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Lifetime History of Suicide Attempts among Not Guilty by Reason of Insanity State Hospital Inpatients: The Roles of past Harmful Substance Use and Current Social Support

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Abstract

This study tested current perceived social support (CPSS) as a moderator of the relation between previous substance use (PSU) and lifetime suicide attempt (SA) history among 200 NGRI inpatients. Results indicated no significant CPSS main effect. PSU was associated with greater odds of multiple prior lifetime SA. Moderation indicated those low in PSU but high in CPSS were least likely to report multiple prior lifetime SA. Conversely, NGRI inpatients with high CPSS and high PSU were most likely to report multiple lifetime SA. Our study suggests CPSS and PSU assessments may inform suicide risk assessments and interventions among NGRI inpatients.

Keywords

Criminal responsibility; social support; suicide attempt; suicidal behavior; substance use

As suicide rates in the United States continue to rise (Hedegaard et al., 2018), it is imperative that we turn our attention to understudied high-risk populations. There has been a dearth of suicide risk research among inpatients who are hospitalized in a psychiatric facility and adjudicated not guilty by reason of insanity (NGRI; i.e., criminal responsibility defense). NGRI adjudication generally requires that the individual did not comprehend the nature of their actions or was unable to discern right from wrong due to impaired mental functioning at the time of the crime. Individuals found NGRI are at the intersection between those with severe psychopathology and criminal justice involvement, two groups that are at high risk for suicide (e.g., Mumola, 2005; Neuner et al., 2008); therefore, it is likely that individuals found NGRI are also at high risk. Unfortunately, we have inadequate knowledge

about suicide risk among inpatients found NGRI, and much of the limited literature on this topic is outdated.

A 1984 study of inpatients within a state hospital, in which approximately 38% were adjudicated NGRI, found that approximately 90 suicides occurred per 100,000 inpatients during hospitalization (Haynes & Marques, 1984). This rate is approximately six times greater than that of the general United States population (14 suicide per 100,000 individuals [age adjusted]; Centers for Disease Control & Prevention, 2020) and that of individuals in prison (14 suicide per 100,000 inmates; Mumola, 2005). The suicide rate among inpatients found NGRI is comparable to inpatients hospitalized in a psychiatric facility who are at particularly high risk for suicide. One study indicated a suicide rate of 101 suicides per 100,000 psychiatric hospital admissions among inpatients during hospitalization (Neuner et al., 2008). A recent study among inpatients found NGRI indicated that approximately 46% reported at least one previous suicide attempt, 58% reported previous suicidal thoughts, and 10% reported current suicide ideation distress (Mitchell et al., 2018a). Furthermore, the severity of psychiatric symptoms was associated with greater suicide ideation distress and suicide attempt history (Mitchell et al., 2018a). Antisocial personality traits were also associated with a suicide attempt history (Mitchell et al., 2018a). Identifying additional factors associated with suicide attempt history among inpatients found NGRI is critical to developing potentially life-saving guidance on managing suicide risk in this high-risk population. Thus, we tested key correlates of lifetime suicide attempt history, including past harmful substance use (i.e., substance use that causes functional impairment, physical health conditions, and/or psychological distress) and current perceived social support.

Research has indicated that individuals with harmful substance use problems are significantly more likely to attempt suicide and to die by suicide when compared to the general population (e.g., Kessler et al., 1999; Yuodelis & Ries, 2015); however, the relation between harmful substance use and suicide risk has not been examined among inpatients found NGRI. Research demonstrates that even substance use history is associated with future suicidal behaviors (Darvishi et al., 2015; Poorolajal et al., 2016; Vijayakumar et al., 2011). This may be particularly relevant to suicide risk for inpatients found NGRI who have a substance use history but are hospitalized and without access to harmful substances. Literature from populations similar to inpatients found NGRI (e.g., individuals with severe mental illness, inpatients hospitalized in a psychiatric facility, individuals in jail or prison; Conner et al., 2009; Swogger et al., 2012) suggests harmful substance use may be an important consideration for suicide attempts among inpatients found NGRI. Among individuals with psychiatric disorders, such as schizophrenia and bipolar disorders, meta-analytic findings have demonstrated that harmful alcohol and substance use were significantly associated with previous suicide attempts (Cassidy et al., 2018; Messer et al., 2017). Further, among inpatients hospitalized in an acute psychiatric facility, those with substance use disorders were significantly more likely to report moderate to severe current suicide risk (i.e., suicidal urges or plans, hopelessness, imminent desire for suicide, and/or recent suicidal behaviors; Ries et al., 2009). Collectively, these findings highlight that for individuals with severe psychiatric symptoms, much like those adjudicated NGRI, harmful substance use is important in relation to suicidal behaviors.

Harmful substance use is also problematic among individuals involved in the criminal justice system and has been associated with previous suicide attempts and suicide deaths among these individuals (e.g., Fazel et al., 2006; Fruehwald et al., 2004; Hakansson et al., 2010). Research has indicated that among individuals in prison and on probation, those who previously attempted suicide also had a history of greater harmful substance use and used a larger number of substances than those without a suicide attempt history (Hakansson et al., 2010). Moreover, psychological autopsies were conducted on 40 individuals who died by suicide and received mental health services during their incarceration in New York state correctional facilities between 1993 and 2001 (Kovaszny et al., 2004). The psychological autopsy data revealed that 95% of the individuals in prison who died by suicide had a history of harmful substance use (Kovaszny et al., 2004). Other research has shown that individuals who were incarcerated and died by suicide were more likely to have a history of more harmful substance use, use of multiple substances, involvement in psychiatric treatment, and prior suicide attempts (Blaauw et al., 2005). Together, these findings demonstrate that harmful substance use is also a significant problem and related to suicidal behaviors among individuals with severe mental illness and those who are involved in the criminal justice system. Therefore, it is likely that harmful substance use is an important consideration regarding suicidal behaviors among inpatients found NGRI, but the literature on this is sparse.

