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Provision of Gun Locks to Increase Their Use in an at-Risk Sample

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COLLEGE OF ARTS AND SCIENCES

PROVISION OF GUN LOCKS TO INCREASE THEIR USE IN AN AT-RISK SAMPLE

By

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ABSTRACT

Approximately 48,300 people die by suicide yearly in the United States (U.S.) alone. Just over half of these deaths result from self-inflicted gunshot wounds, which is to be expected given that 9 out of 10 attempts involving a firearm result in death. Suicide research has demonstrated that prohibiting or reducing access to lethal means, or reducing the lethality of lethal means is an effective intervention for reducing suicide risk. The focus of studying lethal means in suicide research has recently emphasized firearms more strongly, and the literature has yielded strategies to increase the acceptability of lethal means counseling among at-risk individuals; however, strategies have yet to be empirically proven that effectively influence behavioral outcomes (i.e., increased engagement in firearm safety behaviors/thoughts). The present study sought to accomplish this. Nationally recruited at-risk, gun-owning community participants ($n = 23$) were randomly assigned to one of two intervention groups: 1) standard intervention (i.e., suicide risk assessment, safety planning, and lethal means counseling) with a gun lock and instructional video for its proper use, and 2) standard intervention without a gun lock or instructional video. Public health research findings have provided compelling evidence that administering gun locks increases gun safety behaviors in average gun-owners. Accordingly, we hypothesized that among an at-risk sample of gun-owners, administering gun locks would interact with time to increase Engagement in Firearm Safety Behaviors, Intentions to Adhere to Clinician Recommendations, Recommending to Others to Adhere to Clinician Recommendations, and Acceptability of lethal means safety intervention. Hypotheses were tested using Linear Mixed Modeling and demonstrated no interaction effects for group x time. However, main effects for time on Intentions to Adhere to Clinician Recommendations and on Acceptability of Intervention were found and elaborated on in greater detail in our discussion.

CHAPTER 1

INTRODUCTION

1.1 Suicide and Lethal Means Research

The CDC estimated that approximately 48,300 individuals died by suicide in 2018 in the U.S. (2020). Consistent with suicide trends in the U.S. over several decades, just over 24,400 of these deaths (about 50% of the total suicide deaths reported) were a result of self-inflicted gunshot wounds. Over the past two decades, estimates of the case fatality (i.e., number of individuals that die per attempt) among individuals that attempt to die by suicide using firearms have consistently been found to be 90% of attempts or higher (Anestis, 2016; Elnour & Harrison, 2008; Miller, Azrael, & Barber, 2012; Shenassa, Catlin, & Buka, 2003). In addition to these numbers, another important branch of the literature on firearm suicide has demonstrated that firearm ownership and access are related to death by suicide (Anglemyer, Horvath, & Rutherford, 2014; Miller et al., 2012), while firearm access/ownership is not associated with the presence of suicide ideation or psychiatric disorders (Miller et al., 2009). Taken together, the above findings highlight the importance of lethal means research with an emphasis on firearms.

Indeed, much of the literature on suicide and interventions for suicide has turned towards lethal means research in recent years (see Barber & Miller, 2014; Houtsma, Butterworth, & Anestis, 2017; Stanley et al., 2020). Lethal means research focuses on expanding our knowledge about the various methods through which individuals die by suicide. Historically and internationally, lethal means research has produced clear and promising findings regarding the successful reduction of suicide deaths, with studies demonstrating decreases in suicide rates in the United Kingdom (Amos, Appleby, & Kiernan; 2001), Canada (Caron, 2004; Bridges, 2004; Leenaars, 2007), Sri Lanka (Gunnel et al., 2007), Australia (Leenaars, 2007; Tait & Carpenter, 2009), Israel (Shelef et al., 2015), and the United States (Anestis & Anestis, 2015; Anestis, Anestis, & Butterworth, 2017) all as a result of changes to access and/or lethality of various lethal means. These studies were primarily natural experiments, in which the results were observed after the implementation of restrictions and/or regulations on a societal or national level. In the United Kingdom, regulations that increased the use of catalytic converters that produced lower levels of toxic gasses in cars resulted in a decrease in deaths by suicide (Amos, Appleby, & Kiernan; 2001). In Sri Lanka, it was found that regulations on the sale of toxic pesticides, a

previously highly utilized lethal means for suicide, similarly yielded decreases in death by suicide. In Canada (Caron, 2004; Bridges, 2004; Leenaars, 2007), Australia (Leenaars, 2007; Tait & Carpenter, 2009), the United States (Anestis & Anestis, 2015; Anestis, Anestis, & Butterworth, 2017), and Israel (Shelef et al., 2015), legislation/regulations around firearms produced a similar impact on suicide deaths. These natural experiment studies, though not necessarily focused on clinical, suicide-related intervention, have demonstrated the merits of precautions that lead to either lower accessibility to lethal means for suicide or decreasing the lethality of the means that are accessible.

The lethal means research cited above has established a firm foundation for recent endeavors in the field aimed at developing effective interventions for suicide focused on lethal means. This branch of research can be categorized as lethal means counseling research (see Chu et al., 2015 for a detailed discussion of lethal means counseling). Lethal means counseling is an approach to reducing risk for suicide that involves increasing the physical and psychological (e.g., not changing physical distance but storing something out of sight or in a manner resulting in increases in the effort required for access) distance between an at-risk individual and accessible, potential lethal means. This approach could include steps ranging from storing lethal means (i.e. a gun, pills, etc.) out of sight, to the more potent options of entrusting lethal means to family/friends/clinicians, or getting rid of them altogether when possible. Though many forms of lethal means counseling exist, broad clinical guidelines for the assessment and management of suicide risk utilizing lethal means counseling can be found in a review of empirically-supported suicide risk assessment guidelines by Chu and colleagues (2015).

Given the previously discussed findings regarding firearm-related suicide deaths, a growing, primary focal point of lethal means counseling research is firearms. Recent lethal means counseling studies have highlighted attitudes towards and client engagement in lethal means counseling for firearms (e.g., Stanley et al., 2017; Stanley et al., 2020). Stanley and colleagues (2017) conducted a study observing the effects of the phrasing utilized in a lethal means counseling approach. In a general undergraduate sample ($n = 370$), Stanley and colleagues administered vignettes to student participants in which they were taught about lethal means safety, with the primary difference between groups being that one referred to lethal means counseling as “means restriction,” with the other group using the phrasing “means safety.” The primary findings were that utilizing the phrasing “means safety” was associated with individuals

reporting higher intentions to adhere to lethal means counseling and a higher reported acceptability of lethal means counseling. Building upon this study, Stanley and colleagues (2020) conducted a second study in a sample of at-risk undergraduates with some familiarity with firearms ($n = 96$) to test the effects of varying degrees of both fear messaging (i.e., high vs. low emphasis on messaging intended to provoke fear) and emphasis on temporariness of means safety strategies (i.e., high vs. low emphasis on means safety strategies lasting only for the duration of suicide risk). Individuals were grouped into four categories of intervention (i.e., high fear/high temporariness, low fear/low temporariness, high fear/low temporariness, and low fear/high temporariness; see Stanley et al., 2020 for examples of language used in each condition). Results provided clear support for an approach that did not utilize fear messaging, in conjunction with also highly emphasizing that any engagement in means safety was temporary. This group was associated with significantly greater increases in self-reported intentions to adhere to clinician recommendations.

Taken together, the literature regarding the effects of reduction/regulation of access to lethal means (e.g., Anestis & Anestis 2015; Anestis, Anestis, & Butterworth, 2017; Leenaars, 2007; Shelef et al., 2015; Tait & Carpenter, 2009) in conjunction with research studying attitudes and outcomes associated with different lethal means counseling approaches specific to firearms (e.g., Stanley, 2017; Stanley et al., 2020), indicate that a strong future direction for the literature is one focused on elucidating clinically applicable interventions specific to firearms. It is also critical that these interventions demonstrate themselves to be acceptable and to effectively impact the lethality and/or accessibility of firearms. Further, it is clear that addressing these goals in the context of higher risk individuals (e.g., persons with a history of suicide ideation and/or mood disturbances, who also have access to/ownership of firearms) would be of incremental value to the research, as some recent studies (e.g., Stanley et al., 2020) have directly stated.

Lethal means counseling has been empirically demonstrated to be an approach likely to decrease deaths by suicide (e.g., Barber & Miller, 2014; Britton, Bryan, Valenstein, 2016; Bryan, Stone, & Rudd, 2011) among individuals at risk, and certain approaches have been demonstrated to have higher acceptability (e.g., Stanley, 2017; Stanley et al., 2020). The present study intended to build on this research by testing whether these strategies, with the addition of the provision of a gun lock, incrementally improves the efficacy of intervention, in at-risk individuals with access

to firearms. The empirical basis for the addition of gun lock provision is detailed in the following section.

1.2 Gun Locks and Safe Storage

Thus far, lethal means research has repeatedly and clearly illustrated that there is a meaningful association between storing guns safely and lower rates of death by suicide (e.g., Grossman et al., 2005; Monuteaux, Azrael, & Miller, 2019; Shenassa et al., 2004; Webster et al., 2004). Further, the more recent research discussed in the previous section has demonstrated that it is critical to further our understanding of factors that can influence actual engagement in gun safety behaviors in at-risk individuals. Specifically, Stanley and colleagues (2020) found that the type of approach used in lethal means counseling did not meaningfully impact self-reported engagement in firearm safety behaviors. Importantly, these findings occurred despite the study's findings that one particular approach (i.e., emphasizing temporariness and low fear appeals) demonstrated high acceptability and significant association with self-reported *intentions* to adhere to clinician recommendations. This is contrary to what has been indicated by past research on the theory of planned behavior (see Ajzen, 1991; Ajzen, 2015; Mojtabai et al., 2016) and the posited behavioral implications of intentions to adhere to clinical recommendations in the context of health care (i.e., intentions are predictive of behaviors). At least in the context of firearm safety behaviors, the findings of Stanley and colleagues (2020) highlight the need to test approaches for their influence on behavioral outcomes (e.g., engagement in gun safety behaviors), as an incrementally valuable step now that approaches that optimize acceptability and intentions to adhere have been identified.

Recent research has highlighted some variables that significantly influence individuals' likelihood of engaging in gun safety behaviors outside the context of suicide risk and interventions. For instance, a review of the literature (Rowhani-Rahbar, Simonetti, & Rivara, 2016) from 2000-2012 outlines an abundance of evidence indicating that providing individuals with implements for engaging in firearm safety behaviors (e.g., cable locks) results in significantly more engagement in firearm safety behaviors. Another more recent study by Crifasi and colleagues (2018) further found that in a nationally representative (U.S.) sample of gun-owners ($n = 1,444$), several factors significantly impacted the likelihood of engagement in gun safety behaviors. The largest effect found in this study was for whether or not individuals had previously taken a gun safety course (OR = 2.05; CI [1.54, 2.74]). The study also indicated

that individuals reported a preference for being taught gun safety by reputable and knowledgeable groups (e.g., the National Rifle Association, military service members, hunting organizations; 70-77% of participants rated that receiving gun safety training would be “good” from each of these types of groups).

Taken together, the findings above (i.e. Rowhani-Rahbar, Simonetti, & Rivara, 2016; Crifasi et al., 2018) informed the approach of the present study. These studies provide empirical support for an approach to lethal means counseling that includes provision of a gun lock and one in which the source of educational information demonstrates knowledge related to firearms. Accordingly, our study’s experimental condition provided gun locks to participants and an instructional video for the appropriate use of these locks, in which the voice providing instructions regarding gun lock use is the voice of the experimenter providing the remaining interventions (i.e., suicide risk assessment, safety planning, lethal means counseling) via telephone. These remaining interventions followed the recommendations informed by the findings of Stanley and colleagues (2020).

Finally, regarding the approach of the present study, the provision of gun locks is a new direction that has been broadly embraced by the field of suicidology. One of the most recent and comparable examples to this study’s approach is a current research study from the University of Southern Mississippi (see Anestis, 2017 for details about the ongoing study). This study is observing a National Guard sample that is being administered 1 of 4 combinations of interventions (Lethal means counseling alone, a health and stress reduction session alone, or either of the two combined with the distribution of gun locks), in order to determine the degree to which these conditions successfully yield engagement in safety planning and acceptability of lethal means counseling from National Guard members varying in level of risk for suicide.

1.3 The Importance of Degree of Familiarity with Guns

Much of the more recent research regarding lethal means counseling for firearms has heavily emphasized factors *within interventions* that can impact attitudes towards/engagement in lethal means counseling. However, an area that can greatly benefit from further exploration is that of factors *among at-risk individuals* that can impact attitudes towards/engagement in lethal means counseling in the first place (i.e., as a baseline, regardless of the type of lethal means counseling approach). Unpublished analyses by Stanley and colleagues (2020) explored many of these types of factors as potential moderators for the effects of intervention type on self-reported

outcomes. These analyses found that firearm ownership, firearm access, political affiliation, political ideology, suicidal ideation severity, suicide risk severity, depression symptom severity, extraversion, agreeableness, conscientiousness, emotional stability, and openness all had no meaningful impact on the effects of the different intervention approaches. These findings require cautious interpretation due to the difficulty in obtaining adequate power for such analyses (Heo & Leon, 2010). However, investigation in this domain can inform potential next steps in the literature.

One such direction that has yet to be explored would involve examining the relationships (if any) between *degree* of familiarity with firearms and attitudes towards/engagement in lethal means counseling. The current state of the literature does not make the possible direction of any such relationships clear. However, some findings indicate that among those individuals who are familiar with firearms, there may be cultural factors (see Marino et al., 2018; Betz & Wintemute, 2015 for detailed discussions about firearm culture and how it relates to treatment) that influence attitudes towards interventions focused on firearms, and that it is important to leverage factors such as most appropriate language (e.g., Stanley 2017; Stanley et al., 2020) in a manner that is sensitive to that culture. The literature has also demonstrated that increased levels of certain *types* of familiarity with guns can significantly increase the chances of an individual engaging in firearm safety behaviors (e.g., having taken a gun safety course; Crifasi et al., 2018). Taken together, we are interested in exploring whether familiarity with firearms plays a role in more clinically relevant outcomes.

