

5-2015

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Perceived Stress and Suicidal Behaviors in College Students: Conditional Indirect Effects of
Depressive Symptoms and Mental Health Stigma

A thesis presented to
the faculty of the Department of Psychology
East Tennessee State University

In partial fulfillment of the
Honors-in-Discipline
Bachelors of Science Degree
in Clinical Psychology

by
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Spring 2015

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Abstract

Suicide is the second leading cause of death in college students, making it a significant public health concern on college campuses. Perceived stress, depression, and mental health stigma are established risk factors for engaging in suicidal behaviors; however, their interrelationships are unknown. In a sample of 913 college students, we examined the role of depressive symptoms as a potential mediator of the relation between stress and suicidal behavior, and mental health stigma as a moderator of that effect. In bivariate analyses, perceived stress, depressive symptoms, mental health stigma and suicidal behaviors were all positively correlated. Additionally, depressive symptoms partially mediated the relation between stress and suicidal behaviors, such that greater stress was related to more depression and, in turn, to greater engagement in suicidal behavior. Further, mental health stigma significantly moderated this mediating effect, exacerbating the deleterious relations between perceived stress and depression, stress and suicidal behavior, and between depression and suicidal behaviors. Negative, unaccepting attitudes toward mental health treatment, such as fear of social repercussion, may contribute to a worsening of symptoms and suicide risk in students experiencing distress. Our findings may have clinical and public health implications. At the individual level, addressing stress and depression, perhaps by bolstering coping efficacy via Cognitive Behavioral Therapy and, at the community level, implementing strategies to reduce mental health stigma, perhaps via awareness messaging campaigns, may reduce risk for suicide.

Keywords: Suicide, Stress, Stigma, Depression, & College Student

Perceived Stress and Suicidal Behaviors in College Students: Conditional Indirect Effects of
Depressive Symptoms and Mental Health Stigma

Suicide is a major public health concern and the tenth leading cause of death in the United States, with over 41,149 deaths by suicide occurring annually (Center for Disease Control [CDC], 2015). Moreover, it is a particularly important issue on college campuses where it is the second leading cause of death for college students (National Alliance on Mental Illness [NAMH], 2012); over 1,100 students die by suicide each year. It is estimated that each year, for individuals ages 18-29 years old, 2.9 million people have suicidal thoughts and an estimated 477,000 attempt suicide (Crosby, Han, Ortega, Parks, & Gfrierer, 2011). In college students, Bauer, Chesin, & Jeglic (2014) found that 21.6% of their sample reported thoughts of suicide and, in another study, approximately 49% of college students reported a lifetime history of suicidal ideation or attempts (CDC, 2012).

Despite its tragic nature, death by suicide is a relatively rare phenomenon, and it is much more likely that suicide reduction efforts will have an impact on the amelioration of suicidal behaviors. Suicidal behaviors are comprised of “behaviors that don’t always result in death, but are “related” to the process or concept of self-inflicted death” (Silverman, Berman, Sanddal, O’Carroll, & Joiner, 2007b, p. 272). Suicidal behaviors are one of the communicative aspects of suicide, which includes thoughts about suicide, or ideation, and suicide attempts, as well as the severity and frequency of these behaviors (Silverman et al., 2007a; Silverman et. al., 2007b).

Given the high rates of suicidal behavior and death by suicide in young adults, it is important to identify factors that may play a role in such poor outcomes. Indeed, the success of prevention and intervention strategies is predicated on the identification of risk and protective

factors that influence the likelihood of engaging in suicidal behavior (Webb, Hirsch, & Toussaint, 2015). Although there are many risk factors for suicidal behaviors, including psychopathology, a well-established and common contributor to suicidal behavior is the experience of stress (Davis, Witte, & Weathers, 2014; Krysinska & Lester, 2010; Lane, Hourani, Bray, & Williams, 2012; Mitchell, Crane, & Kim, 2008). The perception of stress, and its deleterious effect on health, occurs when individuals are faced with a physical or psychological situation that they do not have the means to properly cope with (Kalaldehy & Shosha, 2012). The experience of stress is ubiquitous, and cuts across all socio-demographic barriers. Supporting this premise, the American Psychological Association [APA] (2012) examined stress levels in Americans and found that 22% of Americans reported experiencing extreme stress and 39% reported that their stress had increased over the past year.

However, some groups may be more likely to experience stressors than others (e.g., veterans), and may also be more vulnerable to the effects of stress than other groups (e.g., those with low willingness to seek care). For instance, Lane, Hourani, Bray, and Williams (2012) found that higher levels of perceived stress among soldiers were related to increased risk for suicidal behavior. College students are another population that may be particularly vulnerable to stressors. The American College Health Assessment [ACHA], in 2014, reported that 43.7% of college students reported above average stress, with 11% reporting tremendous stress. Additionally, 30.3% of college students reported that stress negatively impacted their academic performance in the past year (ACHA, 2014). The high rates of stress for college students may be a result of being separated from their historical support systems and networks of care, and as a result of the collegiate environment, which often involves academic difficulties, vocational concerns, financial strain, and interpersonal problems (Aselton, 2012).

