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The Association between Anhedonia, Suicidal Ideation, and Suicide Attempts in a Large Student Sample

E. Samuel Winer, Christopher W. Drapeau, Jennifer C. Veilleux, and Michael R. Nadorff

Depression is a significant risk factor for suicide. Evidence suggests that anhedonia may be a symptom of depression that is uniquely associated with suicidality. However, exactly how anhedonia is related to suicide is unclear. To provide more specific evidence regarding this association, we investigated relationships between anhedonia, suicidal ideation, and suicide attempts. A large combined undergraduate sample completed the novel Specific Loss of Interest and Pleasure Scale (SLIPS), the Center of Epidemiological Studies Depression Scale (CES-D), and the Suicidal Behaviors Questionnaire—Revised (SBQ-R). Anhedonia was associated with suicidal ideation, even when accounting for depressive symptoms. Additionally, anhedonia was not associated with suicide attempts when symptoms of depression were held constant. The current study provides novel evidence regarding the relationship between anhedonia and risk of attempting suicide. Future research can examine the role anhedonia plays in the unfolding of suicidal behavior over time.

Keywords anhedonia, depression, SLIPS, specific loss of interest and pleasure scale, suicide, suicidal ideation

Suicide is a growing public health concern in the United States. It is estimated that someone in the United States attempts suicide every 24 seconds (Substance Abuse and Mental Health Services Administration, 2014) and dies by suicide every 12.8 minutes (Drapeau & McIntosh, 2015). Although an annual reduction in the suicide rate was observed between 1993 and 2000, the rate has increased annually since 2005 (Centers for Disease Control and Prevention, n.d.).

Suicide is the tenth leading cause of death and accounts for more deaths than either homicides or motor vehicle fatalities (Centers for Disease Control and Prevention, n.d.). Additionally, 9.3 million adults aged 18 and older had serious thoughts of attempting suicide in 2013 with 1.3 million reporting an actual attempt. (Substance Abuse and Mental Health Services Administration, 2014).

Given the prevalence of suicidal thoughts and behaviors among adults aged

18 and older, and the medical costs to treat these attempts, it is important to understand what factors lead to both suicidal thoughts and suicide attempts to reliably identify those transitioning from suicidal ideation¹ to fatal suicidal behaviors (Klonsky & May, 2014). Developing this capacity can inform suicide risk assessment methods and early intervention tools.

Anhedonia, or the loss of interest and/or pleasure in people or things, has recently received increased empirical and theoretical investigation (Treadway, Bossaller, Shelton, & Zald, 2012; Treadway & Zald, 2011, 2013; Wardle, Treadway, Mayo, Zald, & de Wit, 2011; Winer, Veilleux, & Ginger, 2014), with recent evidence suggesting that anhedonia may be a unique predictor of psychopathology (Winer, Veilleux et al., 2014), including suicidality (Nock & Kazdin, 2002; Winer, Nadorff et al., 2014; Xie et al., 2014). For example, a recent study examining the relationship between anhedonia and suicidal ideation found that the level of anhedonia at baseline, as well as changes in anhedonia over time, predicted suicidal ideation at termination within a sample of 1,529 clinical inpatients, when holding constant (a) baseline suicidality and (b) cognitive symptoms of depression (Winer, Nadorff et al., 2014). Similarly, a study of 175 youth aged 6–13 years found that children and young adolescents with elevated scores on the Children's Depression Anhedonia Subscale were more likely to express suicidal thoughts and behaviors, independent of depressed mood. Furthermore, in a sample of 40 depressed outpatients and 20 healthy controls, individuals with high levels of suicidal ideation and previous suicidal behaviors were less likely to respond to rewarding

stimuli on a task assessing anhedonia (Xie et al., 2014).