Though not tested directly in the studies discussed above, Stanley and colleagues (2020), along with Crifasi and colleagues (2018), have illustrated that utilizing a binary approach to familiarity with guns (e.g., yes/no variables of ownership, having taken a course) may not provide the clearest insight about the effects of familiarity with firearms. However, a novel approach providing a higher degree of quantitative information may be to attempt collecting a self-reported, continuous (even if only approximated) measure of familiarity with firearms, as opposed to a binary measure. In the present study, the approach taken was to ask participants to approximate the number of times they engaged in an activity involving firing a firearm (e.g., hunting, going to the range). The present study used this measure to explore whether relationships existed between this kind of familiarity with firearms and baseline outcomes.

1.4 The Present Study

As discussed above, the current state of the literature on lethal means counseling for firearms (e.g., Stanley et al., 2017; Stanley et al., 2020) has provided psychologists and others with ample guidelines for making interventions more *acceptable* to individuals at risk for death by suicide involving a firearm, as well as optimizing their *intentions* to adhere to clinician recommendations. However, one important domain for continued research that can elucidate practical applications is developing/testing approaches targeting *behaviors*. The present study sought to continue informing this critical next step.

Utilizing a sample of at-risk, gun-owning community-based participants ($n = 23$), this study examined the effectiveness of providing physical tools that facilitate gun safety behaviors (i.e., a cable gun lock and an instructional video for its use) in conjunction with the current highest standard of lethal means counseling (i.e., a psychoeducational approach with low fear messaging and high emphasis on temporariness; Stanley et al., 2020). To this end, participants were randomly assigned to one of two intervention groups: 1) A group receiving the psychoeducational approach of lethal means counseling that has empirically been found to be most effective (Stanley et al., 2020), and 2) Another group receiving the same psychoeducation along with a cable gun lock and an instructional video demonstrating its proper use. Consistent with methods previously demonstrated to be empirically robust (e.g., Motjabi et al., 2016; Ajzen, 2015; Stanley et al., 2017; Stanley et al., 2020), the present study examined levels of engagement in firearm safety behaviors/thoughts, self-intentions to adhere to clinician recommendations, and intentions to encourage loved ones to adhere to clinician recommendations. Although previous research on similar interventions (Stanley et al., 2020) demonstrated no significant effects on acceptability of treatment as measured by the Client Satisfaction Questionnaire (CSQ-8; Attkisson & Zwick, 1982; Larsen et al., 1979), the present study continued to observe the CSQ-8 among the outcome measures. The rationale for this was that the addition of gun locks and the instructional video was posited to represent an increased dosage of treatment, and therefore was expected to result in increased effects, perhaps including detectable significant effects on CSQ-8 outcomes.

Engagement in firearm safety behaviors/thoughts was only measured at Pre-Intervention, 2 Week Follow-up, and One Month Follow-up, but the remaining three outcomes were measured at Pre-Intervention, Post-Intervention, Two-Week Follow-Up, and One-Month Follow-Up.

Aim 1 (Primary): Determine whether, from baseline to one-month follow-up, individuals randomized to the *psychoeducation with gun lock/video* group (hereafter referred to as simply *Gun lock* group) reported greater engagement in firearm safety behaviors/thoughts than individuals in the *psychoeducation without gun lock/video* group (hereafter referred to as *Standard group*).

Hypothesis 1: Individuals in the *Gun lock* group will report significantly greater increases in engagement in firearm safety behaviors/thoughts over time, relative to individuals in the *Standard* group.

Aim 2 (Secondary): Determine whether, from baseline to one-month follow-up, individuals randomized to the *Gun lock* group reported greater acceptability of lethal means counseling than individuals in the *Standard* group.

Hypothesis 2: Individuals in the *Gun lock* group will report significantly greater increases in intentions to self-adhere to clinician recommendations over time, compared to individuals in the *Standard* group.

Hypothesis 3: Individuals in the *Gun lock* group will report significantly greater increases over time in intentions to recommend adherence to clinician recommendations to a loved one, relative to individuals in the *Standard* group.

Hypothesis 4: Individuals in the *Gun lock* group will report significantly greater increases in acceptability of lethal means counseling over time, compared to individuals in the *Standard* group.

Exploratory Aim¹: Determine whether *degree* of familiarity with firearms was related to baseline levels of self-reported intentions to adhere to clinician recommendations regarding firearm safety, participants recommending to others that they adhere to clinician recommendations regarding firearm safety, acceptability of lethal means counseling, and engagement in firearm safety behaviors/thoughts.

¹ Our initial proposal included an exploratory aim to test for 3-way interaction effects of Familiarity with Firearms x group x time on each study outcome (i.e., Engagement in Firearm Safety Behaviors, Intentions to Adhere, Recommendation to Others, and Acceptability of Intervention). Due to non-significant findings for the first (and now only) Exploratory Aim, this second exploratory aim was excluded. This decision was further supported by empirical recommendations indicating that samples required for 3-way interactions are considerably larger than those required for 2-way interactions (Heo & Leon, 2010), considered in conjunction with the fact that even our planned analyses for 2-way interactions required a sample size of $n = 64$, but ours was markedly smaller ($n = 23$). This was the result of the difficulty of data collection with such specific criteria (i.e., gun owners with specific psychological histories) in conjunction with recruitment complications associated with COVID-19 pandemic.

CHAPTER 2

METHODS

2.1 Methodological Overview

This study consisted of four phases: 1) Recruitment and screening; 2) Pre-intervention assessment of baseline levels for variables of interest, intervention, and Post-Intervention assessment of only outcome variables; 3) Online Two-Week Follow-Up assessment of outcome variables; 4) Online One-Month Follow-Up assessment of outcome variables.

2.1.1 Inclusion and Exclusion Criteria

The present study strictly included community participants who are at elevated risk for suicide and who reported some familiarity with firearms. Elevated risk for suicide was operationalized as having experienced either an episode of suicide ideation, or primary depressive symptoms (i.e, depressed mood, or anhedonia) at some point in life. The Suicide Behaviors Questionnaire—Revised (SBQ-R; Osman et al., 2001) and a version of the Patient Health Questionnaire (PHQ-9; Kroenke & Spitzer, 2002) that was empirically validated for assessing *lifetime* depressive symptoms (Hitsman et al., 2011) were administered in the brief screening questionnaire via Qualtrics for verifying the “elevated risk for suicide” component of eligibility. Specifically, responses on these measures indicative of self-reported lifetime history of suicide ideation, depressed mood, or anhedonia constituted elevated suicide risk. Firearm access and ownership were also determined by the same, brief screening measure in Qualtrics. The items for firearm ownership and access required a binary response (i.e., yes/no) from participants indicating whether they currently owned and/or had access to a firearm. Only individuals providing an affirmative response for access to a firearm were permitted to participate. All recruiting materials will explicitly state that participants must have access to a firearm. Individuals younger than 18 years of age were also excluded from the study.

2.1.2 Recruitment

Community-based, at-risk individuals with access to a firearm were recruited to participate in this study utilizing: 1) Qualtrics discussion panels; 2) Posts on Reddit forums; 3) Posts in local Craigslist pages (i.e, Tallahassee and Orlando); and 4) Flyers placed in the community (throughout Tallahassee, Orlando, Sanford, Kissimmee, and St. Cloud). Each of these methods of recruitment linked prospective participants to the study screening measure

(described in greater detail in the Screening and Measures sections below). Posts were also made to Facebook, Facebook Ads, and Twitter, but these resulted in no responses.

2.2 Study Procedures

The FSU Institutional Review Board approved all study procedures (see Appendix A), and all participants provided written and verbal informed consent prior to initiating participation (see Appendix B).

2.2.1 Screening

A screening measure was utilized to ensure prospective participants met the study criteria (as described in the Inclusion and Exclusion Criteria section above). This screening measure also included additional items to mask the items specific to the study criteria (e.g, personality characteristic items from the Ten Item Personality Questionnaire). Finally, the screening measure also contained the written informed consent information (Appendix B). Upon completing the screening measure, participants were either a) Contacted via email to be informed that they were ineligible for the study or b) Contacted for a Scheduling Call (see Scheduling Call section, below) to verify consent once more verbally, and to schedule their initial session of study participation.

2.2.2 Randomization

Community-based participants were randomized prior to scheduling calls. A block randomization instrument (Haahr, 2018) was utilized to generate a randomized sequence of group assignment to one of two intervention groups: 1) a *Gun lock* group or 2) a *Standard* group. This was done in a manner consistent with existing guidelines for acceptable standards of randomization (Suresh, 2011). Identification numbers were assigned to participants in sequential order once they provided consent to participate and these numbers dictated group according to the randomization plan generated.

2.2.3 Scheduling Call

Following completion of the screening measure and randomization, eligible participants were contacted via telephone for a Scheduling Call to verbally verify consent once more, resolve remaining questions, verify necessary contact information, and schedule a phone appointment for the initial session of participation in the study. Scripted questions regarding written consent form were used to in order to determine whether it was necessary to provide additional information/reiterate consent form information, along with verbally re-confirming consent. Then, participants provided contact information (i.e., phone, email, and mailing address) needed for

study procedures, after being informed that these data would be destroyed upon completion of the study. Finally the initial participation phone call was scheduled. This initial session was intentionally scheduled a minimum of 10 days after the screening follow-up call to allow for mailing of the locks to participants in the *Gun Lock* group, and participants in the *Gun Lock* group were provided with instructions not to open the package being sent to them until their participation in the initial session. They were told that during the initial session they would receive specific instructions for the package.

2.2.4 Pre-Intervention Assessment

Following the Scheduling Call, the initial session via scheduled phone call began with participants completing pre-intervention measures assessing demographic, psychological, and firearm-related constructs. These measures include items regarding standard demographic characteristics (e.g., age, race, ethnicity, etc.), personality characteristics (e.g., extroversion), broader psychological characteristics (e.g., suicidal ideation, depression symptoms), and firearm-related characteristics (e.g., beliefs and behaviors). Together, these measures provided a baseline evaluation of demographics and outcomes pertinent to the study aims (e.g., engagement in firearm safety behaviors/thoughts, intentions to adhere to clinician recommendations, intentions to recommend lethal means safety to loved ones, and acceptability of lethal means counseling). The measures themselves are described in greater detail in the Measures section.

2.2.5 Intervention

Participants then received interventions according to their group. The *Gun Lock* group participants viewed an instructional video and were instructed to open the packages with their gun locks. All participants then received a clinician-administered standardized suicide risk assessment (Joiner et al., 1999; Chu et al., 2015), a semi-structured safety planning intervention (Stanley & Brown, 2012), and a scripted lethal means counseling intervention (Stanley et al., 2020). The locks and video were only provided to the *Gun Lock* group, but the latter interventions were provided to all participants in both the *Gun Lock* and *Standard* groups. Each of the interventions is elaborated upon in the following paragraphs.

Regarding the gun lock, *Gun Lock* participants were mailed the lock prior to participation. Although locks from multiple manufacturers were utilized due to availability, all locks provided were 15-inch cable locks approved by the California Department of Justice, the industry standard. *Gun Lock* participants also received a YouTube link via Qualtrics upon completion of

Pre-Intervention measures. Participants were instructed to inform the experimenter when beginning to watch the video. This allowed the experimenter to confirm via timing and/or audio that participants watch the full video, uninterrupted and in a standardized fashion. The video explained the proper use of a 15-inch cable lock. The video featured the voice of the experimenter, along with text and visual demonstration of how to place the lock on four different types of firearms (i.e., a revolver, a magazine-fed semi-automatic pistol, a shotgun, and a rifle). The video was scripted/uniform (Appendix E) to maximize internal validity. All *Gun Lock* group participants were only shown the video one time to ensure standardization. *Gun Lock* participants were subsequently provided instructions to open the package with the gun lock that they received in the mail. They were informed that the lock was the same as the lock demonstrated in the video, that it was theirs to keep, and that they would not need it for the remainder of the session.

The next intervention provided was the standardized suicide risk assessment. This was the first intervention for the *Standard Group* and third for the *Gun Lock* group. The assessment utilized in this study followed the guidelines established by Joiner and colleagues (1999) and later updated by Chu and colleagues (2015). Each risk assessment included a clinician evaluation of the following: 1) Presence, frequency, duration, intensity, and content of suicidal thoughts; 2) Broader death ideation; 3) Suicidal intent; 4) History of suicidal behavior; and 5) Other suicide-relevant factors (e.g., loneliness, hopelessness). In addition, access to and familiarity with means to carry out a suicide attempt was evaluated by the experimenter. All responses to this first portion of the intervention were rated as either binary “yes/no” responses or on a Likert-type scale (e.g., 0/None at all to 10/Definite/Highest possible), according to the nature of the question. Responses also allowed for categorization of participants’ risk for suicide as Low, Low-Moderate, Moderate, Moderate-Severe, Severe, Severe-Extreme, or Extreme risk, according to established guidelines (Joiner et al., 1999; Chu et al., 2015). The entire risk assessment is a semi-structured interview and is typically conducted over a brief period (usually lasting 10-15 minutes). While not all of the risk levels described above typically warrant safety planning and lethal means counseling, the inclusion criteria of the present study suggested that many, if not all, participants could benefit from safety planning and lethal means counseling. More specifically, because all participants reported a lifetime history of elevated risk for suicide, and because all participants reported access to a firearm, these interventions were appropriate.

Safety planning (Chu et al., 2015; Stanley & Brown, 2012) is empirically supported for effectiveness at reducing likelihood of future suicidal behavior (Knox et al., 2011). As with the suicide risk assessment, all participants across both groups were engaged in a safety planning intervention. Safety planning involves generating/writing specific, detailed steps that one can take in order to reduce risk for suicide, or prevent/de-escalate a crisis. The specific steps are numbered and to be performed in an order such that the later steps (e.g., calling 1-800-273-TALK, calling 911) will likely only be utilized in more dire crises, when the first activities listed provide no/minimal relief.

Per the recommendations of Stanley & Brown (2012), the first step in a safety plan is typically writing the idiosyncratic, early warning signs that a crisis may emerge. Due to the fact that all participants were screened for a lifetime history of elevated risk for suicide, but not necessarily a lifetime history of experiencing suicide-related crises, this step was eliminated to maintain a standardized approach. Instead, the first portion of safety planning was to generate personalized coping strategies. In order to make safety planning semi-structured and more standardized, four specific categories of coping strategies were utilized. Participants were instructed to generate activities that are either social (e.g., calling a friend, spending time at a public place like a park), involve physical activity (e.g., walking outdoors for five minutes), are highly engrossing/distracting and time-consuming (e.g., reading a feel-good book, completing Sudoku puzzles), or have generally demonstrated adaptive effectiveness for improving their mood without adverse effects (i.e., substance use or self-harm could not be utilized as an adaptive coping strategy). Additionally, participants were encouraged to be as specific as possible (e.g., “20 push-ups,” as opposed to “working out”), to indicate activities that are readily accessible (e.g., “walk 15 minutes” rather than “walk at XYZ park”), and to select activities aimed to evoke an emotional state opposite to that which is produced by a crisis situation (e.g., listening to pleasant music rather than disturbing/agitating music).