Strained social connections is another well-established factor related to suicide attempts and deaths (e.g., Chu et al., 2017; Van Orden et al., 2010) that appears to be especially relevant for high-risk populations (i.e., inpatients hospitalized in a psychiatric facility, individuals involved in the criminal justice system) and associated with harmful substance use (Hakansson et al., 2010; You et al., 2011). Unfortunately, the relation between social support and suicide risk has not been examined among inpatients found NGRI, let alone within the context of harmful substance use. Greater social support has been associated with a lower likelihood of lifetime suicide attempt history among United States and English national samples (Kleiman & Liu, 2013) and may serve to buffer against future suicide attempts. Research has shown that recent interpersonal conflict or loss of social relationships is associated with suicide deaths among individuals who died by suicide with substance dependence (Yuodelis & Ries, 2015). Furthermore, a low sense of belonging has been associated with higher suicide ideation among adult inpatients hospitalized in a psychiatric facility (e.g., Mitchell et al., 2017), and low family support was associated with a greater severity of suicidal thoughts among inpatient adolescent females and alcohol and substance use among their male peers (Kerr et al., 2006). Similarly, a lack of belongingness, low social support, and living alone were associated with a higher likelihood of a suicide attempt history among individuals receiving treatment for substance use (You et al., 2011). Additionally, individuals in prison and on probation with a suicide attempt history were also more likely to have strained interpersonal relationships and to associate with other individuals in prison who engage in harmful substance use (Hakansson et al., 2010). In sum, low social support appears to be related to suicidal behaviors among individuals with harmful substance use problems and criminal justice involvement. This is likely relevant to inpatients found NGRI who may perceive social support (or a lack thereof) from other

patients, hospital staff, and significant others outside of the hospital system, which may be related to suicidal behaviors.

In the current study, we tested past harmful substance use and current perceived social support in association with a lifetime suicide attempt history among inpatients found NGRI. We hypothesized that greater past harmful substance use and lower current perceived social support would be independently and directly associated with a greater likelihood of a lifetime suicide attempt history. Additionally, it is possible that greater current perceived social support may attenuate the relation between past harmful substance use and suicide risk, whereas a lack of current perceived social support may be detrimental. Therefore, we hypothesized a significant interaction between past harmful substance use and current perceived social support, such that the relation between past harmful substance use and lifetime suicide attempt history would be dampened when current perceived social support was higher compared to when current perceived social support was lower. More specifically, inpatients found NGRI who are higher in current perceived social support and lower in past harmful substance use would be more likely to have no lifetime suicide attempt history, but individuals lower in current perceived social support and higher in past harmful substance use would be more likely to have a higher number of previous lifetime suicide attempts.

Method

Participants

The current sample includes data from 200 inpatients (164 men, 36 women; $M_{\text{age}} = 44.69$ years, $SD_{\text{age}} = 12.69$ years) admitted to two California Department of State Hospitals (DSH) facilities. All persons in this sample were adjudicated NGRI, according to the California penal codes §1026 and 25(b). Per the M’Naghten’s Case (R. v. M’Naghten, 1843), which is included in California penal code §25(b) for establishing NGRI status, a person is considered NGRI if they did not understand the nature and quality of their act or they were unable to distinguish right from wrong at the time of the crime.

In the sample, 36.5% of participants identified as European American ($n = 73$), 23.5% as “other” ($n = 47$; e.g., multiracial), 19% as African American ($n = 38$), 12.5% as Hispanic ($n = 25$), 5.5% as Asian American ($n = 11$), and 2.5% Native American ($n = 5$); one participant did not report their racial identity. Furthermore, 80.5% ($n = 161$) of participants identified as heterosexual and 18.5% ($n = 37$) identified as nonheterosexual; two participants elected not to report their sexual orientation. On average, participants reported 11.44 years of education ($SD = 4.64$ years). The average length of hospitalization at the time of participation was 2,630 days ($SD = 2,362$) with a range of 19 to 10,548 days. Most of the participants endorsed previous misdemeanor and/or felony convictions ($n = 171$, 85.5%). Participants’ primary and secondary psychiatric diagnoses were obtained from a review of their medical charts. The primary diagnoses included schizophrenia ($n = 84$, 42%), schizoaffective disorder ($n = 65$, 32.5%), bipolar I ($n = 21$, 10.5%), and major depressive disorder ($n = 6$, 3%). The remaining 11% of participants ($n = 22$) had another primary disorder, including substance use disorder, delusional disorder, pedophilic disorder, or unspecified psychotic disorder. Two participants in the sample (1%) had a primary diagnosis of antisocial personality disorder. One hundred sixty-four participants (82%) had a secondary psychiatric

diagnosis, which included substance use disorder ($n = 117$, 58.5%), antisocial personality disorder ($n = 7$, 3.5%), depressive disorder ($n = 8$, 4%), anxiety disorder ($n = 5$, 2.5%), trauma-related disorder ($n = 4$, 2%), and other specified personality disorder ($n = 4$, 2%). The remaining 2.42% of participants ($n = 22$) had another secondary disorder including obsessive-compulsive disorder, pedophilic disorder, borderline intellectual functioning, bipolar I disorder, borderline personality disorder, other specified personality disorder, a neurocognitive disorder, or factitious disorder. Additionally, more than a quarter of the participants ($n = 55$, 27.5%) endorsed prior non-suicidal self-injury, and more than half of the participants ($n = 116$, 58%) reported a lifetime history of suicide ideation.

