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Openness to firearm storage safety as a suicide prevention tool among those exposed to suicide: The role of perceived closeness to the suicide decedent

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ABSTRACT

Background: Exposure to suicide and closeness to a suicide decedent may be relevant to means safety, especially in firearm owners. This study examines how such factors are associated with firearm owners' current firearm storage methods and openness to changing storage methods.
Method: 300 firearm owners completed a survey on Amazon's Mechanical Turk program; 176 participants reported being exposed to suicide. Perceived closeness was rated as Not at all close, Close, or Extremely Close.
Results: Those exposed to suicide were more open to secure storage and temporarily storing the firearm with a trusted individual to prevent someone else's suicide. Those close to the suicide decedent were more likely to use secure storage practices, more open to using secure storage methods to prevent their own and someone else's suicide, and had a higher degree of storage methods in place compared to those not close to the decedent.
Limitations: The sample may not be representative of all American firearm owners exposed to suicide.
Conclusions: Being close to a suicide decedent may influence firearm owners' current storage practices and openness to changing storage methods. Such individuals may better relate to the suicide decedent and realize the significance of using secure storage methods to prevent suicide.

1. Introduction

Suicide is the tenth leading cause of death and is considered a major public health concern (Centers for Disease Control and Prevention, 2017). Being exposed to suicide (i.e., knowing someone personally who died by suicide) can impact a variety of individuals, including those outside of the decedent's immediate family (Cerel et al., 2014). The latest data indicates that half of Americans report being exposed to one or more suicides during their lifetime (Feigelman et al., 2018). Furthermore, for each suicide death, it is estimated that 135 individuals are considered to be suicide exposed (Cerel et al., 2018). Individuals exposed to suicide are at an increased risk for developing suicidal ideation and engaging in suicidal behaviors (Cerel et al., 2016; Maple et al., 2017; Pitman et al., 2014). This risk has been evidenced in a variety of populations, including family members of decedents, adolescents and adults exposed to non-kin suicides, and military service members and veterans (Andriessen et al., 2016; Bryan et al., 2017; Cerel et al., 2015; Hedstrom et al., 2008; Hom et al., 2017; Maple et al., 2017; Qin et al., 2002; Tidemalm et al., 2011). The impact a suicide death has on an individual is influenced not just by the relationship to the decedent (i.e., kin vs. non-kin) but also by perceived closeness to the decedent (Andriessen et al., 2016; Cerel et al., 2013; Cerel et al., 2016; Maple et al., 2017). For example, Cerel et al., (2017) found that individuals who reported higher levels of closeness to a suicide decedent were more likely to report experiencing suicidal ideation and to have more severe suicidal ideation in the past two weeks compared to those who reported low closeness. These findings demonstrate that exposure to suicide can affect a multitude of individuals in various ways. Given this, it is imperative to understand how suicidal ideation and behavior in individuals who are exposed to suicide can be prevented.

One method that has been found to reduce suicide rates is limiting access to lethal means (Barber and Miller, 2014). Specifically, means safety interventions focus on decreasing the lethality or limiting access to lethal methods that can be utilized for suicide (Barber and Miller, 2014; Sarchiapone et al., 2011). These methods have been associated with a 30 to 50% decrease in suicide rates in other countries (Barber and Miller, 2014) and may be particularly effective in decreasing the risk of suicide when the method is widely available, popular, highly lethal, and/or cannot be easily replaced by similar methods (Hawton et al., 2007). Firearms are considered to be one of the most lethal means of suicide (Miller et al., 2004; Vyrostek et al., 2004) and account for more than 50% of suicides in the United States (U.S.) (CDC, 2017). Limiting access specifically to firearms has led to a reduction in suicide rates in countries like Australia (Chapman et al., 2006), Canada

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(Bridges, 2004), Israel (Lubin et al., 2010), New Zealand (Beautrais et al., 2006), and Switzerland (Reisch et al., 2013). Research has shown that firearm ownership is associated with dying by suicide, further, this relationship holds even after controlling for covariates such as demographics, suicidal ideation, and prior suicidal behavior (Anestis and Houtsma, 2017; Miller et al., 2013; Miller et al., 2007; Miller et al., 2016; Miller et al., 2015; Opoliner et al., 2014). The risk for suicide further increases when firearms are stored unsafely (Anestis et al., 2017; Brent, 2001). Given that about 4 in 10 U.S. adults have access to a firearm in their household (Parker et al., 2017), it is especially important to understand the factors that may influence an individual's willingness to engage in means safety interventions for firearm storage. It may be that exposure to suicide and closeness to a suicide decedent can positively influence an individual's openness to changing their storage methods. The personal loss may provide an individual with a new perspective that makes them better relate to the suicide decedent and realize the significance of using secure storage methods to prevent suicide. Such an experience could serve as a meaningful turning point in one's openness to more secure storage in a population that is highly vulnerable to suicidal behaviors.