The fifth step of the plan was dedicated to reminding individuals to repeat these first coping strategies exhaustively if completing them all were not helpful the first time around (e.g., “Repeat steps 1-4 as many times as possible”). After repetitions have been exhausted, the next step involved contacting specific individuals/organizations for the purpose of seeking support, (i.e., these phone calls would be specifically about suicidal symptoms, in contrast to any leisurely calls made earlier as a coping strategy). This list was to include the names and phone numbers of

specific friends, family members, or therapists (if any). Then, participants were reminded (in the following order) of the last resort options that are always available to them, including the national crisis line (1-800-273-TALK), calling 911, and/or voluntarily going to a nearby hospital and requesting help. Finally, participants were instructed to list their reasons for living on their safety plan and were provided instructions for using the plan (i.e., keeping it on one's person when suicide ideation is occurring, using it step-by-step and reviewing reasons for living until one feels better, storing it somewhere accessible/easy to remember after suicide ideation is absent for several weeks).

The final intervention was a psychoeducation-based session of lethal means safety counseling, administered by a clinician according to established practices and previous research (Bryan et al., 2011; Chu et al., 2015; Rudd, 2006; Stanley et al., 2020). As described previously in this manuscript, lethal means safety counseling involved the identification of steps that increase the physical and/or psychological distance between the at-risk individual and a firearm. These strategies can involve a wide range of actions. These actions include but are not limited to: placing firearms in a harder to access/see location, placing firearms in a locked location and transferring the key to someone for safekeeping, transferring firearms to another person (typically loved ones, family, police) for safekeeping, or using a gun lock. This portion of the intervention was scripted in order to maximize internal validity and utilized language indicated by past research (Stanley et al., 2020; Appendix E). The script was originally developed based on a broad array of research. This includes: empirically-informed clinical practices (Harvard T.H. Chan School of Public Health, 2018); studies of autonomy and self-determination theory (Ryan & Deci, 2000; Sheldon, Williams, & Joiner, 2003); fear messaging research (Tannenbaum et al., 2015; Witte, 1992); research on normalizing responsible firearm ownership (Barber & Miller, 2014; Betz & Wintemute, 2015); and research on the optimization of language used in lethal means counseling (Stanley et al., 2017, 2020).

2.2.6 Post-Intervention Assessment

Following interventions, participants proceeded to complete post-intervention outcome measures online. Participants were once again administered measures assessing intentions to self-adhere to clinician recommendations, intentions to recommend lethal means safety to a loved one, and acceptability of lethal means counseling. Measures of engagement in firearm safety behaviors were not administered due to the absence of an opportunity for change. Once

measures were complete, all participants were provided with a debriefing form (Appendix C), along with a list (Appendix D) of national mental health resources. This list included the name, phone numbers of the National Suicide Prevention Lifeline (1-800-273-TALK), and the SAMHSA Treatment Locator website (<https://findtreatment.samhsa.gov/>). This list of resources also contained links to videos and a written guide illustrating the proper use of a gun cable lock.

2.2.7 Two-Week and One-Month Follow-Up Assessments

For both the Two-Week and One-Month Follow-Up participation sessions, participants received a link via email that directed them to another web-based Qualtrics survey containing the same measures as those included in the Post-Intervention Assessment. In addition to these measures, the Two-Week and One-Month follow-Up contained follow-up measures of engagement in firearm safety behaviors/thoughts. Email reminders were sent until a participant participated in the follow-up assessments. All participants that failed to respond to the Two-Week Follow-Up Assessments after the date of their One-Month Follow-Up Assessment arrived and/or failed to respond to the One-Month Follow-Up Assessments after a month and two weeks was considered to be missing follow-up data. Upon completion of both follow-up assessments, participants were again presented with the same debriefing form (Appendix C) and resource list (Appendix D) as described above.

2.2.8 Compensation

All eligible participants who completed the Pre-Intervention Assessment, Intervention, and Post-Intervention Assessment portions of the study received a free gun lock, though *Gun Lock* group participants received the lock prior to participation and *Standard* group participants received the lock after the entire month-long duration of their full participation in the study. All participants were incentivized to complete all four time-points of the study via a Visa Gift Card raffle. Participants were informed that 2 out of 64 participants that completed all four time-points (selected at random after the study is complete) would receive a \$100 Visa Gift Card, and that 6 out of 64 participants (also selected at random after the study is complete) would receive a \$50 Visa Gift Card.

2.3 Measures

2.3.1 Demographics Overview

Standard demographic items were used to gather information on participants' age, sex, race, ethnicity, sexual orientation, religion, political affiliation, and political ideology.

2.3.2 Engagement in Firearm Safety Behaviors/Thoughts

This instrument was used as an outcome measure for our analyses. The measure is a structured self-report questionnaire (Stanley et al., 2020) that assessed participants' engagement in firearm safety behaviors/thoughts. The questionnaire previously contained one item ("What steps have you taken to limit your access to firearms for safety purposes?"), with two categories of responses. One category consisted of behaviors (e.g., "Purchased/obtained a gun lock and used it," "Stored my firearm unloaded"). The second category consisted of thoughts (e.g., "Realized the risks of firearms outweigh the benefits," "Decided I no longer want to obtain a firearm"). However, previous research (Stanley et al., 2020) has demonstrated that a binary approach (i.e., yes/no) to these thoughts and behaviors may not be sufficiently informative about engagement in safety behaviors/thoughts. In an attempt to increase the utility of this measure, the checklist of responses was changed to Likert-type items for the present study. Accordingly, the items asked how often individuals have engaged in specific behaviors/thoughts (e.g., "How often have you used a gun lock?", "How often have you thought the risks of firearms outweigh the benefits?"). All items utilized a Likert type scale with four possible responses (i.e., 0 = Never, 1 = Sometimes, 2 = Often, 3 = Always). Higher scores on this measure reflect higher engagement in firearm safety behaviors/thoughts. The measure demonstrated excellent internal consistency at baseline in our analyses ($\alpha = 0.93^2$). This measure was administered multiple times and the wording of items reflected the time point at which the measure was administered (e.g., beginning items with, "Since your phone visit with a research clinician for this study [i.e., approximately two weeks ago]..." at two-week follow-up). This measure was not administered during Post-Intervention Assessment due to lack of opportunity for changes.

2.3.3 Intentions to Adhere to Clinician Recommendations/Recommendation to Others

This measure is a structured self-report questionnaire utilized in previous research (Stanley et al., 2017; Stanley et al., 2020), and was used in the present study to assess participants' intentions to adhere to clinician recommendations to limit access to a firearm for safety purposes. The two items were rated on a 10-point Likert type scale (1 = Not At All Likely; 10 = Very Likely) and they read as follows: 1) "How likely would you be to adhere to your clinician's recommendations to limit your access to a firearm for safety purposes?"; and 2) "How

² The Cronbach alpha coefficient that was calculated for Engagement in Firearm Safety Behaviors/Thoughts excluded two items that exhibited no variance (i.e., whether or not participants had ever donated firearms, and whether participants have ever given firearms to law enforcement for safekeeping).

likely would you be to encourage a loved one to adhere to your clinician’s recommendations to limit their access to a firearm for safety purposes?”

2.3.4 Client Satisfaction Questionnaire-8 (CSQ-8)

The CSQ-8 was utilized as an outcome measure in our study. The measure is an 8-item instrument assessing the degree to which individuals find services to be acceptable (Attkisson & Zwick, 1982; Larsen et al., 1979). Items are rated on Likert-type scales ranging from 1 to 4 (e.g., 1 = Quite dissatisfied, 2 = indifferent or mildly dissatisfied, 3 = Mostly satisfied, 4 = Very satisfied). The measure utilizes a summed score (range: 8-32), with higher values being indicative of higher levels of acceptability for the services received by respondents. Items cover a broad array of acceptability standards (e.g., “How satisfied are you with the amount of help you received?”, “Have the services you received helped you to deal more effectively with your problems?”). The CSQ-8 has been demonstrated to have strong psychometric properties (Attkisson & Zwick, 1982; Larsen et al., 1979) and was found to have excellent internal consistency at baseline in our analyses ($\alpha = 0.93$).

2.3.5 Self-Injurious Thoughts and Behaviors Interview-Short Form (SITBI-SF)

The SITBI-SF is an assessment of past suicidal thoughts and behaviors (Nock et al., 2007). The present study utilized a self-report version of the measure, consistent with past research (Stanley et al., 2020; Stanley et al., 2015; Zetterqvist et al., 2013). In our analyses, single items assessed for the presence/absence of suicide ideation, plans, and attempts. Previous research has demonstrated the SITBI-SF to have good internal consistency ($\alpha = 0.84-0.89$) and concurrent validity (e.g., Nock et al., 2007). The SITBI-SF demonstrated acceptable internal consistency at baseline in our study ($\alpha = 0.76$).

2.3.6 Suicidal Behaviors Questionnaire-Revised (SBQ-R)

The SBQ-R is a 4-item self-report instrument that assesses the presence, severity, and frequency of lifetime suicide ideation and attempts, along with the likelihood of making a future suicide attempt (Osman et al., 2001). The SBQ-R yields a summed score, with higher summed scores indicating elevated risk for suicide (range: 3-18). Past studies have illustrated that the SBQ-R has excellent test-retest reliability ($r = 0.95$), acceptable-to-good internal consistency ($\alpha = 0.76-0.87$), and strong convergent validity (e.g., Osman et al., 2001). A recent systematic review (Batterham et al., 2015) of measures intended to screen for suicide risk indicated that the

SBQ-R is an exemplary measure. The SBQ-R exhibited good internal consistency at baseline in the present analyses ($\alpha = 0.86$).

2.3.7 Depressive Symptom Inventory—Suicidality Subscale (DSI-SS)

The DSI-SS is a 4-item self-report instrument that assesses the presence and the severity of suicidal thoughts, plans, and urges occurring over the two weeks prior to response (Joiner, Pfaff, & Acres, 2002). Participants responded to items on a 4-point scale ranging from 0 to 3 (e.g., 0 = “I am not having impulses to kill myself,” 1 = “In some situations I have impulses to kill myself,” 2 = “In most situations I have impulses to kill myself,” 3 = “In all situations I have impulses to kill myself.”). Higher summed scores indicate more elevated severity of suicidal symptoms (range: 0-12). Research has shown that the DSI-SS has excellent internal consistency ($\alpha = 0.90$) and construct validity (Joiner et al., 2002). Research on measures of suicide risk has also indicated that it is an exemplar measure (Batterham et al., 2015). In our analyses, DSI-SS was found to have good internal consistency at baseline ($\alpha = 0.89$).

2.3.8 Patient Health Questionnaire—9 (PHQ-9)

The PHQ-9 is a self-report measure of symptoms of depression consisting of 9 items. The items relate to DSM-5 (American Psychiatric Association, 2013) diagnostic criteria (Kroenke & Spitzer, 2002; Kroenke, Spitzer, & Williams, 2001). Participants responded to the following prompt: “Over the past 2 weeks, how often have you been bothered by any of the following problems?” Items correspond to each symptom domain (e.g., feeling down, depressed or hopeless) and are rated on a 4-point scale (0 = Not at all, 1 = Several days, 2 = More than half the days, 3 = Nearly every day). Responses are summed, with higher scores indicating more severe depression symptoms (range: 0- 27). Research has established that scores between 5 and 9 suggest “mild” symptoms; scores between 10 and 14 suggest “moderate” symptoms; scores between 15 and 19 suggest “moderately severe” symptoms; and scores above 20 are indicative of “severe” symptoms (Kroenke et al., 2001). The measure has been shown to be reliable and valid, and the previously described cutoff points have demonstrated high sensitivity and specificity for a diagnosis of major depression (Kroenke et al., 2001). The measure demonstrated good internal consistency at baseline in our analyses ($\alpha = 0.86$). Two items in the screening measure for our study were also based on a previously-used version of the PHQ-9 adapted for detecting lifetime depressive symptoms (Hitsman et al., 2011).

2.3.9 Firearm Ownership and Access Survey

This instrument was strictly used for screening purposes. The survey is a structured questionnaire used in previous research (Stanley et al., 2020) and was used to collect information regarding participants' firearm ownership. The instrument uses five items, four of which ask binary (yes/no) questions about firearm ownership/access and a fifth question asking for a percent probability that respondents will obtain a firearm in the future. The items are the following: 1) "Do you own a firearm?"; 2) "Do you have access to a firearm?"; 3) "Do you want to obtain a firearm in the future?"; 4) "Do you intend to own a firearm in the future?" and 5) "What is the percent probability that you will obtain a firearm in the future?" Responses to questions 1 and 2 of this instrument were utilized for screening purposes (i.e., to include only individuals with access to a firearm).

2.3.10 Views on Firearms Survey

This instrument is a questionnaire developed for past research (Stanley et al., 2020), wherein respondents answer four items. The first two items: "Are you a member of the National Rifle Association (NRA)?" and "Are you a member of an organization similar to the National Rifle Association (NRA)?" are both rated as binary (i.e., Yes/No) items, indicating membership to firearm-related organizations. The other two items are adapted from a questionnaire administered by the nonpartisan Pew Research Center (Parker, Horowitz, Igielnik, Oliphant, & Brown, 2017). These items read as follows: 1) "What do you think is more important—to protect the right of Americans to own guns, or to control gun ownership?"; and 2) "Do you think that gun ownership in this country does more to protect people from becoming victims of crime or does more to put people's safety at risk?" These items are also binary items (e.g., responses to the first item are "Protect the right of Americans to own guns" or "Control gun ownership").

2.3.11 Ten-Item Personality Inventory (TIPI)

The TIPI is a ten-item measure of personality characteristics drawn from the five-factor model of personality (i.e., openness, conscientiousness, extroversion, agreeableness, and neuroticism; Gosling, Rentfrow, & Swann, 2003). Each of these personality characteristics is evaluated by two items rated on a 7-point Likert scale (1 = Disagree strongly, 7 = Agree strongly), with respondents rating the degree to which they disagree or agree with a series of statements. Due to its brevity, the developers of this instrument caution against calculating

internal consistency for the full TIPI or its subscales (Gosling et al., 2003). Nonetheless, the TIPI has previously demonstrated robust psychometric properties (Gosling et al., 2003).