In general, stress is a multi-faceted experience and process, and involves changes to the body (e.g., release of adrenalin and cortisol) and mind (e.g., concentration, emotional changes). Further, stress is truly a mind-body phenomena, in that it is a perceptual process that can contribute to actual physical symptoms; for instance, prolonged stress and cortisol release is related to weight gain and heart disease (Sher, 2002; Wosu, Valdimarsdóttir, Shields, Williams, & Williams, 2013; Younge et al., 2015). This effect is bi-directional, as physical health and illness robustly contribute to cognitive and emotional functioning, including feelings of stress (Bray & Kwan, 2006; Kelsall et al., 2014). As an example, heart disease, is related to emotional distress (Blumenfield, Suojanen, & Weiss, 2012). Yet, despite its strong association with physical health, stress is largely a subjective experience, and an individual's perception of a stressful event has a large impact on how the event affects them (Cohen, Kamarck, & Mermelstein, 1983); therefore, it is important to understand how perception of a stressful event may contribute to psychopathology and suicidal behaviors, as we do in the current study.

There is a well-established literature supporting the relation between perceived stress and psychopathology, including anxiety and depression (Chavez-Korell & Torres, 2013; Duan, Ho, Siu, Li, & Zhang, 2015; Lee, Joo, & Choi, 2013; Zhang, Yan, Zhao, & Yuan, 2014), including in college students. According to the ACHA, in 2014, 10% of college students reported being diagnosed or treated for depression, and 12.8% of college students reported that depression hindered their academic success in some way. Depression, in addition to being a potential consequence of stress, is an independent contributor to suicidal behavior and is, itself, a significant public mental health concern (Hirsch, Webb, & Jeglic, 2011; Lamis, Malone, Langhinrichsen-Rohling, & Ellis, 2010; Taliaferro, Rienzo, Pigg, Miller, & Dodd, 2005; Westefeld & Furr, 1987).

Sub-clinical depressive symptoms may be even more common, and have many of the same negative outcomes as a clinical diagnosis of depression (Cuijpers & Smit, 2008).

Individuals suffering from sub-clinical depression report feelings of sadness, emptiness, worthlessness and hopelessness, loss of interest in once enjoyed activities, and fatigue (APA, 2013); however, they do not meet the full criteria for diagnostic depression. Yet, sub-clinical depression is a risk factor for developing clinical depression (Hill, Yaroslavsky, & Pettit, 2015).

Sub-clinical depression is common in young adults and college students. For instance, in a previous study of college students ($n=158$), 42% reported severe depressive symptoms (Hirsch et al., 2011), and 81% of college students ($n=962$) experience depression at some point in their college career (Westefeld & Furr, 1987). Another study found that 53% of college students ($n=1,455$) reported experiencing what they would label as depression and, of those students, 36% did not seek treatment (Furr, Westefeld, McConnell, & Jenkins, 2001). Of note, self-reported depressive symptoms are a significant risk factor for suicidal behaviors (Bauer et al., 2014; Nsamenang, Webb, Cukrowicz, & Hirsch, 2013; Westefeld & Furr, 1987).

As we have described, suicide and suicidal behavior are complex phenomena, with both proximal (e.g., stressors) and distal risk factors (e.g., beliefs about mental health treatment). We have noted, in our review of the literature, that the association between perceived stress and suicidal behavior may be direct, but may also be indirect via the influence of perceived stress on mental health functioning, namely depressive symptoms. As well, additional factors, such as health beliefs and values, may impact an individual's choice of coping strategies and willingness to engage in adaptive health behaviors, including seeking psychiatric treatment if needed.

This potential unwillingness to engage in self-help, or seek psychological assistance when needed, may be due to stigma against mental illness and treatment seeking (Calloway et

al., 2012), which is generally related to poor mental health outcomes. Stigma was first conceptualized by Goffman (1963) as a spoiled identity, or a trait that discredits the individual within society, and which occurs within the context of social, economic and political power (Link & Phelan, 2001). Such power leads to the creation of stigma through labeling, attribution of negative traits, separation of “us” and “them,” status loss and discrimination. Corrigan (2004) reconceptualized stigma as a social-cognitive process involving stereotypes, prejudice and discrimination, and which is delineated into two factors: 1) self-stigma, or the internalization of the negative views of society, leading to self-prejudice, and 2) public stigma, or the stereotypes and unjust treatment experienced by stigmatized individuals.

