this figure.

Table 4

Descriptive Statistics of Classes in Four-Class Latent Class Model Based on Derivation Sample

Class	% Female	% Male	Avg. alcohol	Avg. anxiety	Avg. hostility	Avg. social anxiety	Avg. academics
1	65.9%	30.8%	.90	2.29	1.53	2.43	2.28
2	68.8%	25.8%	.97	2.48	1.53	2.46	2.32
3	62.7%	34.3%	.85	2.29	1.35	2.40	2.29
4	57.9%	40.9%	.78	2.00	1.30	2.25	2.16

Note. Class 1 = prior ideation; Class 2 = extensive risk; Class 3 = prior treatment; Class 4 = circumscribed depression.

Discussion

The findings from the study begin to describe the types of clients at university and college counseling centers who have an elevated risk of engaging in suicide behavior while in treatment. Consistent with previous research, at-risk college student clients exhibit symptoms of depression (Baalbaki, 2016; DeJong et al., 2010; Westefeld et al., 2006) and have previously engaged in self-injurious behavior, either in the form of a suicide attempt or nonsuicidal self-injury (Beautrais, 2003; Brown et al., 2000; O'Connor et al., 2013) That being said, the overwhelming majority of clients with these characteristics will not, of course, engage in suicide behavior during therapy, and the data do not provide insight into why clients engaged in suicide behavior or the lethality of their attempts. Counter to expectation and prior research, a number of client characteristics were found not to predict suicide behavior, including important clinical variables such as anxiety, spirituality, and alcohol use. The relatively small sample of students who engaged in suicide behavior during treatment invites further research with more clients to assess the predictive power of these factors in explaining clients' suicide behavior.

The findings from this study challenge the view that self-injurious behaviors are no more than a "cry for help" (Jordan & Samuelson, 2016). In fact, a nuanced consideration of a client's past behavior may be warranted. On the one hand, data from the general population indicate that nearly half of all people who engage in suicide behavior subsequently admit that they did not want to die, and the behavior was an attempt to receive help (Kessler et al., 1999). On the other hand, these findings may not generalize to individuals seeking psychotherapy, particularly college students. Furthermore, it could be the case that repeated painful experiences may lead to increasingly lethal self-injurious behavior. In fact, there is a movement within the field of suicidology to not distinguish suicide behavior from nonsuicidal self-

injury, as the distinction tends to obscure the fact that some self-injurious behavior (e.g., cutting) may result in suicide, whether intentional or not (Burke et al., 2018). Thus, it would behoove therapists to inquire about and to take seriously clients' reports of prior nonsuicidal self-injury, especially because data from the current study indicate that clients with such histories are more than twice as likely as clients without such histories to attempt suicide while in treatment.

From a clinical perspective, we would caution against a nonintegrated view of the factors in this study that predicted suicide behavior. One of the value-added benefits of the latent classes is that they inherently group variables together that could assist psychotherapists in assessing suicide risk. The most frequent type of suicidal client seen at a university counseling center, those we have termed with "circumscribed depression," also carried a relatively low risk of engaging in suicide behavior. For example, clients in the extensive risk group were four times more likely to attempt suicide than clients in the circumscribed depression group. Although our data do not contain indicators of treatment outcome, one might reasonably suspect that clinicians could effectively treat these clients like most other (i.e., nonsuicidal) depressed clients. In contrast, students who might be characterized as having "extensive risk" factors comprise the smallest portion of suicidal clients and yet carry the highest likelihood of engaging in suicide behavior during treatment. Perhaps not surprisingly, clients in the extensive risk group were more than five times as likely as clients in the prior treatment group to engage in suicide behavior during counseling, four times as likely those in the circumscribed depression group, and as almost twice as likely as clients in the prior ideation group. On the whole, clients in the extensive risk and prior ideation classes (i.e., those characterized by a history of nonsuicidal self-injury) comprised nearly two thirds of the students in the latent classes who attempted suicide. When clients begin therapy with elevated symptoms of depression and have a history of multiple risk factors, including previous suicidal ideation, previous suicide attempts, prior nonsuicidal self-injury, in addition to having received prior treatment in the form of medication, counseling, and/or hospitalization, clinicians should conduct thorough suicide assessments and consider active, preventive measures to minimize the likelihood of suicide behavior. It seems important to point out that this group of clients was the only one characterized by prior suicide behavior, which is generally considered the strongest predictor of future suicide risk (O'Connor et al., 2013), as was revealed by our logistic regression analyses.