Thus, anhedonia may be uniquely associated with suicidal ideation. However, each of the aforementioned studies contains limitations that make the specificity of this association unclear. First, although Winer, Nadorff et al. (2014) assessed for the association between anhedonia and suicidal ideation, their investigation did not include a measure of suicide attempts. Second, although Nock and Kazdin's (2002) pioneering study had adequate power to attempt to discriminate between suicidal ideation and attempts, their sample was limited to youth, and thus it is uncertain whether their findings generalize to adult populations. Third, although Xie et al. (2014) included an innovative task to assess anhedonia, the lack of power of their sample required that they compare individuals with both suicidal ideation and previous attempts with other depressed and control groups, thus conflating ideation and attempts. Perhaps most importantly, none of these studies included an independently validated scale of anhedonia (i.e., not a subscale or task).

Thus, although anhedonia may potentially be uniquely associated with suicidal ideation and/or attempts, whether anhedonia relates discriminantly to one but not the other remains an empirical question. Answering this question is important, as suicidal ideation may only be cursorily related to suicide attempts. For example, one large study reported that only 7.4% of individuals endorsing suicidal ideation in the sample reported attempting suicide over the ensuing 2 years (ten Have et al., 2009). Additionally, results from the National Comorbidity Survey found that the prevalence of people with suicidal ideation reporting a suicide attempt differed depending on whether they made a plan for attempting suicide. Specifically, about 25% of those with suicidal ideation but without a suicide plan eventually attempted

¹We use the term *suicidal ideation* here instead of *suicide risk* due to the study's emphasis on *discriminating* suicidal ideation from suicide attempts. That is, it attempts to answer which people, with suicidal ideation, are eventually at risk to attempt suicide.

suicide, whereas 58% of those with both suicidal ideation and a suicide plan eventually attempted suicide (Kessler, Borges, & Walters, 1999).

It is possible that anhedonia is predictive of suicidal thoughts, but less predictive, or potentially even negatively correlated, with ultimate attempts. This is because individuals who experience anhedonia, especially a change in anhedonia from baseline, are likely to also experience other symptoms of depression that make action very difficult. It may be that a reduction in anhedonia is associated with increased energy that allows a person who is contemplating suicide to act. Alternatively, it could be that the final plan of action results in an increase in pleasure: one finally has decided on a way out, which in and of itself provides hope and relief. This is consistent with previous research that suggests that those at heightened risk for suicide endorse lower levels of depression (Johns & Holden, 1997), and that one's resolve to attempt suicide may lead to a stabilization in behavior that provides more of a euthymic appearance in comparison to those who may be "anxiously preoccupied by suicidal ideation" (Schmid, Manjee, & Shah, 1994, p. 337).

Thus, we wished to examine whether (a) anhedonia was uniquely associated with suicidal ideation, as previously found in the literature (Nock & Kazdin, 2002; Winer, Nadorff et al., 2014; Xie et al., 2014), and whether (b) anhedonia was uniquely associated with suicide attempts. To investigate the unique elements of anhedonia, we examined the relationship between anhedonia, suicidal ideation, and suicide attempts while holding other symptoms of depression constant. To examine anhedonia, we used a reliable and well-validated measure, the Specific Loss of Interest and Pleasure Scale (SLIPS; Winer, Veilleux et al., 2014), which allowed us to conduct a specific investigation of the relationship between anhedonia, suicide risk, and

suicide attempts. We hypothesized that anhedonia would be associated with suicidal ideation, as previously found, and that this relationship would remain significant even when holding other symptoms of depression constant. However, we hypothesized that anhedonia would not predict suicide attempts cross-sectionally, due to the inability of cross-sectional data to capture the developing relationship of anhedonia and suicide attempts over time.