Measures

The Demographics and History Questionnaire (DHQ)—The DHQ was created by the authors for this data collection. On the questionnaire, participants were asked to self-report information regarding demographics (e.g., age, ethnicity, gender), psychiatric history (e.g., psychiatric diagnoses and treatment, suicide ideation and suicide attempt history, non-suicidal self-injury history), and criminal history.

Lifetime suicide attempt history—For the current study, previous lifetime suicide attempt status was determined based on two questions on the DHQ: “Have you ever attempted suicide? (yes/no)” and “If yes, how many times?” These questions allowed us to create three mutually exclusive lifetime suicide attempt history groups: those who never attempted suicide (responded “no” to the first question; $n = 107$, 53.5%), those who attempted suicide once (responded “yes” to the first question and reported suicide one attempt; $n = 40$, 20%), and those who attempted suicide multiple times (responded “yes” to the first question and reported more than one suicide attempt; $n = 53$, 26.5%). This multicategorical lifetime suicide attempt history status variable was used as the criterion variable in the current analysis. Using a multicategorical lifetime suicide attempt history status variable in this way is consistent with previous research (e.g., Smith et al., 2014). It should also be noted that we did not collect data indicating when the lifetime suicide attempt(s) occurred or if the attempt(s) occurred before or during participants’ current hospitalization.

The Self-appraisal Questionnaire (SAQ)

The SAQ is a self-report measure of criminal risk factors (Loza, 2017). The scale consists of 72 true/false questions, which yield a total score and seven subscale scores: Criminal Tendencies, Conduct Problems, Alcohol and Drug Abuse, Anger, Antisocial Personality Disorder, Criminal History, and Antisocial Associates. Higher overall scores indicate greater criminal risk factors. The SAQ has demonstrated internal consistency, with Cronbach’s alphas ranging from 0.69 to 0.88 (Loza et al., 2004; Mitchell et al., 2013), as well as concurrent and predictive validity for assessing recidivism (Loza et al., 2004; Loza et al., 2005). The current study only utilized the Conduct Problems (Cronbach’s $\alpha = .86$; covariate) and Alcohol and Drug Abuse (Cronbach’s $\alpha = .72$; predictor variable) subscale scores. The Conduct Problems subscale includes items that assess behavioral problems that occurred during childhood. The Alcohol and Drug Abuse subscale includes

items that assess past harmful substance use, withdrawal symptoms, and criminal justice involvement due to past harmful substance use.

The Brief Symptom Inventory (BSI)

The BSI is a self-report measure of psychiatric symptom distress experienced within the last week (Derogatis & Melisaratos, 1983). The measure consists of 53 questions with response options ranging from 0 (*not at all*) to 4 (*extremely*; Derogatis, 1993). The BSI measures nine symptom dimensions and three global indices, including the General Severity Index (GSI; Derogatis, 1993). Higher scores indicate greater psychiatric symptom distress. The BSI has demonstrated good reliability and validity (Broday & Mason, 1991; Derogatis, 1993) and internal consistency of the subscales and global indices, which ranged from .70 to .89 (Hayes, 1997). There has been stronger support, however, for a unidimensional factor structure of the BSI rather than the subscales (e.g., Hayes, 1997; Loutsiou-Ladd et al., 2008; Piersma et al., 1994); therefore, the current study utilized the GSI (Cronbach's $\alpha = .96$), which is an average of all the item responses that produces an overall score based on the number of symptoms endorsed and intensity of distress (Derogatis & Melisaratos, 1983).

The Multidimensional Scale of Perceived Social Support (MSPSS)

The MSPSS is a self-report measure of the quality of current perceived social support from friends, family, and significant others (Zimet et al., 1988). This measure consists of 12 statements to which participants are asked to respond using a Likert-style scale ranging from 1 (*very strongly disagree*) to 7 (*very strongly agree*). The items included on the MSPSS can apply to individuals both in the community and in a restricted environment (e.g., a state hospital). The MSPSS has demonstrated strong internal consistency, as well as concurrent and construct validity among adolescent and adult inpatients hospitalized in a psychiatric facility and individuals in prison (Kazarian & McCabe, 1991; Mitchell et al., 2018b; Zhang et al., 2010). The current study used the MSPSS total score (Cronbach's $\alpha = .88$) as an indication of global current perceived social support, with higher scores indicating higher levels of current perceived social support.