The group with the second highest risk of suicide behavior was composed of clients who had not sought treatment previously but had thought seriously about suicide and had engaged in nonsuicidal self-injury at some point prior to intake. Because these clients

Table 5

Suicide Attempts Within Latent Classes Based on Derivation Sample

Class	Suicide attempt		
	No (% of class)	Yes (% of class)	Total
1	10,414 (99.45%)	58 (.55%)	10,472
2	6,214 (99.01%)	62 (.99%)	6,276
3	10,824 (99.82%)	19 (.18%)	10,843
4	23,138 (99.75%)	57 (.25%)	23,195
Total	50,590 (99.61%)	196 (.39%)	50,786

Note. Class 1 = prior ideation; Class 2 = extensive risk; Class 3 = prior treatment; Class 4 = circumscribed depression.

are likely unfamiliar with therapy and how to benefit from it, therapists may need to be particularly mindful of early interventions (e.g., explanations of how therapy effectively addresses client problems, referrals for psychotropic medication, monitoring the alliance) so that clients experience therapeutic gains before potentially dropping out of treatment. The clients in the "prior treatment" class serve as a point of contrast. These students had been in counseling previously and had been on psychotropic medication of some kind in the past. Despite these indicators of potential long-standing mental health problems, these clients were at the lowest risk of engaging in suicide during treatment, likely because they knew how to take advantage of the services available to them.

Beyond client characteristics and treatment considerations lies the issue of center effects. In this study, we found that 12% of the variance in client suicide behavior could be attributed to the centers at which clients received treatment. This figure is comparable to that found in other research on agency effects in the treatment of mental health, where estimates of center effects have ranged from 8% to 12% (Glisson & Green, 2011; Schoenwald, Chapman, Sheidow, & Carter, 2009; Warren, Nelson, Mondragon, Baldwin, & Burlingame, 2010). Whereas suicide rates tend to be lower at counseling centers than at other mental health settings (Chemtob et al., 1988), clearly not all counseling centers have similar rates of suicide behavior. Counseling centers vary in their policies regarding high-risk clients, with some preferring to retain and treat such clients and others preferring to refer out to community therapists. Beyond policy differences, there may be agency factors that affect important therapy outcomes, such as client suicide behavior. In a comprehensive review of the literature, Falkenström, Grant, and Holmqvist (2018) identified a number of organizational climate and culture factors that are associated with better therapy outcomes, including low conflict and high cooperation among staff, therapists' perceived engagement in and satisfaction with their work, clear role definitions, low emotional exhaustion, and managers who are perceived as supportive, inspirational, and respectful (cf. Glisson & Hemmelgarn, 1998). These variables likely contribute to synergy within a counseling center, which then promotes positive client outcomes, although Falkenström et al. (2018) point out that reverse causality is also possible (i.e., good client outcomes affect agency variables).