The present study examined if exposure to suicide and the level of closeness to a suicide decedent are associated with current firearm storage practices and openness to changing storage methods in a sample of U.S. firearm owners. It was hypothesized that individuals who reported being exposed to suicide and had a close relationship with a suicide decedent would be more likely to currently store their firearms securely (i.e., locked, unloaded, and in a secure location), more open to storing their firearms more securely to prevent their own and someone else's suicide, and more open to temporarily removing firearms from the home to prevent their own and someone else's suicide. For exploratory purposes, we also examined if suicide exposure and perceived closeness was associated with a greater degree of storage safety measures employed.

2. Materials and methods

2.1. Participants

Data was collected using Amazon's Mechanical Turk (mTurk) program for a study examining firearms and suicide, with a total of 300 American firearm owners participating (53.0% male; 82.3% White; 92.0% heterosexual; $_{m}$age = 36.11; age range = 20–69). In order to be eligible for the study, individuals were required to be adults currently residing in the U.S. and to own at least one firearm. The study was restricted to individuals who had completed at least 100 projects on mTurk and had at least an average 95% approval rating on past projects. Previous research has demonstrated that the quality of data collected through mTurk is similar or better than data collected from more typical samples (e.g., undergraduates, community samples) utilized in various research studies and that mTurk workers are demographically similar to their national populations (Behrend et al., 2011; see Shapiro et al., 2013 for a review). Participants provided informed consent prior to the study and were compensated $6 for their participation, which required an average of approximately 45 minutes. All procedures were reviewed and approved by the relevant institutional review board.

2.2. Measures

2.2.1. Exposure to suicide

Exposure to suicide was assessed by asking participants if they had ever known anyone who died by suicide. Those who knew more than one suicide decedent were instructed to answer the remaining items in regard to the suicide decedent to whom they felt closest. Perceived closeness to the suicide decedent was assessed by asking participants the following question:

"How close would you say your relationship was with this individual at the time of his or her death?" Participants rated their closeness as being Not at all Close, Close, or Extremely Close. Participants were then asked to identify their relationship to the decedent and when the death occurred (e.g., parent, sibling, friend). These methods are similar to those used in other studies assessing suicide exposure in multiple populations (Bryan et al., 2017; Cerel et al., 2016; Hom et al., 2017).

2.2.2. Firearm storage practices

Demographic information, firearm storage practices, and openness to means safety measures were assessed using items designed for the larger study. Participants endorsed dichotomously if they used a particular method to store their firearm(s). Storage methods of interest included whether their firearm(s) were stored locked (e.g., trigger lock), loaded, and in a secure location (e.g., locked gun safe). If multiple firearms were owned, participants were instructed to select the response that reflected the highest risk. For example, if a participant owned multiple firearms and one was stored unlocked, they were instructed to select the "unlocked" response.

2.2.3. Openness to means safety measures

Using a Likert scale ranging from 0 (*Not at all*) to 4 (*Extremely*), participants rated their willingness to engage in strategies to prevent their own or someone else's suicide in times of crisis (e.g., "Are you open to the idea of storing a gun more securely in the future to prevent a suicide attempt by yourself?"; Are you open to the idea of letting someone you trust temporarily keep your gun outside of your home for you if somebody you live with becomes suicidal or highly distressed?").

2.2.4. Suicidal ideation, plan, and attempts

Lifetime suicidal ideation, plans, and attempts were assessed using the self-report short form of the Self-Injurious Thoughts and Behaviors Interview (SITBI; Nock et al., 2007). The SITBI is comprised of multiple modules assessing lifetime suicidal ideation, plans, gestures, attempts, non-suicidal self-injury, and behavior. Only the dichotomously scored items regarding lifetime suicidal ideation ("Have you ever had thoughts of killing yourself?), plans ("Have you ever actually made a plan to kill yourself?"), and attempts ("Have you ever made an actual attempt to kill yourself in which you had at least some intent to die?") were included for the purposes of this study. These items were used to provide clinical characteristics of the sample and serve as potential covariates in the main analyses.

2.3. Data analysis

In the first series of analyses, suicide exposure served as the independent variable. Covariates included in each analysis were selected after conducting zero-order correlations, chi-square analyses, and analyses of variance (ANOVAs) examining differences in demographic (age, sex, race) and suicide-related variables (lifetime suicide ideation, lifetime suicide plan, lifetime suicide attempt) among each outcome variable within the overall sample (N = 300). The second series of analyses were limited to those who were exposed to suicide (n = 176) and examined perceived closeness to the suicide decedent as the independent variable. Covariates were identified using chi-square analyses and ANOVAs examining demographic and suicide-related variables among each outcome variable within the suicide exposed sample. Time since death was also included as a covariate for all analyses in which closeness to suicide decedent served as the independent variable.

Two logistic regressions were conducted to examine the differences between current firearm storage methods based on 1) suicide exposure and 2) level of perceived closeness to the suicide decedent. Current firearm storage was dichotomized as being secure (i.e., locked, unloaded, and in a secure location) or unsecure (i.e., unlocked, loaded, and/or in an unsecure location). Adjusted odds ratios (AOR) were used