Procedures

All study procedures were approved by the State of California Committee for the Protection of Human Subjects and the collaborating university's Human Research Protection Program Institutional Review Board. The current study was part of a larger study examining criminogenic risk factors and mental health among inpatients found NGRI. Inpatients deemed NGRI in two California state hospitals were asked to participate in the current study. Researchers in this study were doctoral-level psychologists employed by the California DSH, and clinical/counseling doctoral students and advanced undergraduate research assistants from the collaborating university. All researchers involved in the project received training on the approved study and suicide risk procedures. Prior to participation, researchers provided potential participants with a summary of the study procedures and assessments. Exclusion criteria for participation included having below a 6th grade English reading level and inability to provide informed consent. Because of this exclusion criterion, persons interested in participating in the study were asked to complete a San Diego Quick Reading Assessment (La Pray & Ross, 1969) to ensure they met the requisite reading level. Interested

persons who were eligible for participation were provided a consent form, and they were given time to ask questions. The research assistant then asked potential participants questions regarding the study procedures and their rights as a participant (e.g., “Must you take part in this study, or is it okay to say ‘no’?”; “Tell me the main things we are asking you to do as part of this study.”; “What are the risk for participating in this study?”; “What are the benefits of this study?”; “Who will see how you answered these questionnaires?”). These questions were used to assess their understanding of their rights and the study to determine their capacity to consent. Potential participants who were not able to answer these questions were thanked for their time and dismissed. People deemed eligible and who agreed to participate were asked to sign the consent form. Participants were not compensated for their participation and were allowed to discontinue participation at any time without penalty.

In the assessment packets, the DHQ was presented first, and the other measures were counterbalanced to prevent sequencing effects. Participants received the assessment packet and were instructed to omit identifying information. Instead, each participant was given an identification code to ensure anonymity. In accordance with the State of California Committee for the Protection of Human Subjects and the hospitals’ requirements, participant responses were kept confidential unless the participant reported imminent suicide risk (further described below) or that they intended to physically harm someone else in the hospital or after release. Additionally, confidentiality would not be maintained if the participant reported abuse of a child, older adult, or an infirm adult. In this study, confidentiality was not broken for any participants.

To assess imminent suicide risk, participants endorsing suicide ideation were approached by a researcher who was a licensed psychologist affiliated with the California DSH. The researcher assessed imminent suicide risk, including current suicide ideation, plan and intent to attempt suicide, and access to means for suicide. No participants reported imminent suicide risk. As a precautionary measure, all participants were given a list of coping skills to manage possible distress. After in-person data collection was complete, each participant’s California DSH file was reviewed by a research assistant to confirm their psychiatric diagnoses.

Data Analysis Plan

All analyses were conducted using the Statistical Package for the Social Sciences (SPSS) version 25. Multinomial logistic regression was used to test the hypotheses given the use of a multicategorical lifetime suicide attempt history status criterion variable (i.e., no lifetime suicide attempt, one lifetime suicide attempt, multiple lifetime suicide attempts). The analyses were conducted using “no lifetime suicide attempt history” as the reference group, and the predictor variables were mean centered. To test the main effects, past harmful substance use (i.e., SAQ Alcohol and Drug subscale score) and current perceived social support (i.e., MSPSS total score) were entered as predictor variables of lifetime suicide attempt history status. To test moderation effects, the two-way interaction between past harmful substance use and current perceived social support was added as a predictor variable in the model. If the interaction was statistically significant ($p < .05$), then simple slopes were examined. Specifically, the association between past harmful substance use and lifetime

suicide attempt history status was examined at higher (+1 *SD*) and lower (−1 *SD*) levels of current perceived social support.

Results

Data Screening and Preparation

Expectation maximization (EM) imputation was used to address missing data for continuous variables. Only 3.39% of the data were missing, and Little's Missing Completely at Random (MCAR) test indicated that data were MCAR ($\chi^2[23,093, N=207] = 14,867.95, p > .999$); therefore, EM imputation was appropriate (Tabachnick & Fidell, 2013).

Four participants did not provide responses for their lifetime suicide attempt history and were excluded from the analysis. Univariate and multivariate outliers were examined. Variable scores that were greater than ± 3.29 *SD* from the mean were considered univariate outliers and were winsorized (Tabachnick & Fidell, 2013). There was only one univariate outlier score on the current perceived social support variable, which was adjusted prior to analysis. Next, multivariate outliers were tested using Mahalanobis Distance; three multivariate outliers were identified, and these cases were excluded from the analysis. In sum, although we collected data from 207 participants, only 200 participants were included in the analyses due to four cases with missing data on lifetime suicide attempt history status and the three multivariate outlier cases.

Additional covariates were considered if they were significantly associated with the criterion variable, lifetime suicide attempt history status. Age was significantly associated with single versus no lifetime suicide attempt history status ($OR = 1.04, p = .005$) and gender (coded as men = 1, women = 0) was significantly associated with multiple versus no lifetime suicide attempt history status ($OR = 0.44, p = .038$). Adjusting for age also allowed us to account for differences in the lifetime suicide attempt history status variable that could be accounted for by age (e.g., older individuals have had more time to attempt suicide multiple times during their life). Therefore, age and gender were included as covariates in all analyses. No other demographic variables (e.g., years of education, ethnicity, sexual orientation) were significantly associated with lifetime suicide attempt history status. Furthermore, psychiatric symptom severity (BSI GSI; $OR = 2.07, p = .038$) and the SAQ Conduct Problems ($OR = 1.10, p = .009$) were significantly associated with multiple versus no lifetime suicide attempt history status; therefore, these variables were also included as covariates in all analyses.¹

Primary Analyses

Bivariate correlations and descriptive statistics are presented in Table 1. Multinomial logistic regression was used to test the hypothesis that elevated past harmful substance use would be associated with more lifetime suicide attempts, whereas greater current perceived social support would be associated with fewer lifetime suicide attempts (see Table 2). Results

¹It should be noted that SAQ Criminal History and SAQ Antisocial Personality were not included in the analysis due to unsatisfactory internal consistency coefficients (SAQ Criminal History Cronbach's alpha = .47; SAQ Antisocial Personality Cronbach's alpha = .64). Additionally, the other SAQ scales that were not included in the primary analyses were not significantly associated with lifetime suicide attempt history status. Therefore, these other SAQ scales were excluded.

indicated that there were no significant main effects of current perceived social support ($OR = 1.00, p = .816$) or past harmful substance use ($OR = 1.03, p = .776$) in association with single versus no lifetime suicide attempt history status, after adjusting for other covariates. However, there was a significant main effect of past harmful substance use in association with multiple versus no lifetime suicide attempt history status ($OR = 1.31, p = .008$) but no significant main effect of current perceived social support ($OR = 0.98, p = .162$; Nagelkerke $R^2 = .22$).