One of the primary limitations of the present study is that the data do not shed light on effective aspects of treatment for clients who are suicidal. Of the roughly 100,000 clients who indicated at some point during treatment that they had suicidal thoughts, fewer than half of 1% engaged in suicide behavior. This raises the question of what therapists did to help prevent suicide among their clients. Therapists can build upon the findings from this study by inquiring, in a manner that is respectful of clients' religious and other culturally influenced beliefs, about the presence of a suicide plan and assessing its imminence and lethality (Shea, 2011). Although prescriptions to conduct suicide assessments are common, there is a paucity of research on effective suicide interventions. Future research might also profitably examine effective treatment principles (e.g., Castonguay & Beutler, 2006), as well as necessary and sufficient treatment dosages (e.g., frequency or length of sessions) for at-risk clients (Bongar & Sullivan, 2013; Jobes, 2016; Wenzel & Jager-Hyman, 2012). Given the extreme demands on university counseling center resources, such research could help administrators generate policies and guidelines pertaining to wait-ing lists, session limits, and treatment formats for at-risk clients. Research involving multiple case studies of clients who engaged in suicide behavior (e.g., reviewing case notes, interviewing therapists) may provide additional insight into risk factors, protective factors, and treatment variables that would benefit clinicians and their high-risk clients. It might also prove useful to examine trajectories during treatment of both suicidal ideation and psychological distress to determine if predictions could be made about when clients are most likely to engage in suicide behavior. Also, as experienced therapists know, assessment instruments are meant to supplement, not replace, other means of gathering clinically significant information from clients, each with its own limitations. Finally, it will be important to determine the extent to which the findings from the present study generalize to clients who are not college students.

References

Baalbaki, M. (2016). *Suicidal risk at a college counseling center: Correlates at intake and therapeutic outcomes* (Master's thesis). Retrieved from http://search.proquest.com/docview/1822219074/abstract/2E6A44DF78764906PQ/1

Bates, D., Maechler, M., Bolker, B., & Walker, S. (2015). Fitting linear mixed-effects models using lme4. *Journal of Statistical Software, 67,* 1–48. http://dx.doi.org/10.18637/jss.v067.i01

Beautrais, A. L. (2003). Suicide and serious suicide attempts in youth: A multiple-group comparison study. *The American Journal of Psychiatry, 160,* 1093–1099. http://dx.doi.org/10.1176/appi.ajp.160.6.1093

Berman, A. L. (2011). Estimating the population of survivors of suicide: Seeking an evidence base. *Suicide & Life-Threatening Behavior, 41,* 110–116. http://dx.doi.org/10.1111/j.1943-278X.2010.00009.x

Bernal, M., Haro, J. M., Bernert, S., Brugha, T., de Graaf, R., Bruffaerts, R., . . . Alonso, J. (2007). Risk factors for suicidality in Europe: Results from the ESEMED study. *Journal of Affective Disorders, 101,* 27–34. http://dx.doi.org/10.1016/j.jad.2006.09.018

Bongar, B., & Sullivan, G. (2013). *The suicidal patient: Clinical and legal standards of care* (3rd ed.). Washington, DC: American Psychological Association. http://dx.doi.org/10.1037/14184-000

Brent, D. A., & Melhem, N. (2008). Familial transmission of suicidal behavior. *The Psychiatric Clinics of North America, 31,* 157–177. http://dx.doi.org/10.1016/j.psc.2008.02.001

Brown, G. K., Beck, A. T., Steer, R. A., & Grisham, J. R. (2000). Risk factors for suicide in psychiatric outpatients: A 20-year prospective study. *Journal of Consulting and Clinical Psychology, 68,* 371–377. http://dx.doi.org/10.1037/0022-006X.68.3.371

Burke, T. A., Jacobucci, R., Ammerman, B. A., Piccirillo, M., McCloskey, M. S., Heimberg, R. G., & Alloy, L. B. (2018). Identifying the relative importance of non-suicidal self-injury features in classifying suicidal ideation, plans, and behavior using exploratory data mining. *Psychiatry Research, 262,* 175–183. http://dx.doi.org/10.1016/j.psychres.2018.01.045

Castonguay, L. G., & Beutler, L. E. (2006). Principles of therapeutic change: A task force on participants, relationships, and techniques factors. *Journal of Clinical Psychology, 62,* 631–638. http://dx.doi.org/10.1002/jclp.20256

Center for Collegiate Mental Health. (2019). *2018 Annual report.* University Park, PA: The Pennsylvania State University.

Centers for Disease Control and Prevention. (2018). *Understanding suicide: Fact sheet. National Center for Injury Prevention and Control.* Washington, DC: Author.