METHOD

Participants

Participants were 1,122 undergraduate students attending a large, public university in the Southern United States collected across two cross-sectional studies. Missing values were assessed for randomness. Neither missing values for anhedonia nor depression were significantly associated with suicide attempts. Missing values on depression were also not associated with suicidal ideation, whereas missing values on anhedonia were associated with difference with suicidal ideation, in comparison to non-missing values. Due to this difference, we removed participants with missing data via listwise deletion (Allison, 2002). Thus, only participants with complete data for the regression analyses were included, resulting in a sample of 991 participants (413 male, 577 female, 1 declined to answer). The sample had an age range of 18–36 years (Mean age = 18.98 years, SD = 1.47 years, 13 declined to answer age). Approximately 76% of participants identified as Caucasian, 18% African American, 1% Hispanic, 1% Asian-Pacific Islander, less than 1% Native American, and 3% other. Participants were recruited using the SONA system, which is an online survey manager, and completed informed consent and the surveys online. Participants were given course credit for participating in the study. A portion of the

data from this study was collected as part of a larger study examining sleep and suicide (Nadorff, Anestis, Nazem, Harris, & Winer, 2014).

Measures

Specific Loss of Interest and Pleasure Scale (SLIPS; Winer, Veilleux et al., 2014). The SLIPS is a 23-question self-report measure that asks about changes in the ability to get interested or take pleasure in primarily social experiences. The SLIPS is scored on a four-point scale (0–3), with responses of “3” recoded as “0” to limit trait anhedonic responses and emphasize recent feelings of anhedonia, resulting in a range of 0–46. It has demonstrated high internal consistency and has been validated as a measure of anhedonia related to depression (Winer, Veilleux et al., 2014). In the present sample, the mean was 5.10 (SD = 7.46) and reliability was acceptable ($\alpha = 0.94$).

The Center of Epidemiological Studies Depression Scale (CES-D; Radloff, 1977). The CES-D is a 20 question self-report measure of symptoms of depression. The CES-D is scored on a four-point scale (0–3), with a range of 0–60. A cutoff score of 16 is commonly used to indicate clinically-significant depressive symptoms (Radloff, 1977). It has acceptable internal consistency for both the general ($\alpha = 0.85$) and clinical ($\alpha = 0.90$) populations (Radloff, 1977), and has been validated as a measure of depressive symptoms (Weissman, Sholomskas, Pottinger, Prusoff, & Locke, 1977). Questions relating to anhedonia were removed from the CESD (items 8 and 12) to reduce overlap with the measure of anhedonia. With these items removed, the mean was 12.69 (SD = 9.48) with acceptable reliability ($\alpha = 0.90$).

The Suicidal Behaviors Questionnaire – Revised (SBQ-R; Osman et al., 2001). The SBQ-R,

a revised measure based upon the Suicidal Behaviors Questionnaire (Linehan, 1981), is a four-item self-report measure designed to assess levels of suicidal ideation. The SBQ’s four items are summed to create a total index score that ranges from 3 to 18. A cutoff score of 7 for the general population or 8 for psychiatric inpatients may be used to determine clinically significant levels of suicide risk (Osman et al., 2001). It has acceptable internal consistency with an alpha of 0.88 in a clinical sample and 0.87 in a non-clinical sample (Osman et al., 2001). In the present study, item 1 responses indicating ideation and attempts (responses “5” and “6”) were recoded as “4” so that they were independent of actual behaviors as measured by suicide attempt history (see below). In the present sample, the mean was 4.45 (SD = 2.57) with acceptable reliability ($\alpha = 0.82$).

Suicide Attempt History. Suicide attempt history was assessed with the open-ended item “How many times have you attempted suicide?” Due to the low number of suicide attempts, the question was dichotomized so those who did not report a prior suicide attempt received a score of 0 and those reporting one or more attempts were given a score of 1 (e.g., Nadorff et al., 2014). A total of 60 participants (6%) reported having a prior suicide attempt and 931 participants reported never attempting suicide.

RESULTS

Suicidal Ideation

To investigate the relationship between anhedonia and suicidal ideation, we conducted a multiple regression analysis with anhedonia and other symptoms of depression as independent variables and suicidal ideation as the dependent measure.