2.4 Data Analytic Approach

2.4.1 Primary, Secondary, and Exploratory Analyses

First, we conducted chi-square tests of independence and one-way analyses of variance (ANOVAs) to determine whether the intervention groups differed significantly with regard to covariates (e.g., demographic characteristics, firearm familiarity, clinical characteristics, and personality characteristics) at Pre-Intervention. This approach was used to determine the success of randomized assignment.

Initially, tests of our aims and hypotheses were to utilize similar methodology to that of Stanley and colleagues (2020). Specifically, repeated measures analysis of variance (RM-ANOVA) was to be utilized, emphasizing a within-between interaction model (e.g., Liu, Crispe, & Kim, 2010) to assess the effects of intervention group over time. Accordingly, a priori power analyses (reported in detail below) were based on RM-ANOVA. Importantly, our sample size was lower than these analyses recommended ($n = 23$ as opposed to $n = 64$). As such, and because even some of the participants included have not completed follow-up assessments, there are fewer participants than anticipated and there are notable missing data for the participants that were included. In order to address these issues and utilize a more robust methodology, linear mixed modeling (LMM; Cnaan, Laird, & Slasor, 1997; Krueger & Tian, 2004) was utilized.

To test Aim 1, Hypothesis 1 (i.e., [H1] individuals in the *Gun lock* group will report significantly greater increases in engagement in firearm safety behaviors/thoughts over time, relative to individuals in the *Standard* group), repeated measures analysis utilizing linear mixed modeling (LMM, Cnaan, Laird, & Slasor, 1997; Krueger & Tian, 2004) analyses were utilized to investigate the effects of time, group, and their interaction. This was utilized instead of the previously described ITT and RM-ANOVA approach (Alshurafa et al., 2012, Lavori & Dawson, 2001) for reasons discussed in detail below, in the Missing Data section). Aim 2, Hypotheses 2, 3, and 4 (i.e., [H2] individuals in the *Gun lock* group will report significantly greater increases in intentions to self-adhere to clinician recommendations over time, compared to individuals in the *Standard* group; [H3] individuals in the *Gun lock* group will report significantly greater increases over time in intentions to recommend adherence to clinician recommendations to a loved one, relative to individuals in the *Standard* group; and [H4] individuals in the *Gun lock* group will

report significantly greater increases in acceptability of lethal means counseling over time, compared to individuals in the *Standard* group) were also tested using three separate LMM analyses (Cnaan, Laird, & Slasor, 1997; Krueger & Tian, 2004) similar to the one described for Aim 1, H1. Here, too, time and group were entered into the model to assess their effects along with the effects of the interaction between time and group.

Finally, our Exploratory Aim³ was assessed by reviewing correlation coefficients between familiarity with firearms and outcome variable levels at baseline. This included Engagement in Firearm Safety Behaviors, Intentions to Adhere to Clinician Recommendations, Recommending to Others to Adhere to Recommendations, and Acceptability of Intervention. All analyses were conducted in SPSS version 26.

2.4.2 Power Analyses

A priori power analyses were conducted using the statistical package G*Power, version 3.1 (Faul, Erdfelder, Buchner, & Lang, 2009). The addition of a gun lock and instructional video for its use in the present study were considered an increase in treatment dosage. Accordingly, robust effects could presumably be expected for these analyses. Further, previous research has demonstrated that the provision of gun locks results in significantly more engagement in firearm safety behaviors (Rowhani-Rahbar, Simonetti, & Rivara, 2016). Nonetheless, relatively conservative estimates of small-to-medium sized effects were used for power analyses, based on past research (Stanley et al., 2020; Stanley et al., 2017). For the F-test for ANOVA, values of $f = 0.10$, $f = 0.25$, and $f = 0.40$ equate to small, medium, and large effect sizes, respectively (Cohen, 1988, 1992). Thus, a small-to-medium effect would be indicated by $f = 0.175$.

A priori power analyses for Aim 1, Hypothesis 1 utilized RM-ANOVA analyses with a within-between interaction, based on data from three time points (Pre-Intervention, Two-Week Follow-Up, and One-Month Follow-Up). Accordingly, it was determined that with an alpha value of $p = .05$, a total sample size of $n = 54$ participants (27 per group) was required to achieve adequately powered analyses (power = .80) for detecting a small-to-medium sized effect ($f = 0.175$; Cohen, 1992). Recent research on retention strategies in longitudinal clinical studies demonstrated that a majority (53%) of their eligible studies obtained a retention rate of 90% or greater at one-year follow-up, with the remaining 47% of their eligible studies obtaining between 80% and 90% retention rates (Abshire et al., 2017). According to these numbers and the

³ Please see footnote regarding initially proposed exploratory aims, found on page 8

retention rate of recent research similar to the present study (over 90%; see Stanley et al., 2020), a conservative (given this evidence) estimate of 85% retention was assumed at One-Month Follow-Up. With an expected 85% retention rate expected at One-Month follow-up, then accounting for attrition $n = 64$ participants (32 per group) were required in order to obtain adequate power. This assumption was important, as our initial approach proposed handling the predicted missing data (i.e., approximately 10%) with Intent-to-Treat (ITT), carry-forward method (Alshurafa et al., 2012, Lavori & Dawson, 2001) analyses is most appropriately indicated when approximately 10% or less of the data are missing.

Power analyses for the secondary analyses that would address Aim 2, Hypotheses 2, 3, and 4 also used RM-ANOVA with a within-between interaction. These analyses were expected to be more highly powered than the primary analyses due to the fact that data on these outcomes were available for all four time points, rather than only three. Accordingly, the sample size required for these secondary analyses to achieve adequate power (.80) assuming a small-to-medium effect size ($f = 0.175$; Cohen, 1992) and an alpha value of $p = .05$ was $n = 46$ participants (23 per group). Thus, the sample size required that was initially assessed for our primary analyses ($n = 64$) was presumed to be sufficient for these analyses as well. Here again, the proposed analyses were to use ITT for missing data in the RM-ANOVA.

Unfortunately, the ITT and RM-ANOVA approach that we proposed for our analyses resulted inappropriate for our data, as we were missing more than 10% of our data (see Figure 1 for details on our missing data). Accordingly, we concluded that Linear Mixed Modeling (LMM) analyses would be more robust, accounting more appropriately for our missing data with maximum likelihood estimation (see Missing Data section below for further explanation of our rationale for this).

2.4.3 Power for Exploratory Analyses

Our Exploratory Aim was tested by observing a bivariate correlation between degree of familiarity with firearms and intentions to adhere to clinician recommendations, acceptability of lethal means counseling, and engagement in firearm safety behaviors/thoughts at baseline. Past research (Crifasi et al., 2018) has provided evidence that one type of familiarity with firearms (i.e., having completed a gun safety course) can *increase* the likelihood that an individual will engage in firearm safety behaviors, while another form of familiarity with firearms (i.e., owning greater than or equal to five firearms) can *decrease* the likelihood that an individual will engage

in firearm safety behaviors, it was difficult to estimate the nature of the effect for the degree of familiarity in the present study. Thus, it was determined to be most appropriate to use a conservative small-to-moderate effect size of $r = 0.2$. This, in conjunction with an assumed alpha of $p = .05$ would have required a sample of $n = 193$ to obtain adequate power (.80). Consequently, even if a retention rate of 100% would have been achieved ($n = 64$), the present study would have been underpowered for this exploratory analysis, and it should be interpreted with caution.

2.4.4 Missing Data

Intent-to-treat (ITT) analyses were initially planned for addressing missing data, in anticipation of less than 10% missing data, based on similar past research (Stanley, 2020). Specifically, we planned to utilize the last outcome carried forward method (Alshurafa et al., 2012, Lavori & Dawson, 2001), which takes the last successfully collected observation of participants with missing data and imputes those same values into the missing responses. However, as previously noted the present study currently contains data for a small sample of participants ($n = 23$) with approximately 13.59% of the data missing for these participants (see Figure 1 for a more detailed overview of missing data). This not only renders the previously planned ITT analyses inappropriate for handling missing data within the context of our aims, but also indicates that the RM-ANOVA approach previously planned is not a robust methodology given the missing data. Instead, linear mixed model (LMM Cnaan, Laird, & Slasor, 1997; Krueger & Tian, 2004) analyses were utilized for our primary and secondary aims to observe the mixed effects (interactions) of time and group, given that LMM is a more robust approach for missing data in a repeated measures model.

CHAPTER 3

RESULTS

3.1 Attrition and Incomplete Data

For a detailed overview (i.e., CONSORT diagram) illustrating the flow of participants throughout study time points, refer to Figure 2. The diagram accounts for individuals lost to follow-up ($n = 1$), as well as individuals who missed a follow-up session, but completed the following one ($n = 1$). Finally, the diagram also illustrates individuals who did not complete their One-Month Follow-Up ($n = 6$). Notably, 13% ($n = 3$) of participants did not have data for their Two-Week Follow-up, and 35% ($n = 8$) did not have data for their Four-Week Follow-Up, either due to missing a follow-up assessment, being lost to follow-up (see Figure 1 for a detailed survey of this). Consistent with recommendations in past research, this pattern of missing data with a repeated measures model is best handled by LMM analyses (Cnaan, Laird, & Slasor, 1997; Krueger & Tian, 2004) and utilizing such analyses allowed for all participants ($n = 23$) to be included in analyses.

3.2 Sociodemographic Characteristics

Participants ranged in age from 19-62 years ($M = 35.3$ years, $SD = 30.36$). The majority of participants were male (52%). Regarding race/ethnicity, 65.2% of participants identified as Caucasian/White, 4.3% African American/Black, 8.7% Hispanic/Latino, 8.7% Asian/Pacific Islander, 8.7% reported that they were bi-racial, and 4.3% reported identifying as another race/ethnicity. Regarding sexual orientation 69.6% of participants identified as heterosexual, 4.3% identified as homosexual, and 26.1% identified as bisexual⁴. Data were also gathered regarding religious affiliation, and 26.1% of participants reported that they were Catholic, 8.7% identified as Protestant, 4.3% of participants reported that they were Buddhist, 21.7% identified as Atheist, 8.7% Agnostic, 21.7% reported that they were Unaffiliated Believers, 4.3% Unaffiliated Non-Believers, and 4.3% identified their religious affiliation as “Other.” Lastly, 34.8% of participants reported that they “Never Married,” 47.8% reported being married, 8.7%

⁴ Although no significant differences were found between groups regarding sexual orientation, it is noteworthy that 26.1% of individuals in the study identified as bisexual considering that approximately 4% of adults in the U.S. identify as bisexual (Gates, 2006). While sexual minority is known to confer risk for suicide (King, 2008), and may thus inflate rates of sexual minority in our sample given that we are recruiting at-risk individuals, it is unclear why this would occur more strongly for individuals identifying as bisexual, compared to homosexual. Our small sample size ($n = 23$) makes it difficult to draw conclusions regarding this.

reported cohabiting with their partner, and 8.7% reported that they were divorced. For a more detailed overview of sociodemographic characteristics of our sample, please refer to Table 1.

There were no significant differences at baseline (i.e., Pre-Intervention Assessment) regarding age ($F[1, 21] = 0.35, p = 0.56$), sex ($\chi^2 [1, N = 23] = 0.35, p = 0.55$), race/ethnicity ($\chi^2 [5, N = 23] = 7.89, p = 0.16$), sexual orientation ($\chi^2 [2, N = 23] = 1.66, p = 0.44$), religious affiliation ($\chi^2 [7, N = 23] = 7.89, p = 0.34$), or marital status ($\chi^2 [3, N = 23] = 1.05, p = 0.79$). These findings indicate that randomization functioned as intended and that at baseline, participants were statistically equivalent regarding these measures across both intervention groups.

3.3 Firearm-Related Characteristics

Participants all had access to a firearm as part of the requirements for inclusion for this study. This was measured via self report during Screening. Additionally, on a free-response item intended to estimate one specific type of familiarity with firearms, participants indicated that they have engaged in activities that involved shooting their firearms between 0 and 150 times ($M = 34.22; SD = 44.06$). In response to Pew Research survey regarding views related to firearms (Parker et al., 2017), 95.7% of participants indicated that they were not members of the NRA, and 91.3% also said they were not members of any other group similar to the NRA. 69.6% of participants reported that they believe it is more important to protect the rights of Americans to own guns than it is to control gun ownership, and 73.9% of participants stated that they believe firearms do more to protect people than put people at risk. A more thorough summary of these findings, stratified by intervention group, can be found in Table 2.

Notably, participants did not demonstrate significant differences between treatment groups on familiarity with firearms ($F [1,21] = 0.06, p = 0.82$), NRA membership ($\chi^2 [1, N = 23] = 0.67, p = 0.41$), membership of other firearms-related organizations ($\chi^2 [1, N = 23] = 0.11, p = 0.74$), beliefs about protecting gun rights ($\chi^2 [1, N = 23] = 0.47, p = 0.49$), or beliefs about whether guns are more likely to protect someone as opposed to increase someone's risk ($\chi^2 [1, N = 23] = 0.12, p = 0.74$), all as intended for randomization of groups. Accordingly, it is assumed that randomization was successful and that participants did not differ regarding views related to firearm ownership at baseline.

3.4 Psychological and Personality Characteristics

Regarding psychological characteristics, 60.9% of participants indicated that they had experienced suicide ideation at some point in their lifetime, 30.4% reported having had a plan at least once, and 17.4% stated that they had attempted at least once in their lives. 30.4% of participants also indicated that they had caused themselves physical harm without the intention of dying (i.e., non-suicidal self-injury; NSSI). Suicidality scores ranged from 3 to 18 (i.e., the full range) on the SBQ-R ($M = 6.48$; $SD = 3.8$) and from 0 to 9 on the DSI-SS ($M = 2.18$; $SD = 0.45$). Regarding depressive symptoms (PHQ-9), participants ranged from 0 to 25 ($M = 7.96$; $SD = 5.56$). 34.8% of participants stated that they were currently engaged in treatment for mental health-related difficulties, 26.1% said they had been in the past, and 39.1% reported that they have never received any kind of treatment related to mental health. Regarding personality traits, participants scored ranging from 1 to 7 on Extraversion ($M = 3.65$; $SD = 1.77$), Agreeableness ($M = 4.61$; $SD = 1.5$), Emotional Stability ($M = 3.67$; $SD = 1.5$), and Openness to Experience ($M = 5.2$; $SD = 1.44$), and ranged from 1.5 to 7 on Conscientiousness ($M = 4.98$; $SD = 1.35$). For a detailed summary of these characteristics stratified by intervention group, refer to Table 3.