Chapman, A. L., & Dixon-Gordon, K. L. (2007). Emotional antecedents and consequences of deliberate self-harm and suicide attempts. *Suicide*

& *Life-Threatening Behavior, 37,* 543–552. http://dx.doi.org/10.1521/suli.2007.37.5.543

Chemtob, C. M., Hamada, R. S., Bauer, G., Torigoe, R. Y., & Kinney, B. (1988). Patient suicide: Frequency and impact on psychologists. *Professional Psychology, Research and Practice, 19,* 416–420. http://dx.doi.org/10.1037/0735-7028.19.4.416

Chu, C., Buchman-Schmitt, J. M., Stanley, I. H., Hom, M. A., Tucker, R. P., Hagan, C. R., . . . Joiner, T. E., Jr. (2017). The interpersonal theory of suicide: A systematic review and meta-analysis of a decade of cross-national research. *Psychological Bulletin, 143,* 1313–1345. http://dx.doi.org/10.1037/bul0000123

Coduti, W. A., Hayes, J. A., Locke, B. D., & Youn, S. J. (2016). Mental health and professional help-seeking among college students with disabilities. *Rehabilitation Psychology, 61,* 288–296. http://dx.doi.org/10.1037/rep0000101

Collins, L. M., & Lanza, S. T. (2010). *Latent class and latent transition analysis.* New York, NY: Wiley.

Cooper, J., Kapur, N., Webb, R., Lawlor, M., Guthrie, E., Mackway-Jones, K., & Appleby, L. (2005). Suicide after deliberate self-harm: A 4-year cohort study. *The American Journal of Psychiatry, 162,* 297–303. http://dx.doi.org/10.1176/appi.ajp.162.2.297

Coryell, W., Haley, J., Endicott, J., Solomon, D., Leon, A. C., Keller, M., . . . Mueller, T. (2002). The prospectively observed course of illness among depressed patients who commit suicide. *Acta Psychiatrica Scandinavica, 105,* 218–223. http://dx.doi.org/10.1034/j.1600-0447.2002.1o127.x

DeJong, T. M., Overholser, J. C., & Stockmeier, C. A. (2010). Apples to oranges?: A direct comparison between suicide attempters and suicide completers. *Journal of Affective Disorders, 124,* 90–97. http://dx.doi.org/10.1016/j.jad.2009.10.020

Dziak, J. J., Lanza, S. T., & Tan, X. (2014). Effect size, statistical power, and sample size requirements for the bootstrap likelihood ratio test in latent class analysis. *Structural Equation Modeling, 21,* 534–552. http://dx.doi.org/10.1080/10705511.2014.919819

Falkenström, F., Grant, J., & Holmqvist, R. (2018). Review of organizational effects on the outcome of mental health treatments. *Psychotherapy Research, 28,* 76–90. http://dx.doi.org/10.1080/10503307.2016.1158883

Figueiredo, A. R., & Abreu, T. (2015). Suicide among LGBT individuals. *European Psychiatry, 30,* 1815. http://dx.doi.org/10.1016/S0924-9338(15)31398-5

Furr, S. R., Westefeld, J. S., McConnell, G. N., & Jenkins, J. M. (2001). Suicide and depression among college students: A decade later. *Professional Psychology, Research and Practice, 32,* 97–100. http://dx.doi.org/10.1037/0735-7028.32.1.97

Garlow, S. J., Rosenberg, J., Moore, J. D., Haas, A. P., Koestner, B., Hendin, H., & Nemeroff, C. B. (2008). Depression, desperation, and suicidal ideation in college students: Results from the American Foundation for Suicide Prevention College Screening Project at Emory University. *Depression and Anxiety, 25,* 482–488. http://dx.doi.org/10.1002/da.20321

Glenn, C. R., & Nock, M. K. (2014). Improving the short-term prediction of suicidal behavior. *American Journal of Preventive Medicine, 47,* S176–S180. http://dx.doi.org/10.1016/j.amepre.2014.06.004

Glisson, C., & Green, P. (2011). Organizational climate, services, and outcomes in child welfare systems. *Child Abuse & Neglect, 35,* 582–591. http://dx.doi.org/10.1016/j.chiabu.2011.04.009