The combined samples of suicidal ideation conformed to a normal distribution

The overall regression was significant, $F(2, 988) = 197.42, p < .001, R^2 = .27$. Moreover, as predicted, anhedonia was associated with suicidal ideation ($\beta = .30, t = 8.68, p < .05$), independent of other symptoms of depression ($\beta = .30, t = 8.71, p < .001$). Thus, anhedonia, when holding all other symptoms of depression constant, was associated with suicidal ideation.

Suicide Attempts

To investigate the relationship between anhedonia and suicide attempts, we conducted a logistic regression analysis with anhedonia and other symptoms of depression as independent variables and suicide attempts as the dependent measure. The omnibus logistic model was significant $\chi^2(2, N = 991) = 37.79, p < .001$. However, unlike suicidal ideation, other symptoms of depression (Wald = 16.85, $p < .001$), but not anhedonia (Wald < 1, $p = .33$) reached significance. Thus, the relationship between anhedonia and suicide attempts diverged from that between anhedonia and suicidal ideation in this cross-sectional sample.

DISCUSSION

The current findings discriminate the cross-sectional relationship between anhedonia and suicidal ideation from anhedonia and suicide attempts. Previous research has identified a relationship between suicidal ideation and anhedonia; however, the extant literature has provided mixed results regarding the relationship between anhedonia and suicide. For instance, some research suggests that *low* levels of anhedonia may be characteristic of those dying by suicide (Loas, 2007; Watson & Kucala, 1978), whereas other research suggests *high*

levels of anhedonia as one of several predictors of fatal suicide attempts (Fawcett, Clark, & Busch, 1993; Fawcett et al., 1990; Hall, Platt, & Hall, 1999; Loas, Azi, Noisette, Legrand, & Yon, 2009). In the current studies, we found that anhedonia was associated with suicidal ideation but not related to previous suicide attempts.

Regarding the relationship observed among anhedonia and suicidal behavior, Nock and Kazdin (2002) postulate that anhedonia may be experienced as an intolerable psychological state that motivates one to engage in suicidal behavior in order to escape a current stressor. Research also suggests that those thinking of suicide are less motivated to experience pleasure and are more focused on striving to avoid psychological pain (Xie et al., 2014). Pain avoidance has been found to be more predictive of suicidal ideations and behaviors than depression or the experience of psychological pain in a sample of individuals with major depressive disorder (Li et al., 2014).

Research also suggests that the presence of anhedonia in individuals with major depressive disorder may actually reflect impairment in reward-based decision making (Treadway et al., 2012). This impairment may make it difficult for those experiencing anhedonia to attempt suicide. Reductions in psychological pain when an individual engages in suicidal behaviors that are goal driven have also been observed (Reisch et al., 2010). Thus, a reduction in anhedonia may take place in relation to reduction in pain via suicidal behaviors. Further research can help to unpack these overlapping relationships.

Limitations

The current investigation was limited by its reliance on student samples and data from a single timepoint. However, the replication and extension of previous patterns

of findings evidenced with clinical samples (Nock & Kazdin, 2002; Winer, Nadorff et al., 2014) somewhat offsets these limitations. Furthermore, the measure of anhedonia used in this study allowed for an examination of recent changes in anhedonia, yielding a cross-sectional analysis that was highly specific regarding the timeframe in question. Thus, although these results were based on cross-sectional analyses, the novelty of the method and the discriminant results between anhedonia, suicidal ideation, and suicide attempts has yielded a unique set of findings.

Conclusion

The current study has provided unique evidence concerning the link between anhedonia and suicidal ideation. Anhedonia was associated with suicidal ideation in the current study, but was not associated with suicidal behaviors, adding to the mixed evidence regarding anhedonia and suicide attempts.

Few studies have included longitudinal assessments that are necessary to examine the course of anhedonia leading up to a suicide attempt. Future research can examine how anhedonia impacts those at risk for suicide over time to delineate whether anhedonia longitudinally discriminates suicidal ideation from attempts, and to further current understanding of the role anhedonia plays in the unfolding of suicidal behavior.

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Anhedonia, Suicidal Ideation, and Suicide Attempts

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