Of note, there were no statistically significant differences between groups at baseline regarding lifetime history of suicide ideation ($\chi^2 [1, N = 23] = 0.21, p = 0.65$), or suicide-related behaviors (i.e., suicide planning, $\chi^2 [1, N = 23] = 2.61, p = 0.11$; at least one suicide attempt, $\chi^2 [1, N = 23] = 0.311, p = 0.08$; and NSSI, $\chi^2 [1, N = 23] = 0.06, p = 0.81$), suicidality as measured by the SBQ-R ($F [1,21] = 0.001, p = 0.93$), or suicidality as measured by the DSI-SS ($F [1,21] = 0.42, p = 0.52$). Additionally participants demonstrated no significant differences in history of mental health treatment ($\chi^2 [2, N = 23] = 4.4, p = 0.11$), personality characteristics (i.e., Extraversion, $F [1,21] = 1.41, p = 0.25$; Agreeableness, $F [1,21] = 0.98, p = 0.33$; Conscientiousness, $F [1,21] = 1.39, p = 0.25$; Emotional Stability, $F [1,21] = 0.03, p = 0.88$; and Openness to Experience, $F [1,21] = 0.27, p = 0.61$), and depressive symptoms ($F [1, 21] = 0.18, p = 0.68$). Consequently, we assume that randomization functioned as intended and that there are no baseline differences regarding these qualities between the two intervention groups.

3.5 Primary Analyses: Engagement in Firearm Safety Behaviors

Linear mixed effects model (LMM) analyses were conducted in order to determine whether group, time, and their interaction significantly impacted differences on Engagement in Firearm Safety Behaviors (outcome). This set of analyses were utilized to address [Aim 1](#),

Hypothesis 1. LMM analyses were utilized for their ability to account for random effects (participant) within the model and for their utilization of maximum likelihood estimation, which generated estimated means for participants with missing data, thus assisting us in accounting for missing data, thereby increasing the robustness of our approach.

Despite the benefits of LMM for assisting with missing data, it is worth noting that with the present sample, one participant did not complete the assessment at 2-Week Follow-Up, and this outlier resulted in residuals that violated residual normality assumptions for LMM (Shapiro-Wilk = 0.95, $p = 0.02$). This outlier also resulted in the same violation for the later analyses related to Recommendations to Others (i.e., Aim 2, H3), described in further detail below (see Recommendations to Others section). Accordingly, the outlier's responses at 2-Week Follow-Up were removed from both of these sets of analyses. Specifically, data was long-formatted for LMM (i.e., 23 cases became 69 [23x3] instances for Aim 1, H1, and 92 [23x4] instances for Aim 2, H3), and then a single instance was deleted for each of these two analyses. For Aim 1, H1, removal of this outlier resulted in satisfaction of the normality of residuals assumption for LMM (Shapiro-Wilk = 0.97, $p = 0.17$)

LMM analyses for observing the effects of time⁵, group, and their interaction on Engagement in Firearm Safety Behaviors resulted in a satisfactory intraclass-correlation coefficient (ICC = 0.766⁶). This ICC was further indicative of the appropriateness of LMM analyses utilizing a covariance matrix with an autoregressive structure (AR1). LMM analyses indicated that there were no interaction effects for time and group regarding Engagement in Firearm Safety Behaviors ($F [2, 22.17] = 1.3, p = 0.29$). Further, mean Engagement in Firearm Safety Behaviors increased for individuals in the *Gun Lock* group from 10.67 (95% CI 1.02 to 20.32) at Pre-Intervention to 12.21 (95% CI 2.28 to 22.141) at 2-Weeks, and then decreased to 10.04 (95% CI -0.61 to 20.68) at 1-Month. Comparatively, Engagement in Firearm Safety Behaviors increased in the *Standard* intervention group from 18.06 (95% CI 10.22 to 25.9) at Pre-Intervention to 22.72 (95% CI 14.59 to 30.85) at 2-Weeks, and then to 25.25 (95% CI 17.09 to 33.4) at 1-Month. There were no significant main effects found for time ($F [2, 22.17] = 1.09, p = 0.36$) or group ($F [1, 21.72] = 3.84, p = 0.06$). Our primary hypothesis was not supported (i.e.,

⁵ Of note, there were only three time points (i.e., Pre-Intervention, 2-Week Follow-Up, and 1-Month Follow-Up) included in LMM analyses for Engagement in Firearm Safety Behaviors, due to an absence of opportunity for changes in this outcome between Pre-Intervention and Post-Intervention.

⁶ ICC for Engagement in Firearm Safety Behaviors was also strong (ICC = 0.704) prior to the removal of outlier.

Aim 1, H1, there was no significant effect for a group x time interaction on Engagement in Firearm Safety Behaviors) regarding Engagement in Firearm Safety Behaviors (see Figure 3 for a more details regarding participant levels of Engagement in Firearm Safety). Interestingly, despite our analyses demonstrating no main effect for group, it is noteworthy that with our small sample size ($n = 23$), reported differences in Engagement in Firearm Safety Behaviors between the two intervention groups resulted in a p value of $p = 0.06$.

3.6 Secondary Analyses

3.6.1 Intentions to Adhere to Clinician Recommendations

LMM analyses with an AR1 covariance matrix structure similar to those described above were also utilized for observing the effects of time, group, and their interaction on participant Intentions to Adhere to Clinician Recommendation. LMM analyses demonstrated a robust intraclass-correlation coefficient ($ICC = 0.8$) for Intentions to Adhere. Residuals also met the required assumptions of normal distribution (Shapiro-Wilk = 0.98, $p = 0.31$). We found no interaction effects for time(fixed effect) and group(fixed effect) regarding Intentions to Adhere ($F [3, 37.43] = 0.26, p = 0.86$). Mean Intentions to Adhere increased for individuals in the *Gun Lock* group from 5.22 (95% CI 2.97 to 7.47) at Pre-Intervention to 6.22 (95% CI 3.96 to 8.47) at Post-Intervention, then decreasing to 6.17 (95% CI 3.9 to 8.45) at 2-Weeks, and finally 6.12 (95% CI 3.73 to 8.51) at 1-Month. Comparatively, Intentions to Adhere increased in the *Standard* intervention group from 5.79 (95% CI 3.98 to 7.59) at Pre-Intervention to 7.43 (95% CI 5.63 to 9.23) at Post-Intervention, and then decreased to 7.11 (95% CI 5.28 to 8.93) at 2-Weeks, and then to 6.59 (95% CI 4.72 to 8.45) at 1-Month. Our analyses found a main effect for time ($F [3, 37.43] = 3.56, p = 0.02$), with our pairwise analyses determining that the effect for time was significant at the pairwise level ($F [3, 33.12] = 3.32, p = 0.03$), such that within the *Standard* intervention group, participants exhibited significantly higher levels of Intentions to Adhere at Post-Intervention relative to Pre-Intervention (Mean difference = 1.64; $p = 0.01$; 95% CI 2.75 to 0.54) and at 2-Weeks relative to Pre-Intervention (Mean difference = 1.32; $p = 0.02$; 95% CI 2.42 to 0.22). Regarding group, our analyses revealed no significant main effect ($F [1, 21.26] = 0.36, p = 0.56$). For a more detailed overview of Intentions to Adhere in our sample, see Figure 4. Our secondary hypothesis was not supported (i.e., Aim 2, H2; there was no significant effect of a group x time interaction on Intentions to Adhere); findings regarding the

differences we found within the *Standard* intervention group over time are elaborated on in the Discussion (see Discussion chapter).

3.6.2 Recommendation to Others

LMM analyses were to evaluate the effects of time, group, and their interaction, on whether or not participants recommending to others that they adhere to clinician recommendations (i.e., Recommendation to Others). LMM analyses demonstrated a strong intraclass-correlation coefficient ($ICC = 0.97^7$) for Recommendation to Others. Normality of distribution of residuals was met (Shapiro-Wilk⁸ = 0.97, $p = 0.1$). Our analyses revealed no interaction effects ($F [3, 36.43] = 0.28, p = 0.84$) for time and group regarding Recommendation to Others. Mean Recommendations to Others increased for individuals in the *Gun Lock* group from 5.44 (95% CI 2.83 to 8.06) at Pre-Intervention to 6.44 (95% CI 3.83 to 9.06) at Post-Intervention, then decreasing to 6.33 (95% CI 3.69 to 8.97) at 2-Weeks, and finally 6.27 (95% CI 3.56 to 8.99) at 1-Month. Among participants in the *Standard* intervention group, Recommendations to Others increased from 6.79 (95% CI 4.69 to 8.89) at Pre-Intervention to 7.14 (95% CI 5.04 to 9.24) at Post-Intervention, and then decreased to 7.01 (95% CI 4.9 to 9.13) at 2-Weeks, and then increased to 7.13 (95% CI 4.98 to 9.29) at 1-Month. Importantly, there were no main effects in our analyses for time ($F [3, 36.43] = 1.19, p = 0.84$) or group ($F [1, 21.05] = 0.33, p = 0.57$), and our findings did not support our secondary hypothesis (i.e., Aim 2, H3, no interaction effect was found for time x group regarding Recommendations to Others.). For further details regarding observed levels of Recommendations to Others, see Figure 5.

3.6.3 Acceptability of Intervention (Client Satisfaction Questionnaire)

Our final set of LMM analyses assessed the effects of time, group, and their interaction, on how acceptable participants found treatment to be (i.e., Acceptability of Intervention, as evidenced by Client Satisfaction Questionnaire [CSQ] scores). These LMM analyses exhibited a strong intraclass-correlation coefficient ($ICC = 0.78$) for Acceptability of Intervention. Normality of distribution of residuals was met (Shapiro-Wilk = 0.99, $p = 0.9$). LMM analyses revealed no interaction effects ($F [3, 42.96] = 0.89, p = 0.46$) for time and group regarding Acceptability of Intervention. Mean CSQ scores increased for individuals in the *Gun Lock* group from 17.11 (95% CI 13.96 to 20.26) at Pre-Intervention to 20.56 (95% CI 17.41 to 23.7) at Post-Intervention,

⁷ ICC for Recommendation to Others was also strong ($ICC = 0.82$) prior to the removal of outlier.

⁸ Assumption was not met prior to removal of outlier, as discussed previously (Shapiro-Wilk = 0.95, $p = 0.02$).

then decreasing to 18.49 (95% CI 15.31 to 21.68) at 2-Weeks, and finally 17.59 (95% CI 14.23 to 20.95) at 1-Month. Among participants in the *Standard* intervention group, Acceptability of Intervention increased from 17.64 (95% CI 15.12 to 20.17) at Pre-Intervention to 20.07 (95% CI 17.55 to 22.6) at Post-Intervention, and then decreased to 19.38 (95% CI 16.81 to 21.94) at 2-Weeks, and then increased to 19.18 (95% CI 16.57 to 21.8) at 1-Month. Notably, while there was no main effect in our analyses for group ($F [1, 21.2] = 0.12, p = 0.74$), there was a main effect for time ($F [3, 42.96] = 8.43, p < 0.001$). Interestingly, review of the pairwise comparisons illustrated that the effects of time were significant within participants in the *Gun Lock* intervention group ($F [3, 35.37] = 5.16, p < 0.01$), such that they believed the intervention to be significantly more acceptable at Post-Intervention than at Pre-Intervention (Mean difference = 3.44, $p = 0.001$, 95% CI 1.58 to 5.31), at Post-Intervention than at 2-Weeks (Mean difference = 2.06, $p = 0.02$, 95% CI 0.28 to 3.84), and at Post-Intervention relative to 1-Month (Mean difference = 2.97, $p < 0.001$, 95% CI 0.77 to 5.17). Similarly, the effects of time were significant within participants in the *Standard* group ($F [3, 40.87] = 3.86, p = 0.02$), such that they found the intervention to be significantly more acceptable at Post-Intervention than Pre-Intervention (Mean difference = 2.43, $p < 0.01$, 95% CI 3.93 to 0.93), at 2-Weeks than at Pre-Intervention (Mean difference = 1.73, $p = 0.03$, 95% CI 3.27 to 0.2), and at 1-Month than at Pre-Intervention (Mean difference = 1.54, $p = 0.05$, 95% CI 3.08 to 0.001). Although our secondary hypothesis was not supported by these findings (i.e., Aim 2, H4, no significant effects of the interaction between time and group on Acceptability of Intervention were found), our pairwise findings regarding Acceptability of Intervention are discussed in more detail in the Discussion (see Discussion chapter). For an overview of participant responses regarding Acceptability of Intervention, refer to Figure 6.

3.7 Exploratory Aim: Familiarity with Firearms

Lastly, regarding our Exploratory Aim, we wished to assess whether Familiarity with Firearms, as measured by number of times participants have engaged in an activity involving shooting a firearm, could impact/be related to variables of interest. As this has not been evaluated in previous research, particularly utilizing a continuous measure of familiarity with firearms, we approached this by simply evaluating intercorrelations between Familiarity with Firearms and our outcome variables of interest at baseline (i.e., Engagement in Firearm Safety Behaviors, Intentions to Adhere, Recommendations to Others, Acceptability of Intervention).

Notably, Familiarity with Firearms was not found to be correlated with any of the other variables of interest at the $p = 0.05$ level. Importantly, the present sample is considerably underpowered for drawing meaningful conclusions from an analysis of intercorrelations. Nonetheless, these findings will be briefly considered in the Discussion chapter, below.

CHAPTER 4

DISCUSSION

Approximately 48,300 people die by suicide in the United States annually, and roughly half of these deaths are the result of intentional, self-inflicted gunshot wounds (CDC, 2020). Lethal means counseling research is a growing body of literature focused on methods for successfully engaging at-risk individuals in conversations and actions towards decreasing their access to lethal means. This research has established an empirical foundation (e.g., Amos, Appleby, & Kiernan; 2001; Anestis, Anestis, & Butterworth, 2017; Gunnel et al., 2007; Shelef et al., 2015) and broad guidelines (e.g., see Barber & Miller, 2014; Britton, Bryan, Valenstein, 2016; Bryan, Stone, & Rudd, 2011) for lethal means counseling, and has also begun identifying approaches demonstrated to be significantly more acceptable interventions (e.g., Stanley et al., 2017; Stanley et al., 2020). An important direction for future growth in this literature that is ongoing emphasizes successfully impacting behavioral outcomes (i.e., resulting in individuals engaging behaviorally in lethal means safety).