One specific type of stigma is mental health stigma, which is conceptualized as the process of dehumanizing and labeling someone because they suffer from a mental illness or because they seek mental health services (Masuda, Anderson, & Edmonds, 2012; Masuda, Price, Anderson, Schmertz, & Calamaras, 2009). As with other types of stigma, mental health stigma can take two forms, experienced and internalized; thus, an individual may be self-punitive if they seek, or are planning to seek, mental health treatment. Indeed, in previous research, mental health stigma was a barrier to treatment seeking behavior and treatment adherence in individuals with mental illness (Corrigan, Druss, & Perlick, 2014; Corrigan, 2004; Masuda et al., 2012), and among college students (Calloway et al., 2012; Loya, Reddy, & Hinshaw, 2010; Steinfeldt & Steinfeldt, 2012). For example, in a study of college students, by Masuda, Anderson and Edmonds (2012), mental health stigma was associated with less willingness to receive help and, in another study, although many students reported feelings of sadness and depression, only 6.8% sought help for these feelings, citing stigma as one reason for not seeking help (Calloway et al., 2012). Finally, in a study by Sirey, Franklin, McKenzie, Ghosh, and Raue (2014), anticipated

stigma in older adults suffering from depression was predictive of whether they followed-through with recommended mental health services.

Although the independent contributions of stress, depression and stigma to risk for suicidal behavior have been researched extensively, their interrelationships are unknown. As such, we examined the associations between perceived stress and suicidal behavior in college students, the role of depressive symptoms as a potential mediator of the stress-suicide linkage, and the influence of mental health stigma as a potential moderator of this mediating effect. At the bivariate level, we hypothesized that all study variables (i.e., perceived stress, depressive symptoms, mental health stigma and suicidal behavior) would be positively associated. At the multivariate level, we hypothesized that greater levels of perceived stress would be associated with more depressive symptoms and, in turn, to increased engagement in suicidal behavior. Further, we hypothesized that mental health stigma would moderate the mediating effect of depressive symptoms, such that greater mental health stigma would exacerbate the deleterious indirect effect of depressive symptoms.

Method

Participants

Our sample consisted of residential college students ($N=913$) recruited from a rural, Southeastern university, who were 70.8% female ($n=646$) and 27.8% male ($n=254$), with a mean age of 20.19 years old (standard deviation [SD] = 3.808). Racial and ethnic groups represented in this study include: 76.1% Caucasian ($n=695$), 11% African American ($n=100$), 8.1% Asian ($n=74$), 1.2% Hispanic or Latino ($n=11$), 0.5% American Indian ($n=5$), 0.2% Pacific Islander or Native Hawaiian ($n=2$), and 1.5% other ($n=14$). Academic rank of our sample was as follows: 40.2% were 1st year undergraduates ($n=367$), 26.1% were 2nd year undergraduates ($n=238$),

17.4% were 3rd year undergraduate ($n = 17.6$), 11.1% were 4th year undergraduates ($n = 101$), 3.1% were graduate students ($n = 28$), .5% were post-doctoral students ($n = 5$), and 4% reported classification as “other” ($n = 4$) (See Table 1).

Measures

Data for this study was collected using self-report surveys. A demographic questionnaire was included that assessed age, sex, educational level and race/ethnicity.

Depressive Symptoms. The *Beck Depression Inventory-II* (BDI-II) was used to examine depressive symptoms (Beck, Steer, & Brown, 1996). The BDI-II has 21 self-report items that assess presence and severity of symptoms over the past 2 weeks. Items are scored on a four-point Likert scale ranging from 0 (no depressive symptoms) to 3 (severe depressive symptoms). Items are summed for an overall score, with higher scores indicating greater depressive symptoms (Beck et al., 1996; Dere et al., 2014). The BDI-II has a convergent validity of .56 with the Beck Anxiety Inventory, indicating good convergent validity. The BDI-II has also has excellent internal consistency (Cronbach’s $\alpha = .96$) in a college student population (Bauer et al., 2014). Internal consistency (Cronbach’s α) in the current study was good (.88).

Mental Health Stigma. The *Mental Health Stigma Scale* (MHSS) was used to assess the perceived stigma that individuals felt regarding use of mental health services, and was adapted from the Perceived Stigma Scale (Mickelson, 2001; Williams & Polaha, 2014). The 8-item MHSS uses a 5 point Likert scale ranging from 1 (definitely disagree) to 5 (definitely agree), and total scores range from 8- 40 with higher scores indicating stronger perceptions of stigma toward mental health treatment. An example of a question assessing internalized views towards seeking treatment is, “*I would feel ashamed if I sought mental health treatment,*” and an example of an item assessing experienced stigma, how one perceives that others see them, is “*People would*

say negative or unkind things about me behind my back if I sought mental health treatment.”

Although this exact measure has not been used before in prior research, the original perceived stigma scale has shown adequate internal consistency (Cronbach's alpha= .70) in a sample of low-income women (Mickelson & Williams, 2008), and another adaptation, the Financial Stigma Scale, has shown good internal consistency (Cronbach's alpha=.82) in a rural clinic sample (Visser, 2012). Cronbach's alpha in the current study was .85, indicating good internal consistency.