The interaction between current perceived social support and past harmful substance use was then added to the model to test the moderating role of current perceived social support in the relation between past harmful substance use and lifetime suicide attempt history status. Specifically, we hypothesized that the relation between past harmful substance use and lifetime suicide attempt history status would be weaker for those higher in current perceived social support than those lower in current perceived social support. As seen in Table 2, there was a significant interaction between past harmful substance use and current perceived social support in association with multiple versus no lifetime suicide attempt history status ($OR = 1.01, p = .024$) but not in association with single versus no lifetime suicide attempt history status ($OR = 1.01, p = .240$; Nagelkerke $R^2 = .25$).

To further investigate the significant interaction between past harmful substance use and current perceived social support, simple slopes were tested to examine the association between past harmful substance use and lifetime suicide attempt history status (multiple versus no lifetime suicide attempt history status) at different levels of current perceived social support ($\pm 1 SD$). The association between past harmful substance use and multiple versus no lifetime suicide attempt history status was stronger when current perceived social support was higher ($+1 SD, OR = 1.61, p = .001$) than when current perceived social support was lower ($-1 SD, OR = 1.07, p = .620$). The simple slopes are depicted in Figure 1, which presents the estimated probability of lifetime suicide attempt status (multiple versus no lifetime suicide attempt history status) across past harmful substance use scores at different levels of current perceived social support (i.e., $M, \pm 1 SD$). The general pattern of these simple slope analyses indicated that as inpatients found NGRI increase in their past harmful substance use, their likelihood of having attempted suicide multiple times during their lifetime increases, whereas their likelihood of not having attempted suicide during their lifetime decreases. More specifically, when inpatients found NGRI are low in past harmful substance use but high in current perceived social support, they are the least likely to have endorsed multiple lifetime suicide attempts and most likely to have no lifetime suicide attempt history. However, individuals high in past harmful substance use and high in current perceived social support still evidence the highest likelihood of having a history of multiple lifetime suicide attempts and a low likelihood of having no lifetime suicide attempt history.

Discussion

The literature on suicide risk among inpatients found NGRI is extremely limited and dated. This is a disservice to this population, who is likely at elevated risk compared to the general population. Suicide risk among inpatients found NGRI is likely elevated because they are similar to individuals with psychiatric disorders and those with criminal justice involvement,

both of whom evidence elevated suicide rates (e.g., Mumola, 2005; Neuner et al., 2008). Given that harmful substance use and social support are robustly associated with suicidal behaviors and associated with previous suicide attempts among these other high-risk populations (Fruehwald et al., 2004; Hakansson et al., 2010; Ries et al., 2009), it is essential to understand how these experiences are related to a history of lifetime suicide attempts among inpatients found NGRI. Therefore, the current study examined past harmful substance use and current perceived social support in association with lifetime suicide attempt history among inpatients found NGRI. We also examined the moderating role of current perceived social support in the relation between past harmful substance use and lifetime suicide attempt history.

First, it is worth noting that 20% of our sample reported a single previous lifetime suicide attempt and 26.5% reported multiple previous lifetime suicide attempts, which is elevated when compared to similar at-risk samples. Previous research has indicated that 5.26% of individuals in prison reported a single previous lifetime suicide attempt and 7.02% reported making multiple previous lifetime suicide attempts (Smith et al., 2013). Among acute inpatients hospitalized in a psychiatric facility, previous studies indicated 52.4% to 63.2% attempted suicide at least once (Andover & Gibb, 2010; Brown et al., 2019). Our findings suggest that inpatients found NGRI appear to be at elevated risk for a lifetime suicide attempt history when compared individuals in prison, although not as elevated when compared to acute inpatients hospitalized in a psychiatric facility. Research examining factors associated with suicide risk is necessary to inform suicide risk assessment and intervention among inpatients found NGRI given that their suicide attempt history prevalence falls within the range of suicide attempt history rates of other high-risk populations.

To clarify correlates for a lifetime suicide attempt history among inpatients found NGRI, the current study tested the role of two variables that have been associated with a history of suicide attempts (i.e., past harmful substance use and current perceived social support) that have received empirical support among comparable high-risk populations (i.e., inpatients hospitalized in a psychiatric facility, individuals involved in the criminal justice system; Fruehwald et al., 2004; Hakansson et al., 2010; Ries et al., 2009). We hypothesized that greater past harmful substance use and lower current perceived social support would be associated with a greater likelihood of a lifetime suicide attempt history. This hypothesis was partially supported. After adjusting for age, gender, psychiatric symptom severity, childhood conduct problems, and current perceived social support, there was a significant main effect of past harmful substance use in association with a history of multiple lifetime suicide attempts versus no lifetime suicide attempt history; however, there was not a significant main effect of current perceived social support. These findings indicate that past harmful substance use is uniquely associated with a greater likelihood of an inpatient found NGRI reporting multiple previous lifetime suicide attempts compared to no previous lifetime suicide attempts.