The present study represented an effort towards elucidating practical guidelines for improving behavioral adherence to lethal means safety recommendations. Our primary analyses (Aim 1, Hypothesis 1) focused on the effects of providing a gun lock in conjunction with current best practices on such behavioral outcomes (i.e., Engagement in Firearm Safety Behaviors). Our hypothesis (i.e., Individuals in the *Gun lock* group will report significantly greater increases in engagement in firearm safety behaviors/thoughts over time, relative to individuals in the *Standard* group) was not supported by our findings, given that there was no significant effect found for the interaction of group and time on Engagement in Firearm Safety Behaviors.

Secondarily, we intended to demonstrate whether or not utilizing previously established practices with the addition of gun locks would not only maintain the previously illustrated (Stanley et al., 2017; Stanley et al., 2020) merits of bolstering Intentions to Adhere to Clinician Recommendations, Recommending Others to Adhere to Clinician Recommendations, and Acceptability of Intervention, but also that the addition of gun locks would yield increases in those outcomes. Specifically, we hypothesized that [Aim 2, H2] individuals in the *Gun lock* group will report significantly greater increases in intentions to self-adhere to clinician recommendations over time, compared to individuals in the *Standard* group; [Aim 2, H3] that

individuals in the *Gun lock* group will report significantly greater increases over time in intentions to recommend adherence to clinician recommendations to a loved one, relative to individuals in the *Standard* group; and [Aim2, H4] that individuals in the *Gun lock* group will report significantly greater increases in acceptability of lethal means counseling over time, compared to individuals in the *Standard* group. None of these hypotheses were supported by our findings, given that there were no significant effects found for the interaction of time and group on any of these outcomes in our LMM analyses. Lastly, based on mixed recent findings regarding the impact of familiarity with lethal means on various clinically relevant outcomes (e.g., Crifasi et al., 2018; Stanley et al., 2020), we sought to explore whether Familiarity with Firearms was found to have any meaningful correlations at baseline to our outcome variables of interest. Our findings did not support the possibility that Familiarity with Firearms could be closely related to our outcome variables (see Table 4).

Despite our null findings regarding our hypotheses, further review of our data indicated various noteworthy occurrences that may help inform future methodology in similar research studies and/or clinical recommendations regarding lethal means counseling with firearms. These are discussed in greater detail, below (see Clinical Implications and Future Directions section). However, it is critical that we consider these occurrences with caution due to some of them being non-significant, due to the fact that pairwise comparisons were not planned a priori absent interaction effects, and lastly in consideration of the limitations of our data described directly below.

4.1 Strengths and Limitations

Due to our sample size being low ($n = 23$), our confidence intervals were considerably wide, increasing the impact of responses of single participants. Moreover, among the 23 participants there was one that missed participation at 2-Weeks and there were several who have not completed their final 1-Month Assessment (see Figure 1 for a detailed overview of participant attrition). Of note, this missing data, resulted in a change to our original analytic approach. Our analyses were initially intended to be RM-ANOVAs testing interaction effects of group and time, imputing data missing due to attrition utilizing the intent-to-treat, carry forward method (Alshurafa et al., 2012, Lavori & Dawson, 2001). However, research has shown that linear mixed models (LMM; Cnaan, Laird, & Slasor, 1997; Krueger & Tian, 2004) are a superior approach for randomized control trials (RCTs) due to their utilization of maximum likelihood

estimation, which allows for participants with incomplete data to still contribute to analyses rather than requiring listwise deletion or another less robust imputation approach. Additionally, the ICCs found in our analyses, along with data regarding the normality of the distribution of residuals for our outcome variables indicated appropriateness of LMM.

Another limitation of our study was that participants and the experimenter were not blinded to group condition. Although participants were not explicitly told whether they were in the *Gun Lock* group or *Standard* group, this may have been discernible. Consent materials (Appendix B) and experimenter (during Scheduling Calls) informed participants that some participants would need to receive materials by mail prior to their participation and that some participants would be shown a video. Participants know from consent materials that the study tests the effects of “providing gun locks.” This absence of blindness to condition may have resulted in biased responding on outcomes, though inferring such processes would not be possible given our data. Despite our tests of randomization indicating that there were no meaningful differences between groups regarding views on firearms, the Views on Firearms Survey (Stanley et al., 2017, Stanley et al., 2020) exhibits some limitations. First, the measure only provides binary data (e.g., whether participants believe it is more important to protect gun rights, or whether they believe it is more important to control firearm ownership). Secondly, it does not have established norms to identify whether or not participants more generally displayed any inclinations regarding views on firearms, which would have otherwise provided more objective data regarding potential biases.

Another point worth considering regarding participant blinding, is that recruiting gun-owners with access to firearms, with a reported history of mood disturbance, and who are willing to be open discussing such issues, is a difficult task. This contributed to the complications of recruitment that resulted in our current low sample size ($n = 23$). Taking that into consideration alongside recommendations for being culturally sensitive to firearm culture (Marino et al., 2018; Betz & Wintemute, 2015) in our present approach, we felt it was critical to be as forthcoming as possible regarding interventions. Further, it bears mentioning that despite these efforts and transparency, there were several instances during recruitment, during which prospective participants publicly expressed (i.e., posting public comments in response to recruitment postings made on online forums) apprehension and skepticism about participating in academic research observing firearm ownership and variables related to mental health, citing fear

of privacy violations and fear of potential legal repercussions of participating (e.g., believing “red flag” legislation could enable authorities to utilize study data to mandate removal of participants’ firearms; for more information regarding “red flag” laws, see Sanger-Katz, 2019; Gay, 2020). Given the politicized nature of topics related to firearms and mental health, and due to contemporary societal concerns about privacy protection, such a response is understandable. Implications and future directions regarding this are discussed further, below (see Clinical Implications and Future Directions section).

Regarding experimenter blinding, all procedures in the study were either scripted (e.g., lethal means counseling script, Appendix E), automated (e.g., online surveys), or semi-structured clinical interviews (e.g., suicide risk assessment; Chu et al., 2015; Joiner et al., 1999) and were implemented by a single (as opposed to multiple), senior clinician-in-training (i.e., graduate student with 6 years of experience in supervised clinical practice). As such, a strength in our methodology was the standardization of intervention delivery. Given that all interventions were rigorously standardized through scripting and semi-structured clinical interviews, in conjunction with the fact that all were performed by a single clinician, deviations regarding intervention delivery were theoretically minimized to the extent possible. That our approach was a randomized experiment also allows for more practical interpretations of our findings, due to the control we had regarding intervention delivery over time.

Another one of the methodological strengths of our study was the specific nature of our sampling. To the best of our knowledge, this study is the first to restrict inclusion to only individuals who have definite access to a firearm *and* have experienced either a lifetime history of suicide ideation or a lifetime mood disturbance (i.e., depressed mood or anhedonia). Much of previous research either: 1) focuses on a firearm-owning sample without the exclusion criteria of requiring individuals to have a history of mood or more directly suicide-related history (e.g., Crifasi et al., 2018), or b) utilizes a sample emphasizing lifetime history of suicide ideation while not requiring definite access to a firearm at the time of the study (e.g., Stanley et al., 2017; Stanley et al., 2020). Although our mental health-related criteria were broadened to include more general mood disturbances as a minimum for our entire sample, it is noteworthy that 60.9% of our sample reported specifically having a lifetime history of suicide ideation (see Table 3 for further details). Taken together, this demonstrated sampling of individuals that report definite access to firearms and a history of mood concerns, with a majority (i.e., 60.9%) endorsing a

lifetime history of suicide ideation, represents a methodological improvement upon past research, in terms of utilizing a sample more representative of our population of interest (i.e., firearm-owning individuals at risk for suicide).

4.2 Clinical Implications and Future Directions

As previously described, although we did not find evidence to support our primary and secondary analyses, a review of our data and, in particular, the main effects of group and time in our analyses reveals interesting findings regarding Engagement in Firearm Safety Behaviors, Intentions to Adhere, and Acceptability of Intervention. Of course as previously mentioned, it is important to interpret these findings with caution, as they were not planned, our sample size was considerably low ($n = 23$), and due to the limitations of our study discussed above.

Regarding Engagement in Firearm Safety behaviors, although we found neither significant interaction effects (i.e., group x time) on this outcome nor significant main effects for group and/or time, a noteworthy trend ($p = 0.06$) in the main effect of group was observed, such that across time points (including at baseline), the *Standard* intervention group reported higher levels of Engagement in Firearm Safety behaviors. Although methodological limitations and non-significance preclude meaningful inferences regarding this, one potential area that may have resulted in these differences could have been biased responding. As discussed above, our present measure accounting for such inclinations (i.e., Views on Firearms Survey; see Measures section) was not optimal, due to its binary nature (e.g., “What do you think is more important—to protect the right of Americans to own guns, or to control gun ownership?” with a binary response indicative of either “Protect the right” or “Control gun ownership”), and our methods/future research could benefit from testing a Likert-type approach to these inclinations (e.g., “To what extent do you believe it is important to protect the right to own firearms?” with responses including “not at all,” “somewhat,” “quite important,” and “extremely important”). Other such Likert-type methods for assessing preferential and/or political biases have been implemented by past research (e.g., Stanley et al., 2017; Stanley et al., 2020) and future studies can greatly benefit from their inclusion. Additionally, the limitations of our sample size ($n = 23$) weaken the inferences that can be drawn from our analyses. Accordingly, it is recommended for similar future studies to attempt to achieve more robust sample sizes.

Our analyses of main effects, though not planned, also illustrated that in our data there were meaningful differences over time in Intentions to Adhere to Clinician Recommendations

and in Acceptability of treatment. Specifically regarding Intentions to Adhere to Recommendations, participants demonstrated higher Intentions to Adhere, across both groups (i.e., *Gun Lock* and *Standard* intervention group), at Post-Intervention Assessment, 2-Week Assessment, and 1-Month Assessment, as compared to Pre-Intervention assessment. Regarding Acceptability of Treatment, across both groups, participants rated the intervention to be less acceptable at Pre-Intervention than they did at Post-Intervention, 2-Weeks, and 1-Month. Although these two outcomes are slightly different in nature, these findings, when considered together, are indicative of a possibility of preconceived expectations regarding lethal means counseling and/or expectations specific to interventions related to firearms, both of which have been discussed in previous research (for discussion of patient reticence in lethal means counseling see Anestis, 2017; Marino et al., 2018; Betz & Wintemute, 2015; Butterworth, Daruwala, & Anestis, 2020). Regarding future research, these findings suggest that it may be important to attempt to elucidate variables that may impact these expectations within the context of lethal means counseling for firearms. For instance, preliminary approaches to this end may begin by offering an opportunity for qualitative feedback from participants regarding responses on these variables (e.g., “Why did you indicate that you would be [insert participant response; e.g. “not at all,” “somewhat,” or “extremely”] likely to adhere to your clinician’s recommendations to limit your access to a firearm for safety purposes?”), followed by having multiple raters categorize responses into discreet, empirically-informed categories (e.g. hypothetically, “distrust of clinician/mental health services,” “preference of privacy regarding firearms-related choices,” etc.) .

Clinically, these findings also provide guidance regarding advisable intervention approaches to lethal means counseling. For instance, regarding Intentions to Adhere to Clinician Recommendations, our findings suggested that individuals’ intentions to adhere increased significantly across groups between Pre-Intervention and Post-Intervention, but then decreased significantly from Post-Intervention to 2-Weeks, and that this decrease continued to 1-Month. Notably, 2-Week Assessment and 1-Month Assessment did not involve direct contact (i.e., only email reminders to participate) by phone or of a clinical nature at those time points. This may be indicative of the importance of continuing active engagement in lethal means counseling and related discussions/rationale provision over time. Clinically, this would support the use of multiple sessions/visits and follow-up to ensure clients continue to exhibit buy-in and

engagement in lethal means safety over time. Indeed, follow-up involving communication has been an approach with empirical support in suicide intervention research (e.g., Reger et al., 2017) and broader clinical research (Simon et. al., 2011). Importantly, this finding also indicates that future research on lethal means counseling with provision of gun locks may benefit from an intervention group that completes 2-Week/1-Month Follow-Up Assessments exactly as done in the present study, but including another group for comparison, that also includes clinical contact at the 2-Week and/or 1-Month Follow-Up Assessment.

Regarding Acceptability of Treatment, because these findings suggest some reticence (i.e., lower Acceptability of Intervention findings) at Pre-Intervention, that is significantly lower at all other time points, this may indicate that an important clinical step in lethal means counseling may be to provide empirically-informed rationale that addresses and normalizes the expectation that clients receiving will likely experience apprehension towards lethal means counseling at first, but that as time elapses, clients will likely experience decreases in that apprehension and find that the intervention feels more acceptable over time. Indeed, this would be in line with current best practices in lethal means counseling (Runyan, Brooks-Russell, & Betz, 2019)) especially accounting for firearm-related cultural factors (Marino et al., 2018; Betz & Wintemute, 2015). Further, this clinical step can easily facilitate the discussion of temporariness of steps necessary in lethal means counseling, which has been demonstrated by other research to be a critical component for bolstering acceptability of lethal means counseling (Stanley et al., 2020).

4.3 Concluding Remarks

Given the null findings of our analyses, it is important to consider that they were likely underpowered, due to our original intended sample size ($n = 64$). Additionally, it is worth mentioning that the implications discussed in detail above require cautious interpretation until follow-up research is carried out that is better powered for such analyses. However, it is important to note that these analyses did not fail to provide useful information that can continue to guide research with similar aims, as well as informing clinical approaches.

At a time when academia is beginning to do away with old notions of null findings being equated with “defeat,” we are very hopeful about the promise of our null findings and what may come of them. With that spirit of persistence and excitement about the prospect of continued

efforts with these data in mind, we conclude this manuscript with two quotes from one of the greatest fighters of all time, as they relate to the “defeat” of null findings, :

-“It’s not really that much of a big deal – you brush it off and you come back. Defeat is the secret ingredient to success.”

-“What defines us is how well we rise after falling.”