Perceived Stress. The *Perceived Stress Scale* (PSS), which has 14 items, was used to assess the degree to which respondents perceive their life as stressful in the past month. The PSS utilizes a 5-point Likert scale ranging from 0 (never) to 4 (very often), with total scores ranging from 0-56; after reverse-scoring of 7 items, higher scores indicate greater perceived stress (Cohen et al., 1983). An example of a question assessing nervousness and feelings of stress is, *“In the last month, how often have you felt nervous and “stressed?”* In contrast, an example of a reverse coded item would be, *“In the last month, how often have you dealt successfully with irritating life hassles?”* The PSS has exhibited satisfactory internal consistency (Cronbach's alpha .85) and good test-retest reliability (.85) over two days (Kalaldehy & Shosha, 2012) in college student samples (Chao, 2012; Cohen et al., 1983; Mitchell et al., 2008). The Cronbach's alpha in the current study is .87, suggesting good internal consistency.

Suicidal Behavior. The *Suicidal Behavior Questionnaire-Revised* (SBQ-R) consists of 4 items and assesses: lifetime suicidal ideation and attempts; suicidal ideation and attempts over the past 12 months; communication of suicidal intent; and, likelihood of a future suicide attempt (Linehan & Nielsen, 1981; Osman et al., 2001). The SBQ-R has excellent test-retest reliability ($r=.95$) over 2 weeks, and is positively related to the Scale for Suicidal Ideations ($r=.69$) and

negatively related to the Reasons For Living Inventory ($r=-.34$), indicating good convergent and discriminate validity (Batterham et al., 2014; Cotton, Peters, & Range, 1995). The SBQ-R has shown adequate internal consistency (Cronbach's alpha .76) in college student populations. The Cronbach alpha for the current study is .82, suggesting good internal consistency.

Procedure

Our data was collected in 2011-2012 in partnership with the Department of Housing and Residence Life. Student contact information was provided by the Department of Housing and Residence Life, and invitation e-mails were sent to all eligible students that included a link to a 30-45 minute online survey. All student responses were de-identified once payment was made, and students were compensated \$5.00 for participating in the study. Our study protocol was approved by a university Institutional Review Board, and all students provided informed consent.

Statistical Analyses

We evaluated the independence of, and associations between, our study variables using Pearson's Product Moment correlation (r); however, using a conservative coefficient of $r<.70$, none of the associations reached a level of multicollinearity (Field, 2005), satisfying an underlying assumption of regression analysis (Bücher, Dette, & Wieczorek, 2011).

A simple mediation analysis was also conducted, consistent with Preacher and Hayes (2008), covarying age, sex, and ethnicity. This model (Model 4) was used to test the hypothesis that depression would mediate the relationship between perceived stress and suicidal behavior.

Further, consistent with Hayes (2013), moderation analyses were conducted on all mediation pathways (a, b, c). A moderated-mediation model (Model 59) was used to test our third hypothesis that mental health stigma would moderate the a, b and c paths, thus influencing the effect between the predictors and the outcome. Moderated values were examined at ± 1

standard deviations from the mean. Both models used 5,000 bootstrap samples and 95% biased corrected confidence intervals (CIs); significance occurs when zero is not included in the confidence interval. Moderation was considered significant at an alpha (α) level of .05.

Results

Bivariate Correlations

In support of our hypotheses, perceived stress was significantly positively related to mental health stigma ($r = .311, p = .01$), depressive symptoms ($r = .630, p = .01$) and suicidal behavior ($r = .418, p = .01$). Mental health stigma was also positively related to depression ($r = .265, p = .01$) and suicidal behavior ($r = .231, p = .01$), and depression was positively related to suicidal behavior ($r = .513, p = .01$) (See Table 2).

Mediation

In our simple mediation analysis, the association between perceived stress and suicidal behavior was reduced from the total effect, but remained significant after including depressive symptoms in the model (c' ; $DE = .44, SE = .14, p < .01$), suggesting that the stress-suicidal behavior linkage is partially explained by the presence of depressive symptoms. The indirect effect of depression was found to be statistically different from zero, as determined by the CI not crossing zero. Each path of our model was significant, including relations between: (a path) perceived stress and depressive symptoms ($\beta = 8.06, t = 20.62, p < .001$), and (b path) depressive symptoms and suicidal behavior ($\beta = .11, t = 10.17, p < .01$). (See Table 3).

Moderated Mediation

Next, we conducted a moderation analysis for each pathway of the mediation model, finding significance for each association. Mental health stigma was a significant moderator of the a-path (stress to depression), ($\beta = 2.3, t = 5.48, p < .001$), exacerbating the association between

perceived stress and depressive symptoms. Mental health stigma also significantly moderated the b-path (depression to suicidal behavior), ($\beta = -0.03, t = -2.54, p = .01$), such that the relation between depression and suicidal behavior worsened as levels of mental health stigma increased. Finally, the moderating effect of mental health stigma on the direct stress-suicide linkage was significant ($\beta = .32, t=2.01, p <.05$); the relation between stress and suicidal behavior was strengthened at greater levels of stigma. An examination of moderator levels (i.e., mean score and +/- 1 SD scores of mental health stigma) indicates that the stress-suicide relation is not significantly impacted at the lowest levels of mental health stigma, but exerts a moderating effect at average and high levels of mental health stigma (average, $\beta = .45, t = 3.01, p = .003$; high levels, $\beta = .74, t=3.41, p < .001$).