This finding is consistent with previous literature that demonstrates that a history of harmful substance use is related to suicidal behaviors (Kessler et al., 1999; Yuodelis & Ries, 2015). However, unlike other findings that have demonstrated that low social support may increase

risk for a lifetime history of suicide attempts (Hakansson et al., 2010; Kleiman & Liu, 2013; You et al., 2011), the current study did not support the unique relation between current perceived social support and lifetime suicide attempt history status. Based on an anecdotal description of the inpatients found NGRI in the California DSH, the lack of the unique relation between current perceived social support and lifetime suicide attempt history status could be because the California DSH inpatients found NGRI are receiving long-term psychiatric care. This long-term care includes psychotropic medication stabilization and psychotherapeutic treatments, which may have improved the inpatients found NGRI's psychosocial functioning and allowed them to increase positive social connections with others. Thus, inpatients found NGRI's current perceived social support may not be as impaired as other, more acute, patients assessed in previous studies. Similarly, these patients may also be more able to build stable and meaningful social connections with other patients and staff, given their long-term hospitalization. Data support this notion, such that inpatients hospitalized in an acute psychiatric facility had a mean MSPSS score of 58.31 (range of 12 to 84; Mitchell et al., 2018b), whereas the current sample's mean was 66.61. Similarly, our sample evidenced higher mean-level current perceived social support than individuals incarcerated in prisons in China ($M = 41.65$; Zhang et al., 2010). It is also possible that the lack of the significant unique relation between current perceived social support and lifetime suicide attempt history status was a product of the study design (i.e., testing current perceived social support in relation to previous suicide attempts).

Although previous literature suggests that harmful substance use and perceived social support may independently serve as important experiences related to a lifetime history suicide attempt and suicide deaths (Kessler et al., 1999; Kleiman & Liu, 2013; Yuodelis & Ries, 2015), the complex relations between multiple factors may have extremely important implications for understanding lifetime suicide attempt history among inpatients found NGRI. Based on previous literature (e.g., You et al., 2011), we hypothesized that current perceived social support may attenuate the relation between past harmful substance use and lifetime suicide attempt history. Although the association between past harmful substance use and no prior lifetime suicide attempt versus multiple prior lifetime suicide attempts was moderated by current perceived social support, the change in the association was not as hypothesized. Simple slope analyses revealed that the association between past harmful substance use and multiple prior versus no prior lifetime suicide attempt status was stronger when current perceived social support was higher than when current perceived social support was lower. The plotted simple slopes provided further clarity and indicated that those low in past harmful substance use but high in current perceived social support were less likely to have reported multiple prior lifetime suicide attempts. Furthermore, contrary to our expectation, the plotted simple slope estimated probabilities indicated that individuals who reported high past harmful substance use and high current perceived social support evidenced the highest likelihood of a multiple lifetime suicide attempt history. Additionally, for those low in current perceived social support, the estimated probability of a history of multiple lifetime suicide attempts stayed relatively stable, between 52% and 64%, regardless of the severity of past harmful substance use. These findings indicate that current perceived social support does not change the relation between harmful substance use and history of multiple previous lifetime suicide attempts when past harmful substance use is elevated, but

instead may be associated with a greater likelihood of a multiple lifetime suicide attempt history.

One possible explanation for these findings is that current supportive social relationships in the context of past harmful substance use confer additional negative social experiences. According to the interpersonal theory of suicide (Joiner, 2005; Van Orden et al., 2010), thwarted belongingness (i.e., a sense of loneliness and lack of reciprocal caring relationships) and perceived burdensomeness (i.e., feelings of self-hate and liability to others) are necessary for suicidal behaviors to occur. From this framework, it is possible that although individuals may have elevated rates of social support, they may perceive these relationships to be non-reciprocal and feel as if they are a burden or liability to their sources of social support. This may be the case for inpatients found NGRI with elevated current perceived social support and past harmful substance use, such that their past harmful substance use may strain social relationships (perceived social support) and lead to thwarted belongingness and perceived burdensomeness (feelings of disconnection, self-harm, and liability), which may negate the beneficial aspects of social support and lead to elevated risk for suicide attempts. Alternatively, inpatients found NGRI may have support from social networks that are composed of strenuous relationships from which they do not receive the benefits of strong social support. Furthermore, research among individuals who have attempted suicide indicates that social support significantly fluctuates over the course of a day and should be considered as a dynamic construct (Coppersmith et al., 2019). It is also possible that although some inpatients found NGRI reported high current perceived social support during hospitalization, this may not have been the case when they were still in the community. Perhaps they had lower perceived social support when they were in the community and actually using harmful substances. Therefore, the time point that our assessments were administered (i.e., during hospitalization) may not reflect inpatients found NGRI's experiences during other times in their lives. This should be considered when interpreting our findings. However, these postulations are empirical questions to be tested in future research.

The current findings are important to consider in the context of clinical interventions. Broadly, our findings highlight the importance of suicide risk assessment that considers the complex relations between factors associated with suicidal behaviors. Even after adjusting for psychiatric symptoms, a particularly important correlate of suicide risk (e.g., Nock et al., 2010), the interaction between current perceived social support and past harmful substance use was significant, emphasizing the important interplay between these experiences. Therefore, treatment settings would likely benefit from suicide risk assessments that consider multiple domains of factors associated with suicide risk among inpatients found NGRI.