-Conor McGregor

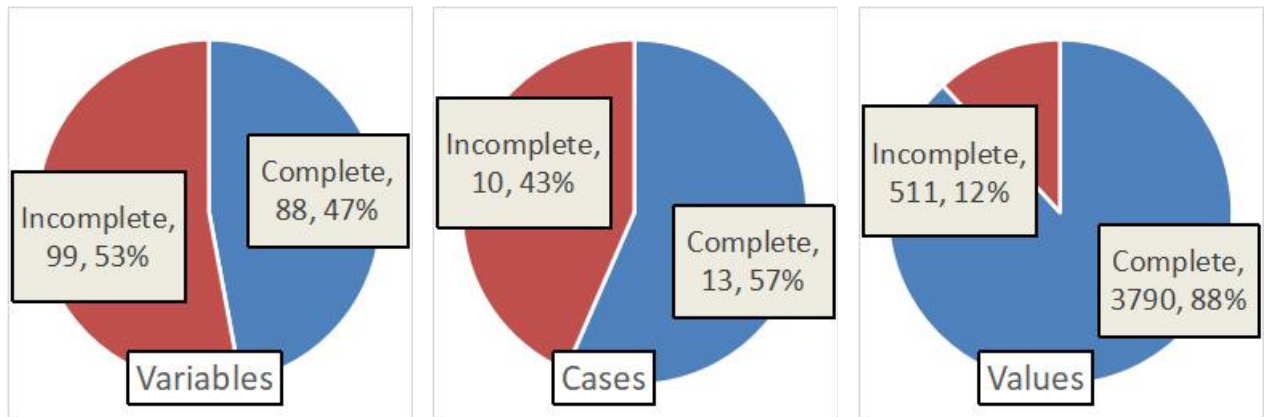


Figure 1. Overview of Missing Values

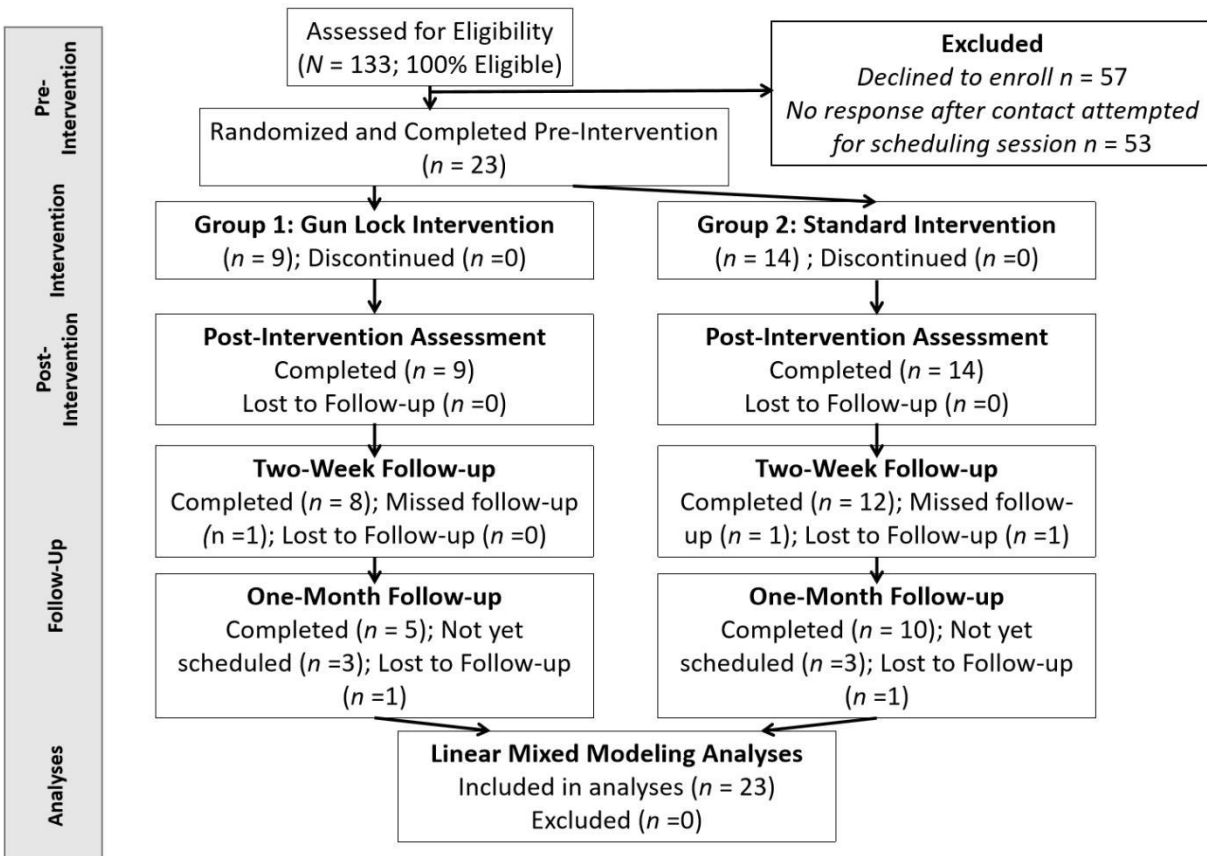


Figure 2. CONSORT Diagram

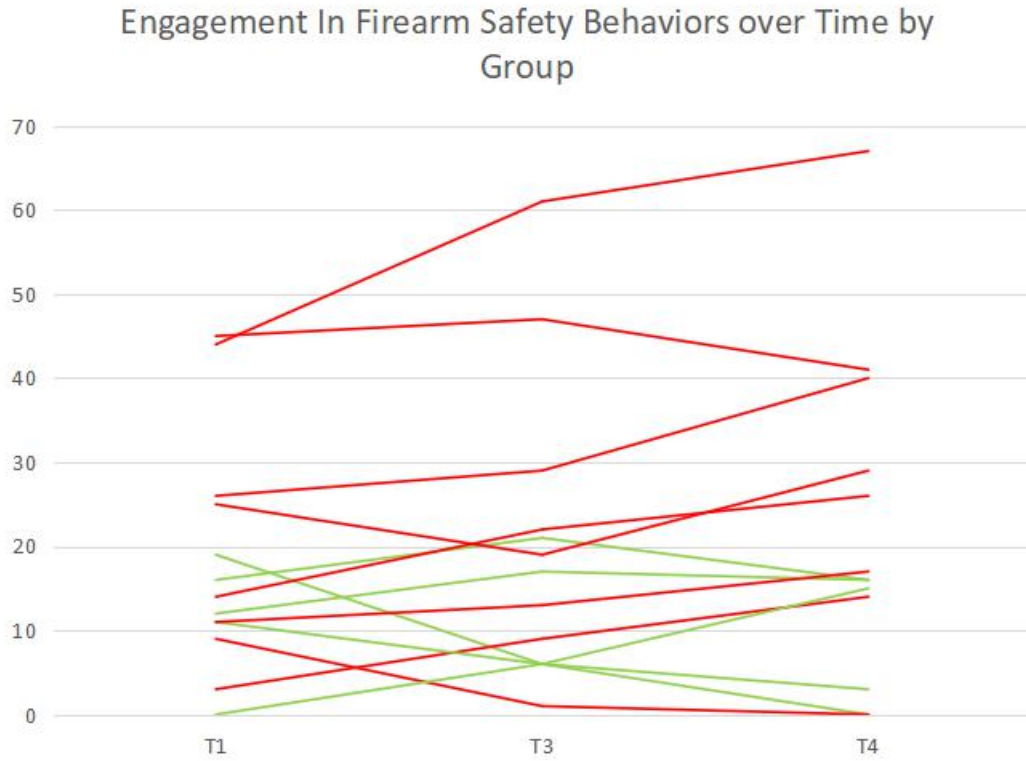


Figure 3. Engagement In Firearm Safety Behaviors

Note: Gun Lock intervention group participants indicated by green lines, Standard Intervention group indicated by red lines.

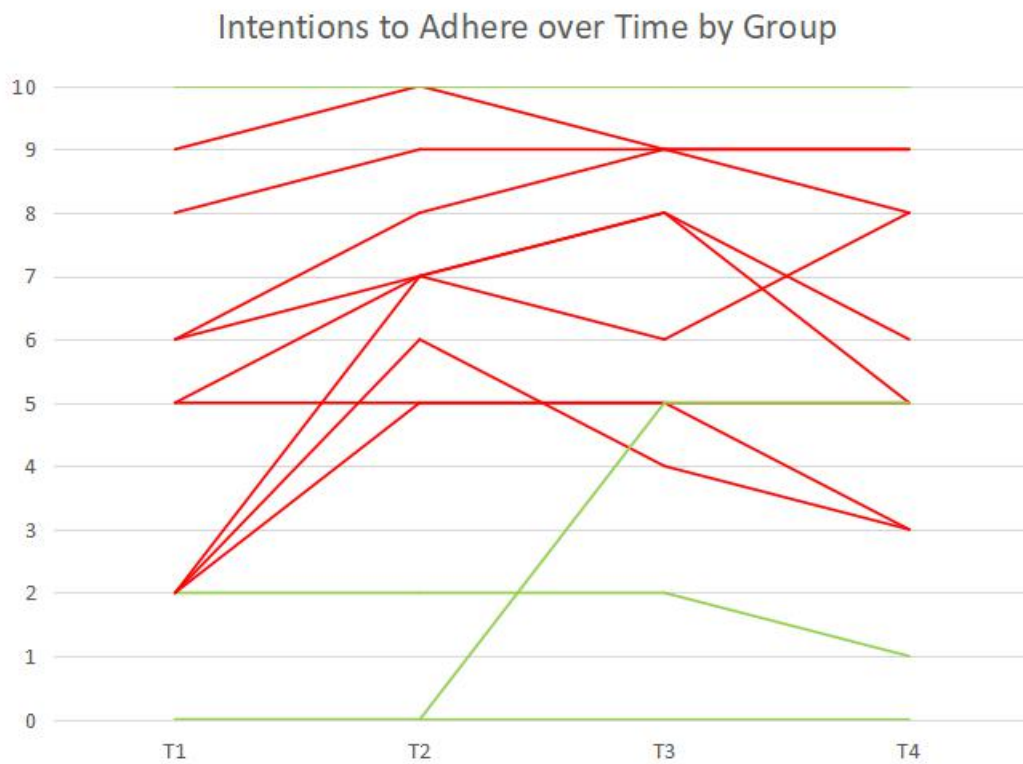


Figure 4. Intentions to Adhere to Clinician Recommendations
Note: Gun Lock intervention group participants indicated by green lines, Standard Intervention group indicated by red lines.

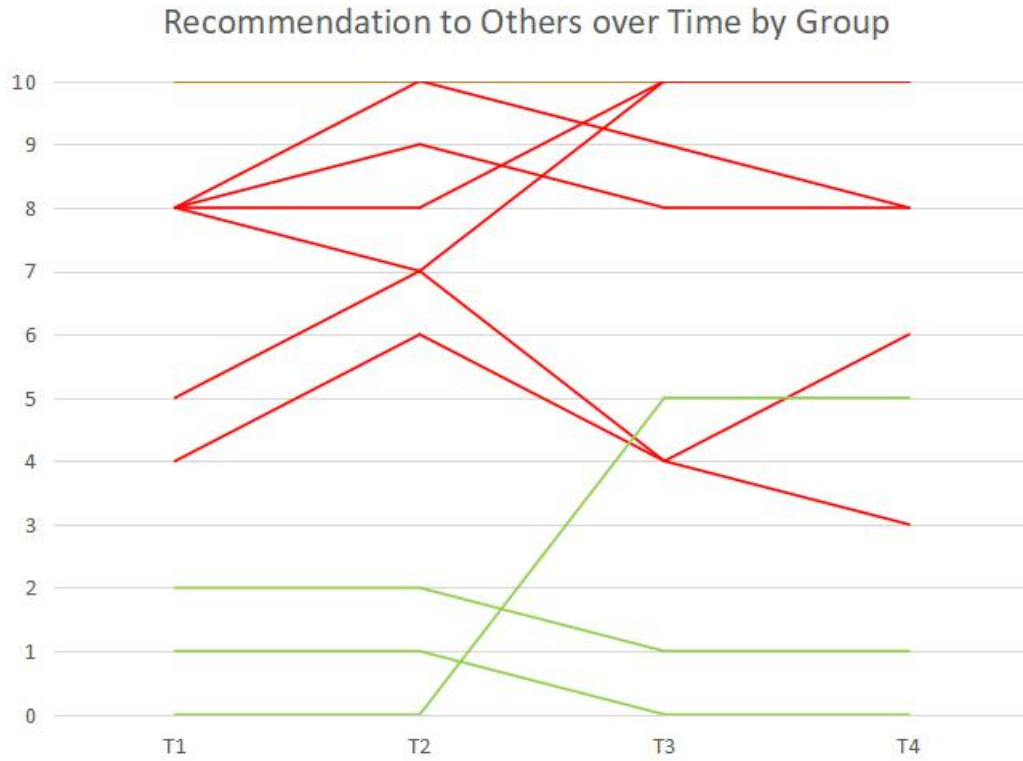


Figure 5. Recommending to Others to Adhere to Clinician Recommendations
Note: Gun Lock intervention group participants indicated by green lines, Standard Intervention group indicated by red lines.

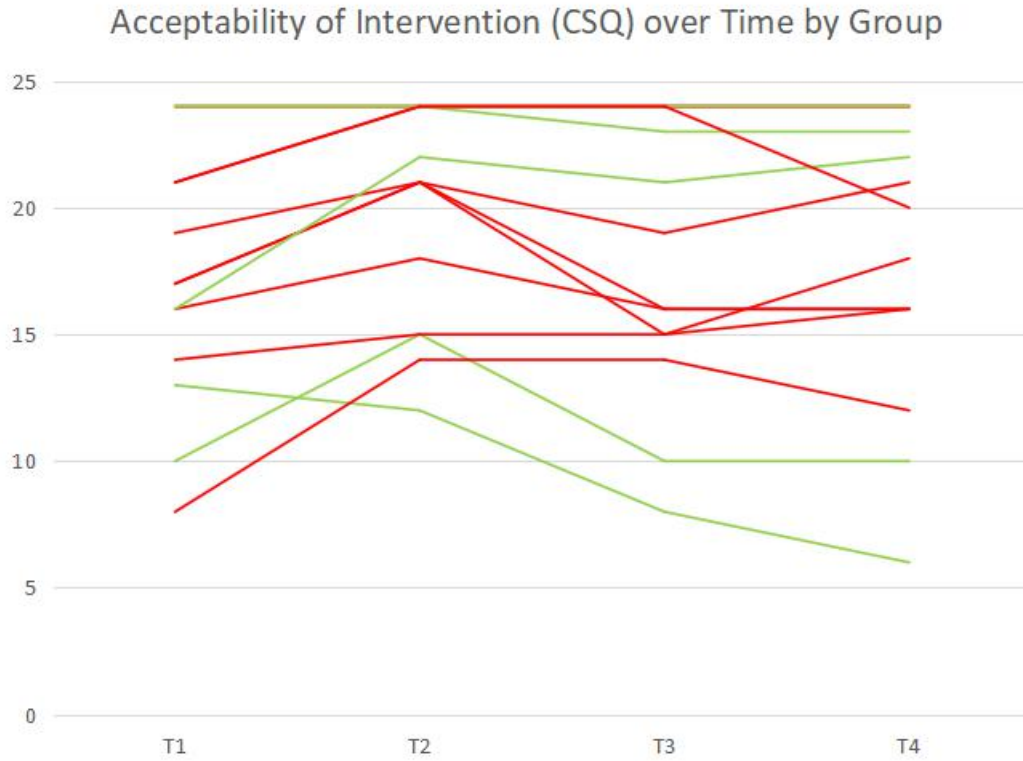


Figure 6. Acceptability of Intervention (Client Satisfaction Questionnaire)
Note: Gun Lock intervention group participants indicated by green lines, Standard Intervention group indicated by red lines.