Discussion

In our sample of college students, perceived stress, mental health stigma, and depressive symptoms were significantly positively related to suicidal behaviors, in support of our hypotheses. Also supporting hypotheses, depression partially mediated the relation between stress and suicidal behaviors, such that greater stress was related to higher levels of depressive symptoms and, in turn, to greater engagement in suicidal behaviors. Finally, also supporting hypotheses, mental health stigma significantly moderated the mediating effect of depressive symptoms, specifically the linkages between stress and depression and between depression and suicidal behaviors; at greater levels of stigma, these relations are worsened.

Our findings support previous research indicating that perceived stress is a risk factor for depression and suicidal behaviors (Davis et al., 2014; Krysinaka & Lester, 2010; Lane et al., 2012; Mitchell et al., 2008). As well, our findings replicate past studies implicating depressive symptoms as a significant risk factor for suicidal behavior (Hirsch et al., 2011; Lamis et al.,

2010; Westefeld & Furr, 1987). However, we extend previous research by examining all of these factors in a single, comprehensive model and describe a potential pathway of action for the impact of stress on suicidal behavior (i.e., via depressive symptoms). We also extend previous work by integrating the socially-constructed element of mental health stigma, which played an integral part in our model, interacting with both stress and depression to exacerbate suicide risk.

Our results suggest that perceived stress is not only directly related to suicidal behavior when mental health stigma is present, but that it is also indirectly related to suicidal behavior via its effect on depressive symptoms; additionally, mental health stigma negatively impacts this indirect relationship. In the first pathway of our model (a path), perceived stress was related to depressive symptoms, highlighting a common etiological contributor to psychopathology (Davis et al., 2014; Polanco-Roman & Miranda, 2013). College students experiencing high stress may start to feel overwhelmed, resulting in reduced motivation toward future-oriented goals, diminished efficacy regarding ability to overcome the source of distress, and sense of hopelessness, all of which are risk factors for the development and maintenance of depressive symptoms. (Lamis et al., 2014; Polanco-Roman & Miranda, 2013).

In the second pathway of our model (b path), depressive symptoms were related to suicidal behavior. As noted in the extant literature, symptoms of depression, which often include intense psychological pain, feelings of worthlessness, and thoughts of death and dying, are a strong predictor of suicidal behavior and death by suicide (Hirsch et al., 2011; Taliaferro et al., 2005; APA, 2013; Vuorilehto et al., 2014). Finally, the initial relation between stress and suicidal behavior (c path) was also significant, indicating a direct link between the perception of stress and engagement in suicidal behavior. The physiological and psychological changes that occur when a persistent stressor is encountered can weaken resolve, erode confidence in the ability to

cope and can contribute to both physical and psychological fatigue, potentially exacerbating suicide risk (Beiter et al., 2015; Chao, 2012; Lester, 2014; Moore, Burgard, Larson, & Ferm, 2014).

Taken together, our findings suggest that the association between stress and suicidal behavior is accounted for, at least in part, by the presence of depressive symptoms. Although the relation between stress and suicidal behavior may seem intuitive and, indeed, it was significant in our model, our findings highlight a potential mechanism of action for the effect of stress on suicide. Previous research suggests that negative and potentially traumatic life events, as well as daily hassles and chronic stressors, are risk factors for suicide (Lamis & Dvorak, 2013; Lamis et al., 2010; Linehan & Nielsen, 1981) and, further, there is some evidence that dysregulated emotions, such as depression and anxiety, might facilitate the transition between the experience of a stressor (e.g., academic stress in adolescents; physical abuse in African American females) and engaging in suicidal behavior (Ang & Huan, 2006; Kaslow, et al., 1998; Lester, 2014). However, our study is the first to examine these associations in a college student population that is vulnerable to distress and psychopathology, and the first to examine subjective perception of stress, which is often a more salient predictor of poor health outcomes than objective ratings of the experience of stressors (e.g., sum of negative life events) (Rueggeberg, Wrosch, & Miller, 2012). In sum, feeling overwhelmed and unable to control the events occurring in one's life appears to contribute to the development and maintenance of depressive symptoms and, ultimately, to engaging in suicidal behavior.

Our findings also suggest that socially-derived factors, such as stigma, can impact mental health and suicidal behavior. In much of the previous research on mental health stigma, the focus has been on the experience of having a mental illness, rather than on stigma surrounding

the receipt of mental health treatment and, further, much past research has focused on the impact of stigma on help-seeking behaviors rather than on the actual processes underlying psychopathology and suicidal behavior (Brownson, Becker, Shadick, Jaggars, & Nitkin-Kaner, 2014; Corrigan, 2004; Corrigan et al., 2014; Steinfeldt & Steinfeldt, 2012; Wong, Brownson, Rutkowski, Nguyen, & Becker, 2014). In the current study, however, we found that stigma regarding mental health treatment negatively impacted all facets of our model of suicidal behavior. At the bivariate level, mental health stigma was positively related to stress, depression and suicidal behavior, implicating it as a risk factor for poor outcomes. At the multivariate level, mental health stigma was a significant moderator of each relation in our model, between stress and suicidal behavior, between stress and depression, and between depression and suicidal behavior; in each case, mental health stigma exacerbated these detrimental associations.