Glisson, C., & Hemmelgarn, A. (1998). The effects of organizational climate and interorganizational coordination on the quality and outcomes of children's service systems. *Child Abuse & Neglect, 22,* 401–421. http://dx.doi.org/10.1016/S0145-2134(98)00005-2

Haas, A., Koestner, B., Rosenberg, J., Moore, D., Garlow, S. J., Sedway, J., . . . Nemeroff, C. B. (2008). An interactive web-based method of outreach to college students at risk for suicide. *Journal of American College Health, 57,* 15–22. http://dx.doi.org/10.3200/JACH.57.1.15-22

Hayes, J. A., Locke, B. D., & Castonguay, L. G. (2011). The Center for Collegiate Mental Health: Practice and research working together. *Journal of College Counseling, 14,* 101–104. http://dx.doi.org/10.1002/j.2161-1882.2011.tb00265.x

Hayes, J. A., McAleavey, A. A., Castonguay, L. G., & Locke, B. D. (2016). Psychotherapists' outcomes with White and racial/ethnic minority clients: First, the good news. *Journal of Counseling Psychology, 63,* 261–268. http://dx.doi.org/10.1037/cou0000098

Hill, R. M., Oosterhoff, B., & Kaplow, J. B. (2017). Prospective identification of adolescent suicide ideation using classification tree analysis: Models for community-based screening. *Journal of Consulting and Clinical Psychology, 85,* 702–711. http://dx.doi.org/10.1037/ccp0000218

Jobes, D. A. (2016). *Managing suicidal behavior: A collaborative approach* (2nd ed.). New York, NY: Guilford Press.

Johnson, R. B., Oxendine, S., Taub, D. J., & Robertson, J. (2013). Suicide prevention for LGBT students. *New Directions for Student Services, 14,* 55–69. http://dx.doi.org/10.1002/ss.20040

Joiner, T. (2005). *Why people die by suicide.* Cambridge, MA: Harvard University Press.

Jordan, J. T., & Samuelson, K. W. (2016). Predicting suicide intent: The roles of experiencing or committing violent acts. *Suicide & Life-Threatening Behavior, 46,* 293–300. http://dx.doi.org/10.1111/sltb.12193

Kessler, R. C., Borges, G., & Walters, E. E. (1999). Prevalence of and risk factors for lifetime suicide attempts in the National Comorbidity Survey. *Archives of General Psychiatry, 56,* 617–626. http://dx.doi.org/10.1001/archpsyc.56.7.617

Kisch, J., Leino, E. V., & Silverman, M. M. (2005). Aspects of suicidal behavior, depression, and treatment in college students: Results from the spring 2000 national college health assessment survey. *Suicide & Life-Threatening Behavior, 35,* 3–13. http://dx.doi.org/10.1521/suli.35.1.3.59263

Klonsky, E. D., May, A. M., & Glenn, C. R. (2013). The relationship between nonsuicidal self-injury and attempted suicide: Converging evidence from four samples. *Journal of Abnormal Psychology, 122,* 231–237. http://dx.doi.org/10.1037/a0030278

Klonsky, E. D., May, A. M., & Saffer, B. Y. (2016). Suicide, suicide attempts, and suicidal ideation. *Annual Review of Clinical Psychology, 12,* 307–330. http://dx.doi.org/10.1146/annurev-clinpsy-021815-093204

Lamis, D. A., Malone, P. S., Langhinrichsen-Rohling, J., & Ellis, T. E. (2010). Body investment, depression, and alcohol use as risk factors for suicide proneness in college students. *Crisis: The Journal of Crisis Intervention and Suicide Prevention, 31,* 118–127. http://dx.doi.org/10.1027/0227-5910/a000012

Lanza, S. T., & Rhoades, B. L. (2013). Latent class analysis: An alternative perspective on subgroup analysis in prevention and treatment. *Prevention Science, 14,* 157–168. http://dx.doi.org/10.1007/s11121-011-0201-1

LeViness, P., Bershad, C., & Gorman, K. (2017). *The Association for University and College Counseling Center Directors Annual Survey.*