Although our findings cannot speak to how social support and harmful substance use impact future suicide risk, these findings may have preliminary implications for the conceptualization and implementation of psychosocial interventions for inpatients found NGRI within the state hospital setting. Our findings provide preliminary support for assessing previous harmful substance use as part of a thorough suicide risk assessment among inpatients found NGRI, which could provide important guidance for subsequent

intervention. Additionally, research indicates that substance use history is associated with future suicidal behaviors (Darvishi et al., 2015; Poorolajal et al., 2016; Vijayakumar et al., 2011); thus, even prior substance use is relevant to current suicide risk. In the case of elevated prior harmful substance use and suicide risk, interventions aimed at reducing harmful substance use and preventing relapse (e.g., motivational interviewing, cognitive behavioral therapy, dialectical behavior therapy; Dimeff & Linehan, 2008; Swogger et al., 2016) may be necessary in addition to attempting to increase social support. Such substance use- focused intervention, even while hospitalized with limited access to substances, would likely benefit inpatients found NGRI who may be later released back into the community. It may also be important to target other negative social factors (e.g., feelings of thwarted belongingness and perceived burdensomeness) that may characterize these individuals' social support relationships; however, future research is needed to clarify how these other negative social factors may relate to risk for suicide attempts among inpatients found NGRI with elevated harmful substance use. Evidence-based interventions for individuals with severe psychopathology that address both harmful substance use and building social support could also be beneficial for reducing suicide risk. For example, Illness Management and Recovery is a program developed for individuals with severe mental illness that targets an array of relevant topics using psychoeducation and skill-building techniques to help patients identify and achieve their recovery goals (Mueser et al., 2006). Particularly relevant to the findings of the current study, the Illness Management and Recovery program includes treatment models related to building social support and addressing harmful alcohol and substance use. Given the results of this study, such a program could be especially helpful for inpatients found NGRI who are diagnosed with chronic and persistent mental disorders, so they can build skills they can use both during and after hospitalization.

This study has limitations that should be considered in tandem with these findings. These data were collected cross-sectionally, and the primary outcome variable was self-reported lifetime suicide attempt history. We also did not have data to indicate if the previous lifetime suicide attempts occurred pre- or post-hospitalization. Therefore, we cannot make definitive conclusions about temporal associations or causality with these data. Relatedly, the MSPSS assesses current perceived social support, the SAQ contains some items that specify a timeframe and others do not, and our outcome was previous lifetime suicide attempts. Hence, our data cannot speak to how current risk or protective factors are associated with future suicide attempts. Future work should replicate the current study using assessments and methods that are more sensitive to time. Additionally, our results may not generalize to all inpatients found NGRI given that our sample was located within the California Department of State Hospitals system, had above a sixth grade English reading level, and demonstrated the capacity to provide informed consent. Due to these criteria, our sample may reflect higher-functioning and more psychiatrically stable inpatients found NGRI than those who were not able to participate, and they may not be representative of inpatients found NGRI in other geographic locations. Similarly, participants primarily identified as men. Therefore, future research should consider prospective research designs, as well as recruiting participants from other locations and testing if these results replicate in a sample of predominately women. Furthermore, our study relied on participants' self-report and a single item assessing lifetime suicide attempt history status. Future research may consider

the use of more comprehensive assessments of suicidal behaviors and gaining corroborating data from participants' medical files (e.g., previously documented suicidal behaviors and suicide risk assessments). Lastly, our study used a variable of past harmful substance use that included drugs and alcohol, but future work should consider including more specific assessments of types of harmful substance use. For example, it is possible that some substances (e.g., opiates) may be more strongly associated with a lifetime suicide attempt history among inpatients found NGRI than other substances (e.g., cannabis), which would provide valuable additional information to the findings of the current study. It is also worth noting that none of our variables of interest were significantly associated with the single previous lifetime suicide attempt group versus the no lifetime suicide attempt history group; therefore, the probability of being in the single previous lifetime suicide attempt group or the no previous lifetime suicide attempt group was not a function of current perceived social support, past harmful substance use, psychiatric symptom severity, or conduct problems after adjusting for gender and age. Only age was significantly associated with greater odds of a single previous lifetime suicide attempt compared to no previous suicide attempt. This finding may suggest that inpatients found NGRI with a single previous lifetime suicide attempt are not significantly different from those with no previous suicide attempt; thus, there may be different factors associated with a past lifetime single attempt versus multiple attempts. Future research should consider factors that would be associated with a single suicide attempt.

In conclusion, the contribution of these findings to the literature are substantial, given the dearth of research pertaining to suicide risk among inpatients found NGRI. Our data indicate that the rates of life-time suicide attempt history among inpatients found NGRI fall within the range of lifetime suicide attempt history rates of other high-risk groups (e.g., individuals in prison and inpatients hospitalized in a psychiatric facility). Furthermore, our findings support past harmful substance use as a significant correlate of multiple prior lifetime suicide attempts among inpatients found NGRI and that current perceived social support does not appear to change the relation between past harmful substance use and history of multiple lifetime suicide attempts when inpatients found NGRI are high in past harmful substance use. These findings provide additional guidance for suicide risk assessment and intervention among these high-risk individuals; however, continued work in this area is necessary to reveal the temporal order of these associations.

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Figure 1.