The beliefs and attitudes that an individual holds about mental health treatment may not only influence whether they seek out needed services, but may also be internalized such that an individual feels they have a weakness or are shameful for needing assistance for psychological difficulties (Crabtree, Haslam, Postmes, & Haslam, 2010; Vertilo & Gibson, 2014). Thus, mental health stigma may not only preclude engagement in treatment, but may also impinge upon the view of the self, resulting in feelings of lowered self-worth (e.g., “I must be crazy if I need help”), reduced sense of efficacy to deal with the source of stress (e.g., “I can’t even handle my own problems”) and, perhaps, a feeling of being alone in the battle for well-being (e.g., “If I can’t go for treatment, then I have to deal with this on my own”) (Corrigan & Watson, 2002; Overton & Medina, 2008). Such maladaptive cognitive-emotional processing may contribute to the transition from the experience of stress to the development of psychopathology and, ultimately, to suicidal behavior, as in our current model.

Although not all individuals who experience stress become depressed or suicidal, and not all depressed individuals become suicidal, the presence of mental health stigma may facilitate these transitions (Chavez-Korell & Torres, 2013; Duan et al., 2015; Link & Phelan, 2001). In our model, this effect occurred at each stage, and such a pattern warrants exploration, as it is important to try to understand how socially-constructed and cultural values play a role in suicide risk. When an individual perceives stress, an appraisal process ensues during which the person assesses the proximity of the threat and their own ability to deal with the source of distress (Kalaldehy & Shosha, 2012). In the context of mental health stigma, however, an individual may be forced into avoidance of the problem (e.g., denial that the stressor is causing distress), which is a maladaptive coping strategy related to poor health outcomes, and may be forced to deal with the problem on their own (e.g., stigma-related inability to admit need for help), negating the otherwise helpful influence of any potentially-available social support or treatment (Aselton, 2012; Deatherage, Servaty-Seib, & Aksoz, 2014). Our findings suggest that this underlying process could feasibly impact the development of both depressive symptoms and suicidal behavior.

Further, when depressive symptoms indirectly occur as a result of stress, the ensuing effect on suicidal behavior is altered in the presence of mental health stigma, suggesting the same problematic processes (e.g., avoidance of stressor and assistance) are responsible (Lee et al., 2013). Once depression is present, with symptoms including hopelessness (e.g., that the stressor will resolve) and poor self-worth (e.g., regarding ability to resolve problem), the presence of mental health stigma which, as we have discussed, may negatively impact valuing of the self and likelihood of treatment seeking, appears to contribute to increased engagement in suicidal behavior. In the face of stress and distress, the shame of admitting the presence of psychological

difficulties or the need for psychological help, may actually amplify perceptions of the magnitude or severity of stressors and the intensity of feelings of despair (Furr, Westefeld, McConnell, & Jenkins, 2001; Lamis et al., 2010; Polanco-Roman & Miranda, 2013), increasing likelihood of suicidal behavior

Limitations

Despite the novelty of our results, they should be understood within the context of potential limitations. Our study design was cross-sectional, which does not allow us to assess causality or directionality of the variables; thus, bi-directionality is a possibility. For instance, depressed individuals may be more likely to perceive their experiences as stressful (APA, 2013; Lee et al., 2013). However, we based our model development on current theory which suggests that environmental triggers, such as stress, are robust contributors to depression and suicide (Mossakowski, 2013; Van der Waerden, Hoefnagels, Hosman, & Jansen, 2014). Our use of self-report measures may have introduced bias; for instance, social desirability, which we did not assess, could influence the degree to which respondents endorse depressive symptoms or suicidal behavior. However, given the rates of stress, depression and suicidal behavior reported in our study, which are comparable to or higher than other published studies with similar samples, it is unlikely that under-reporting occurred (De Luca, Yan, Lytle, & Brownson, 2014; Hirsch et al., 2011; Lester, 2014). Finally, our college student sample was largely comprised of white females, which limits generalizability. Yet, the characteristics and experiences of some of these groups (i.e., college students, females) may contribute to vulnerability, as these groups have well-established risk for depression and suicidal behavior, warranting their utilization as populations of interest (Ahles, Harding, Mezulis, & Hudson, 2015; Shih, Eberhart, Hammen, & Brennan, 2010). Future longitudinal, prospective research involving diverse samples and

utilizing a comprehensive array of objective measures of well-being and distress is needed to substantiate our findings.

Implications

Despite limitations, our proposed model and study findings may have important clinical and public health implications by suggesting that the provision of resources to address mental health is only “half the battle,” and that addressing mental health stigma may be a critical component of any effective prevention effort.