Linzer, D. A., & Lewis, J. B. (2011). poLCA: An R package for polytomous variable latent class analysis. *Journal of Statistical Software, 42,* 1–29. http://dx.doi.org/10.18637/jss.v042.i10

Locke, B. D., Buzolitz, J. S., Lei, P. W., Boswell, J. F., McAleavey, A. A., Sevig, T. D., . . . Hayes, J. A. (2011). Development of the Counseling Center Assessment of Psychological Symptoms-62 (CCAPS-62). *Journal of Counseling Psychology, 58,* 97–109. http://dx.doi.org/10.1037/a0021282

Locke, B. D., McAleavey, A. A., Zhao, Y., Lei, P.-W., Hayes, J. A., Castonguay, L. G., . . . Lin, Y.-C. (2011). Development and initial validation of the Counseling Center Assessment of Psychological Symptoms-34 (CCAPS-34). *Measurement & Evaluation in Counseling*

& *Development, 45,* 151–169. http://dx.doi.org/10.1177/0748175 611432642

Mann, J. J. (2002). A current perspective of suicide and attempted suicide. *Annals of Internal Medicine, 136,* 302–311. http://dx.doi.org/10.7326/0003-4819-136-4-200202190-00010

Masyn, K. E. (2013). Latent class analysis and finite mixture modeling. In T. D. Little (Ed.), *The Oxford handbook of quantitative methods in psychology* (Vol. 2, pp. 551–611). Oxford, UK: Oxford University Press. http://dx.doi.org/10.1093/oxfordhb/9780199934898.013.0025

McAleavey, A. A., Nordberg, S. S., Hayes, J. A., Castonguay, L. G., Locke, B. D., & Lockard, A. J. (2012). Clinical validity of the counseling center assessment of psychological symptoms-62 (CCAPS-62): Further evaluation and clinical applications. *Journal of Counseling Psychology, 59,* 575–590. http://dx.doi.org/10.1037/a0029855

McCutcheon, A. L. (2002). Basic concepts and procedures in single- and multiple-group latent class analysis. In J. A. Hagenaars & A. L. McCutcheon (Eds.), *Applied latent class analysis* (pp. 56–85). New York, NY: Cambridge University Press. http://dx.doi.org/10.1017/CBO9780511499531.003

Minami, T., Davies, D. R., Tierney, S. C., Bettmann, J. E., McAward, S. M., Averill, L. A., . . . Wampold, B. E. (2009). Preliminary evidence on the effectiveness of psychological treatments delivered at a university counseling center. *Journal of Counseling Psychology, 56,* 309–320. http://dx.doi.org/10.1037/a0015398

Muthén, B. O. (1998–2004). *Mplus technical appendices*. Los Angeles, CA: Muthén & Muthén.

Nagin, D. S. (2005). *Group-based modeling of development*. Cambridge, MA: Harvard University Press.

Nock, M. K., Borges, G., Bromet, E. J., Cha, C. B., Kessler, R. C., & Lee, S. (2008). Suicide and suicidal behavior. *Epidemiologic Reviews, 30,* 133–154.

Nock, M. K., & Kessler, R. C. (2006). Prevalence of and risk factors for suicide attempts versus suicide gestures: Analysis of the National Comorbidity Survey. *Journal of Abnormal Psychology, 115,* 616–623. http://dx.doi.org/10.1037/0021-843X.115.3.616

O'Connor, R. C., Smyth, R., Ferguson, E., Ryan, C., & Williams, J. M. G. (2013). Psychological processes and repeat suicidal behavior: A four-year prospective study. *Journal of Consulting and Clinical Psychology, 81,* 1137–1143. http://dx.doi.org/10.1037/a0033751

Qin, P., & Nordentoft, M. (2005). Suicide risk in relation to psychiatric hospitalization: Evidence based on longitudinal registers. *Archives of General Psychiatry, 62,* 427–432. http://dx.doi.org/10.1001/archpsyc.62.4.427

Runeson, B. S. (2002). Suicide after parasuicide. *British Medical Journal, 325,* 1125–1126. http://dx.doi.org/10.1136/bmj.325.7373.1125/a