The simple slope analysis for the significant interaction between current perceived social support and past harmful substance use in association with lifetime suicide attempt history status (no lifetime suicide attempts history versus multiple lifetime suicide attempts history), after adjusting for additional covariates. This depicts the association between past harmful substance use (SAQ Alcohol and Drug Abuse score) and lifetime suicide attempt history status at average (M), high (+1 *SD*), and low (−1 *SD*) levels of current perceived social support. This figure was created using the coefficients from mean-centered predictor variables, including the mean centered SAQ Alcohol and Drug Abuse Score; however, the non-mean centered SAQ Alcohol and Drug Abuse scores are presented on the x-axis to improve clinical interpretation.

Table 1.Pearson's r correlations and descriptive statistics.

	1	2	3	4	5	6
1. Gender $\dagger$	—					
2. Age	.10	—				
3. BSI GSI	.04	.03	—			
4. SAQ CP	-.01	-.17*	.23**	—		
5. SAQ AD	.00	-.18*	.14*	.49**	—	
6. MSPSS Total	-.05	-.14	-.20**	.03	.05	—
<i>M</i>	—	44.69	0.68	6.49	3.11	66.61
<i>SD</i>	—	12.69	0.61	4.53	2.09	14.95

Note.: Gender coded as men = 1, women = 0; BSI GSI = Brief Symptom Inventory Global Severity Index; SAQ = Self-Appraisal Questionnaire; CP = the conduct problems subscale of the SAQ; AD = the alcohol and drug abuse score from the SAQ; MSPSS = the total score from the Multidimensional Scale of Perceived Social Support

$\dagger$ = point-biserial correlation between gender (dichotomous) and the other continuous variables

*
 $p < .05$

**
 $p < .01$.

Table 2.

Multinomial logistic regression results testing the main effects of current perceived social support and past harmful substance use, and the interaction between current perceived social support and past harmful substance use in association with lifetime suicide attempt history status after adjusting for additional covariates.

Criterion Variable	Predictor Variable	Logit	SE	Wald χ^2	df	p	OR	OR 95%CI	
								Lower	Upper
Single	Intercept	-1.62	0.64	6.38	1	.012			
Lifetime	Gender	0.66	0.67	0.98	1	.322	1.94	0.52	7.23
Suicide	Age	0.05	0.02	8.90	1	.003	1.05	1.02	1.08
Attempt	BSI GSI	-0.15	0.37	0.16	1	.688	0.86	0.42	1.77
History	SAQ CP	0.08	0.05	2.78	1	.095	1.09	0.99	1.20
	SAQ AD	0.03	0.11	0.08	1	.776	1.03	0.83	1.28
	MSPSS	0.00	0.01	0.05	1	.816	1.00	0.97	1.02
Multiple	Intercept	0.06	0.38	0.02	1	.877			
Lifetime	Gender	-1.09	0.44	6.10	1	.014	0.34	0.14	0.80
Suicide	Age	0.03	0.02	4.35	1	.037	1.03	1.00	1.06
Attempt	BSI GSI	0.52	0.30	3.08	1	.080	1.69	0.94	3.03
History	SAQ CP	0.04	0.05	0.78	1	.378	1.04	0.95	1.14
	SAQ AD	0.27	0.10	7.02	1	.008	1.31	1.07	1.60
	MSPSS	-0.02	0.01	1.96	1	.162	0.98	0.96	1.01
Single	Intercept	-1.61	0.65	6.22	1	.013			
Lifetime	Gender	0.65	0.68	0.94	1	.333	1.92	0.51	7.23
Suicide	Age	0.05	0.02	8.54	1	.003	1.05	1.02	1.08
Attempt	BSI GSI	-0.12	0.37	0.11	1	.739	0.89	0.43	1.81
History	SAQ CP	0.09	0.05	3.37	1	.066	1.10	0.99	1.21
	SAQ AD	0.02	0.11	0.03	1	.867	1.02	0.82	1.27
	MSPSS	0.00	0.01	0.00	1	.960	1.00	0.97	1.03
	MSPSSxSAQ AD	0.01	0.01	1.38	1	.240	1.01	0.99	1.02
Multiple	Intercept	-0.04	0.40	0.01	1	.927			
Lifetime	Gender	-1.04	0.46	5.14	1	.023	0.36	0.15	0.87
Suicide	Age	0.03	0.02	3.15	1	.076	1.03	1.00	1.06

Criterion Variable	Predictor Variable	Logit	SE	Wald χ^2	df	p	OR	OR 95%CI	
								Lower	Upper
Attempt	BSI GSI	0.54	0.30	3.21	1	.073	1.72	0.95	3.11
	SAQ CP	0.06	0.05	1.49	1	.222	1.06	0.97	1.17
History	SAQ AD	0.27	0.11	6.61	1	.010	1.31	1.07	1.61
	MSPSS	-0.02	0.01	2.32	1	.128	0.98	0.96	1.01
	MSPSSxSAQ AD	0.01	0.01	5.11	1	.024	1.01	1.00	1.03

Note: The reference group is no lifetime suicide attempt history. Gender coded as men = 1, women = 0; BSI GSI = Brief Symptom Inventory Global Severity Index; SAQ = Self-Appraisal Questionnaire; CP = the conduct problems subscale of the SAQ; AD = the alcohol and drug abuse score from the SAQ; MSPSS = the total score from the Multidimensional Scale of Perceived Social Support; MSPSSxSAQ AD = the two-way interaction between the MSPSS total score and the SAQ AD score.