At the community and population levels, stigma toward mental illness and its treatment can be addressed utilizing public mental health strategies, including social marketing, anti-stigma programs and messaging campaigns to raise awareness and understanding, to promote knowledge of, and access to, mental health resources, and to address the sociocultural and institutional underpinnings of this form of stigma by informing science and policy (Kennedy et al., 2013; Warner, 2005). For example, consumer-based mental health stigma reduction programs, involving group participation and exercises (e.g., sharing stories of stigma), reduced levels of stigma in a community sample (Michaels et al., 2013). On college campuses, student-driven campaigns to educate about, promote awareness of, and reduce stigma, appear to be effective (Thompson, Heley, Oster-Aaland, Stastny, & Crawford, 2013). Public health-level interventions directly addressing suicide, including peer and gatekeeper training programs, can serve to inform the public of the warning signs of suicide and how to act to prevent suicide (Cimini et al., 2014; Coppens et al., 2014; Sharpe, Jacobson Frey, Osteen, & Bernes, 2014).

At the individual level, psycho-educational and therapeutic strategies are likely to be effective in addressing most, if not all, of the components of our model. For instance, many therapeutic interventions are described as successfully decreasing stress in college students,

including progressive muscle relaxation, meditation and mindfulness training (Calloway et al., 2012; Dolbier & Rush, 2012; Lamis & Dvorak, 2013). Training students to employ adaptive coping strategies (e.g., problem-solving), rather than maladaptive coping (e.g., avoidance) (Dolbier & Rush, 2012; Horwitz, Hill, & King, 2011; Wong et al., 2014), may also reduce the impact of stress, as well as consequent risk for suicidal behavior (Lamis et al., 2010; Mahmoud, Staten, Hall, & Lennie, 2012). Similarly, there are reliable, evidence-based means of addressing depression in college students, including Cognitive Behavioral Therapy strategies such as distraction, relaxation, and cognitive restructuring (Richards & Timulak, 2012) and Motivational Interviewing strategies such as goal setting and problem-solving, which are both effective in decreasing depressive symptoms (Cimini et al., 2014; Rivero et al., 2014; McIndool & Hopkol, 2014). Suicidal behaviors can also effectively be addressed via Cognitive Behavioral Therapy (e.g., challenging dysfunctional thoughts), Dialectic Behavioral Therapy (e.g., acceptance and management of distress), and Problem Solving Therapy (e.g., problem-solving to overcome barriers to goals) (Bannan, 2010; Daniel & Goldston, 2012; Sánchez-teruel & García-león, 2014).

Although not often addressed clinically, there are therapeutic protocols for the reduction of stigma; however, it should be noted that stigmatized beliefs are often quite resistant to change (Akihiko, 2006). White and Mortensen (2002), for example, proposed that self-reduction of stigma toward others might involve processes of identification, personalization, respect/dignity and empowerment, and Wildschut, Sedikides, & Gheorghiu (2013) found that the use of nostalgia (e.g., about an encounter with someone with mental illness) was effective in reducing participants levels of mental health stigma; however, these approaches are focused on other-stigma, and may be less applicable to self-stigma or stigma focused on a self-behavior (i.e.,

seeking mental health care). Psychoeducation and contact with stigmatized groups (e.g., someone with mental illness) or experiences (e.g., a mental health clinic) may also be useful strategies to reduce stigma (Akihiko, 2006). Very few psychological therapies have been developed that specifically target stigma; however, researchers have adapted techniques from Acceptance and Commitment Therapy (e.g., cognitive diffusion, acceptance and mindfulness) to change the psychological perception and impact of stigmatized experiences (Akihiko, 2006; Hayes, et al., 2004). From the perspective of a healthcare provider, it is also important to take part in the destigmatization process by advocating for patients and striving to counteract negative social attitudes and prejudice toward mental illness and its treatment (Gillian & Annette, 2003; Hayes, et al., 2004).

Conclusion

We examined the stress-suicide linkage in college students, finding that depression partially mediated this association, and that mental health stigma moderated this effect. In other words, stress was related to more depression and, in turn, to suicidal behavior, and these effects were exacerbated by the presence of mental health stigma. Our conceptual model is the first to examine the interrelationships between these variables and the role of mental health stigma in the development of suicidal behavior, and our findings have implications for public mental health interventions. Addressing stigma, in addition to promotion of coping skills and direct treatment of psychological dysfunction, may reduce risk for suicide.