Sareen, J., Cox, B. J., Afifi, T. O., de Graaf, R., Asmundson, G. J. G., ten Have, M., & Stein, M. B. (2005). Anxiety disorders and risk for suicidal ideation and suicide attempts: A population-based longitudinal study of adults. *Archives of General Psychiatry, 62,* 1249–1257. http://dx.doi.org/10.1001/archpsyc.62.11.1249

Schoenwald, S. K., Chapman, J. E., Sheidow, A. J., & Carter, R. E. (2009). Long-term youth criminal outcomes in MST transport: The impact of therapist adherence and organizational climate and structure. *Journal of*

Clinical Child and Adolescent Psychology, 38, 91–105. http://dx.doi.org/10.1080/15374410802575388

Schwartz, A. J. (2006). College student suicide in the United States: 1990–1991 through 2003–2004. *Journal of American College Health, 54,* 341–352. http://dx.doi.org/10.3200/JACH.54.6.341-352

Schwartz, A. J. (2013). Comparing the risk of suicide of college students with non-students. *Journal of College Student Psychotherapy, 27,* 120–137. http://dx.doi.org/10.1080/87568225.2013.766108

Schweitzer, R., Klayich, M., & McLean, J. (1995). Suicidal ideation and behaviours among university students in Australia. *The Australian and New Zealand Journal of Psychiatry, 29,* 473–479. http://dx.doi.org/10.3109/00048679509064956

Shea, C. S. (2011). *The practical art of suicide assessment*. Hoboken, NJ: Wiley.

Silverman, M. M., & Berman, A. L. (2014). Suicide risk assessment and risk formulation part I: A focus on suicide ideation in assessing suicide risk. *Suicide & Life-Threatening Behavior, 44,* 420–431. http://dx.doi.org/10.1111/sltb.12065

Silverman, M. M., Meyer, P. M., Sloane, F., Raffel, M., & Pratt, D. M. (1997). The Big Ten Student Suicide Study: A 10-year study of suicides on midwestern university campuses. *Suicide & Life-Threatening Behavior, 27,* 285–303.

Simonson, R. H. (2008). Religiousness and non-hopeless suicide ideation. *Death Studies, 32,* 951–960. http://dx.doi.org/10.1080/07481180802440589

Smith, E. G., Kim, H. M., Ganoczy, D., Stano, C., Pfeiffer, P. N., & Valenstein, M. (2013). Suicide risk assessment received prior to suicide death by Veterans Health Administration patients with a history of depression. *The Journal of Clinical Psychiatry, 74,* 226–232. http://dx.doi.org/10.4088/JCP.12m07853

Warren, J. S., Nelson, P. L., Mondragon, S. A., Baldwin, S. A., & Burlingame, G. M. (2010). Youth psychotherapy change trajectories and outcomes in usual care: Community mental health versus managed care settings. *Journal of Consulting and Clinical Psychology, 78,* 144–155. http://dx.doi.org/10.1037/a0018544

Wenzel, A., & Jager-Hyman, S. (2012). Cognitive therapy for suicidal patients: Current status. *Behavior Therapist, 35,* 121–130.

Westefeld, J. S., Button, C., Jr., Haley, J. T., Jr., Kettmann, J. J., MacConnell, J., Sandil, R., & Tallman, B. (2006). College student suicide: A call to action. *Death Studies, 30,* 931–956. http://dx.doi.org/10.1080/07481180600887130

Westefeld, J. S., Homaifar, B., Spotts, J., Furr, S., Range, L., & Werth, J. L., Jr. (2005). Perceptions concerning college student suicide: Data from four universities. *Suicide & Life-Threatening Behavior, 35,* 640–645. http://dx.doi.org/10.1521/suli.2005.35.6.640

Wilcox, H. C., Arria, A. M., Caldeira, K. M., Vincent, K. B., Pinchevsky, G. M., & O'Grady, K. E. (2010). Prevalence and predictors of persistent suicide ideation, plans, and attempts during college. *Journal of Affective Disorders, 127,* 287–294. http://dx.doi.org/10.1016/j.jad.2010.04.017