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Table 1

Demographics

	<i>N</i>	Percent
Gender		
Male	254	27.8
Female	646	70.8
Race		
White	695	76.1
African American	100	11
Asian	74	8.1
Hispanic or Latino	11	1.2
American Indian	5	0.5
Pacific Islander or Native Hawaiian	2	0.2
Other	14	1.5

Note. Sample size =913. 11 participants did not complete this demographic information

Table 2

Mean Scores and Correlations among Study Variables

Measure	Perceived Stress	Suicidal Behaviors	Depressive Symptoms	Mental Health Stigma
Suicidal Behaviors	.418**	-		
Depressive Symptoms	.639**	.513**	-	
Mental Health Stigma	.311**	.231**	0.265**	-
Mean	1.67	5.39	9.95	2.65
Standard Deviation	0.73	2.29	9.42	0.89

Note: Sample size = 913. Suicidal behaviors = Suicidal Behavior Questionnaire – Revised; Depressive symptoms = Beck Depression Inventory-II; Mental Health Stigma = Mental Health Stigma Scale; and, Perceived Stress = Perceived Stress Scale. **p<.01

Table 3

Mediation and Moderated-Mediation Analyses Predicting Suicidal Behavior

Measure	β	p	lower	upper
Mediation				
<i>a</i>	8.06***	<.001	7.29	8.83
<i>b</i>	0.11***	<.001	0.09	0.14
<i>c</i>	1.36***	<.001	1.13	1.59
<i>c'</i>	0.44**	0.002	0.16	0.72
Moderation Mediation				
<i>a</i>	1.49	0.22	-0.9	3.88
<i>b</i>	0.18***	<.001	0.12	0.25
<i>c'</i>	-0.41	0.35	-1.27	0.45
Stress x Stigma on Depression	2.3***	<.001	1.48	3.12
Depression x Stigma on Suicidal Behaviors	-0.03	0.01	-0.05	-0.01
Stress x Stigma on Suicidal Behaviors	0.32*	0.04	0.01	0.64

Note. Sample size= 913. *a*, *b*, *c*, & *c'* = unstandardized regression coefficients: *a* = direct association between perceived stress and depressive symptoms; *b* = direct association between depressive symptoms and suicidal behavior; *c* = total effect between perceived stress and suicidal behavior (not accounting for depressive symptoms); *c'* = direct effect between perceived stress and suicidal behavior (accounting for depressive symptoms). * $p < .05$, ** $p < .01$, *** $p < .001$

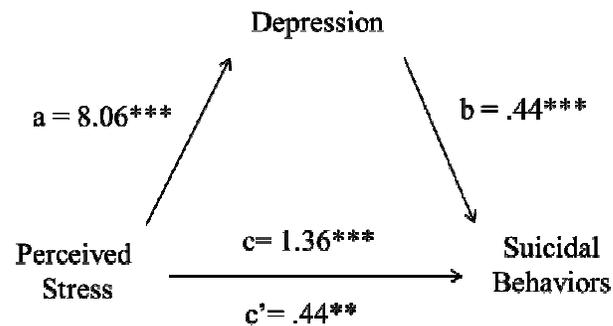
Table 4

Conditional Direct and Indirect Effects of Mental Health Stigma

Mental Health Stigma	Conditional Direct Effect		Conditional Indirect Effect of Depression		
	Effect	<i>p</i>	Effect	LLCI	ULCI
1.76	0.16	0.4144	0.74	0.51	1.02
2.66	0.45**	0.0027	0.83	0.59	1.08
3.55	0.74***	0.0007	0.8	0.44	1.19

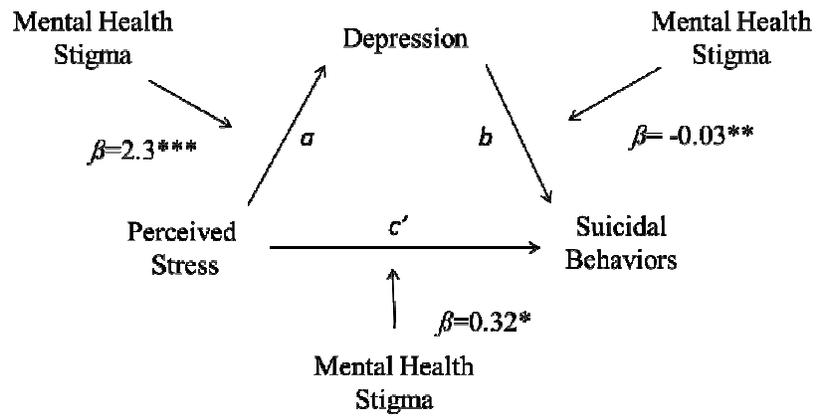
Note. Sample size = 913. LLCI= lower level confidence interval; ULCI = upper level confidence interval. Mental Health Stigma = Mental Health Stigma Scale.

Figure 1: Simple Mediation Model



Note. Sample size = 913. a , b , c , & c' = unstandardized regression coefficients: a = direct association between perceived stress and depressive symptoms; b = direct association between depressive symptoms and suicidal behavior; c = total effect between perceived stress and suicidal behavior (not accounting for depressive symptoms); c' = direct effect between perceived stress and suicidal behavior (accounting for depressive symptoms). * $p < .05$, ** $p < .01$, *** $p < .001$

Figure 2: Moderated-Mediation Model



Note. Sample Size = 913. Path coefficients (β) of the moderator, for each pathway, are represented. Suicidal behaviors = Suicidal Behavior Questionnaire – Revised; Depressive symptoms = Beck Depression Inventory-II; Mental Health Stigma = Mental Health Stigma Scale; and, Perceived Stress = Perceived Stress Scale. * $p<.05$, ** $p<.01$, *** $p<.001$