Table 1. Sociodemographic Characteristics Stratified by Intervention Group

Characteristic	Full Sample (<i>N</i> = 23) <i>n</i> (Valid %)	Group 1: Gun Lock Intervention (<i>n</i> = 9)	Group 2: Standard Intervention (<i>n</i> = 14)
Age, Mean (SD)[Range]	35.3 (30.36) [19-62]	37.56 (28.63) [21-57]	33.86 (31.66) [19-62]
Sex			
Male	12(52%)	4(44%)	8(57%)
Female	11(48%)	5(56%)	6(43%)
Race/Ethnicity			
Caucasian/White	15(65.2%)	6(66.7%)	9(64.9%)
African American/Black	1(4.3%)	0(0%)	1(7.1%)
Hispanic/Latino	2(8.7%)	2(22.2%)	0(0%)
Asian/Pacific Islander	2(8.7%)	0(0%)	2(14.3%)
Bi-Racial	2(8.7%)	0(0%)	2(14.3%)
Other	1(4.3%)	1(11.1%)	0(0%)
Sexual Orientation			
Heterosexual/Straight	16(69.6%)	6(66.7%)	10(71.4%)
Homosexual/Gay	1(4.3%)	1(11.1%)	0(0%)
Bisexual	6(26.1%)	2(22.2%)	4(28.6%)
Religious Affiliation			
Catholic	6(26.1%)	3(33.3%)	3(21.4%)
Protestant	2(8.7%)	1(11.1%)	1(7.1%)
Buddhist	1(4.3%)	0(0%)	1(7.1%)
Atheist	5(21.7%)	4(44.4%)	1(7.1%)
Agnostic	2(8.7%)	0(0%)	2(14.3%)
Unaffiliated Believer	5(21.7%)	1(11.1%)	4(28.6%)
Unaffiliated Non-believer	1(4.3%)	0(0%)	1(7.1%)
Other	1(4.3%)	0(0%)	1(7.1%)
Marital Status			
Never Married	8(34.8%)	2(22.2%)	6(42.9%)
Married	11(47.8%)	5(55.6%)	6(42.9%)
Cohabiting	2(8.7%)	1(11.1%)	1(7.1%)
Divorced	2(8.7%)	1(11.1%)	1(7.1%)

Note. There were no statistically significant differences between treatment groups regarding any of the characteristics reported in this table ($ps > .05$).

Table 2. Firearm-Related Characteristics Stratified by Intervention Group

Characteristic	Full Sample (<i>N</i> = 23) <i>n</i> (Valid %)	Group 1: Gun Lock Intervention (<i>n</i> = 9)	Group 2: Standard Intervention (<i>n</i> = 14)
Familiarity with firearms, Mean (SD)[Range]	34.22(44.06) [0-150]	31.44(47.32) [0-150]	36(43.58) [4-150]
<u>Views on firearms</u>			
Member NRA¹			
Yes	1(4.3%)	0(0%)	1(7.1%)
No	22(95.7%)	9(100%)	13(92.9%)
Member Other²			
Yes	2(8.7%)	1(11.1%)	1(7.1%)
No	21(91.3%)	8(88.9%)	13(92.9%)
Protect Vs. Control³			
Protect	16(69.6%)	7(77.8%)	9(64.3%)
Control	7(30.4%)	2(22.2%)	5(35.7%)
Protection Vs. Risk⁴			
Protection	17(73.9%)	7(77.8%)	10(71.4%)
Risk	6(26.1%)	2(22.2%)	4(28.6%)

Not. There were no statistically significant differences between treatment groups regarding any of the characteristics reported in this table (*ps* > .05).

Table 3. Psychological and Personality Characteristics Stratified by Intervention Group

Characteristic	Full Sample (<i>N</i> = 23) <i>n</i> (Valid %); <i>or</i> Mean (SD)[Range]	Group 1: Gun Lock Intervention (<i>n</i> = 9); <i>or</i> Mean (SD)[Range]	Group 2: Standard Intervention (<i>n</i> = 14); <i>or</i> Mean (SD)[Range]
SITBI-SF Lifetime Suicidality			
Suicide Ideation			
Yes	14(60.9%)	6(66.7%)	8(57.1%)
No	9(39.1%)	3(33.3%)	6(42.9%)
Plan			
Yes	7(30.4%)	1(11.1%)	6(42.9%)
No	16(69.6%)	8(88.9%)	8(57.1%)
Attempt			
Yes	4(17.4%)	0(0%)	4(28.6%)
No	19(82.6%)	9(100%)	10(71.4%)
NSSI			
Yes	7(30.4%)	3(33.3%)	4(28.6%)
No	16(69.6%)	6(66.7%)	10(71.4%)
SBQ-R Suicidality	6.48(3.8) [3-18]	6.44(3.05) [3-11]	6.5(4.29) [3-18]
DSI-SS Suicidality	2.18(0.45)[0-9]	1.69(0.56)[0-5]	2.47(0.66)[0-9]
Depressive Symptoms (PHQ-9)	7.96(5.56)[0-25]	7.33(5.15)[0-17]	8.36(5.97)[2-25]
Mental Health Treatment			
Current	8(34.8%)	1(11.1%)	7(50%)
Past	6(26.1%)	4(44.4%)	2(14.3%)
None	9(39.1%)	4(44.4%)	5(35.7%)
TIPI			
Extraversion	3.65(1.77) [1-7]	3.11(1.45) [1-5.5]	4(1.91) [1.5-7]
Agreeableness	4.61(1.5) [1-7]	4.22(1.86) [1-7]	4.86(1.23) [3-7]
Conscientiousness	4.98(1.35) [1.5-7]	5.39(1.27) [4-7]	4.71(1.38) [1.5-7]
Emotional Stability	3.67(1.5) [1-7]	3.61(1.78) [1-7]	3.71(1.35) [2-6]
Openness to Experience	5.2(1.44) [1-7]	5(1.67) [1-6.5]	5.32(1.32) [3-7]

Note. There were no statistically significant differences between treatment groups regarding any of the characteristics reported in this table (*ps* > .05).

Table 4. Familiarity with Firearms Intercorrelations

Var	M	SD	1	2	3	4	5
1. Engagement in Safety	17.13	14.5	1				
2. Intentions to Adhere	5.57	3.54	0.33	1			
3. Recommendation to Others	6.26	3.79	0.14	0.46*	1		
4. Acceptability	17.43	4.42	0.03	0.29	0.03	1	
5. Familiarity with Guns	34.22	44.06	0.01	-0.27	-0.09	-0.23	1

* $p < 0.05$; Engagement in Safety = Engagement in Firearm Safety Behaviors, Intentions to Adhere = Intentions to Adhere to Clinician Recommendations; Recommendations to Others = Recommending to Others to Adhere to Clinician Recommendations; Acceptability = Acceptability of Intervention

APPENDIX A

APPROVAL MEMORANDUM

Date: 02/04/19

To: Bruno Chiurliza [Redacted]

Address:[Redacted]

Dept.: PSYCHOLOGY DEPARTMENT

From: Thomas L. Jacobson, Chair

Re: Use of Human Subjects in Research: The Provision of Gun Locks in Lethal Means Counseling to Increase Firearm Safety in a Suicide Risk Sample

The application that you submitted to this office in regard to the use of human subjects in the research proposal referenced above has been reviewed by the Human Subjects Committee at its meeting on 11/14/2018

Your project was approved by the Committee. The Human Subjects Committee has not evaluated your proposal for scientific merit, except to weigh the risk to the human participants and the aspects of the proposal related to potential risk and benefit. This approval does not replace any departmental or other approvals which may be required.

If you submitted a proposed consent form with your application, the approved stamped consent form is attached to this approval notice. Only the stamped version of the consent form may be used in recruiting research subjects.

If the project has not been completed by you must request a renewal of approval for continuation of the project. As a courtesy, a renewal notice will be sent to you prior to your expiration date; however, it is your responsibility as the Principal Investigator to timely request renewal of your approval from the Committee.

You are advised that any change in protocol for this project must be reviewed and approved by the Committee prior to implementation of the proposed change in the protocol. A protocol

change/amendment form is required to be submitted for approval by the Committee. In addition, federal regulations require that the Principal Investigator promptly report, in writing, any unanticipated problems or adverse events involving risks to research subjects or others.

By copy of this memorandum, the chairman of your department and/or your major professor is reminded that he/she is responsible for being informed concerning research projects involving human subjects in the department, and should review protocols as often as needed to insure that the project is being conducted in compliance with our institution and with DHHS regulations.

This institution has an Assurance on file with the Office for Human Research Protection. The Assurance Number is IRB00000446.

Cc: [REDACTED]

HSC No. 2018.26057

APPENDIX B

IRB RENEWED APPROVAL

FLORIDA STATE UNIVERSITY
OFFICE of the VICE PRESIDENT for RESEARCH



APPROVAL

October 23, 2019

Bruno Chiurliza
[REDACTED]

Dear Bruno Chiurliza:

On 10/23/2019, the IRB reviewed the following submission:

Type of Review:	Expedited (7)(a) Behavioral research; (7)(b) Social science methods
Title:	The Provision of Gun Locks in Lethal Means Counseling to Increase Firearm Safety in a Suicide Risk Sample
Investigator:	Bruno Chiurliza
Submission ID:	STUDY00000478
Study ID:	STUDY00000478
Funding:	None
IND, IDE, or HDE:	None
Documents Reviewed:	<ul style="list-style-type: none">• Chiurliza.Revised.Debriefing.Clean.12.20.18.pdf, Category: Debriefing;• Chiurliza.Continuing Review.9.26.19.docx, Category: Continuing Review Form;• Chiurliza.Measures.12.20.18.pdf, Category: Other;• Chiurliza.Protocol.Renewal.9.18.19.pdf, Category: IRB Protocol;• Chiurliza.Recruitment.Materials.12.20.18.pdf, Category: Recruitment Materials;• Chiurliza.Revised.Consent.Clean.12.20.18.pdf, Category: Consent Form;

The IRB approved the protocol, effective from 10/23/2019 to 10/22/2020 inclusive. Before 10/22/2020 or within 30 days of study close, whichever is earlier, you are to submit a completed continuing review and required attachments to request continuing

approval or closure. You can submit a continuing review by navigating to the active study and clicking Create Modification / CR. If continuing review approval is not granted before the expiration date of 10/22/2020, approval of this study expires on that date.

You are advised that any modification(s) to the protocol for this project must be reviewed and approved by the IRB prior to implementation of the proposed modification(s).

Federal regulations require that the Principal Investigator promptly report any new information related to this protocol (see Investigator Manual (HRP-103)).

In conducting this protocol, you are required to follow the requirements listed in the Investigator Manual (HRP-103), which can be found by navigating to the IRB Library within the IRB system.

Sincerely,

Human Subjects Research Office
humansubjects@fsu.edu

APPENDIX C

INFORMED CONSENT FORM

CONSENT TO PARTICIPATE IN A RESEARCH STUDY

Study Title: The Provision of Gun Locks in Lethal Means Counseling to Increase Firearm Safety in an At-Risk Sample

Principal Investigator: Bruno Chiurliza, M.S.

Introduction

We invite you to take part in a research study at Florida State University.

First, we want you to know that:

- Taking part in research is entirely voluntary.
- You may choose not to take part, or you may withdraw from the study at any time. In either case, you will not lose any benefits to which you are otherwise entitled.
- You may receive no benefit from taking part. The research may give us knowledge that may help people in the future.

Second, some people have personal, religious or ethical beliefs that may limit the kinds of research procedures they would want to receive. If you have such beliefs, please discuss them with the research team before you agree to the study.

Now we will describe this research study. Before you decide to take part, please take as much time as you need to ask any questions and discuss this study with anyone on the FSU research team, or with family, friends or your personal physician or other professional.

Why is this study being done?

This study is being conducted by Bruno Chiurliza, M.S. (In the FSU Department of Psychology). The purpose of the study is to test the effects that providing gun locks as part of a psychological intervention has on gun safety behaviors among at-risk individuals.

Why are you being asked to take part in this study?

You are being asked to take part in this study because it may help improve our understanding of how to increase firearm safety behaviors (e.g., storing firearms safely).

How many people are expected to take part in this study?

Community participants will be recruited nationally to participate in the study. A total of 64 individuals will participate in this study

Before you begin the study

In order to participate in this study you must: a) Be 18 years of age or older; b) own and/or have access to a firearm; and c) have experienced mood disturbances at some point in your lifetime (e.g., decreased interest in activities, feeling down).

Study Procedures

If you agree and are eligible to participate in this study, we would ask you to do the following: Participants will be placed into two groups: 1) Gun lock group; 2) Standard intervention group. All participants will complete three study sessions, all conducted remotely by phone and using the internet. The first session will be scheduled over the phone following the consent and screening process. This call will also involve providing a mailing address, in order to receive gun locks. This session will be scheduled for approximately 1.5 to 2 weeks after the first call and will take approximately an hour and will consist of completing questionnaires regarding various psychological traits, thoughts, and behaviors, as well receiving the interventions indicated by the group. The second session will be two weeks after intervention and will involve only filling out follow-up questionnaires (i.e., psychological traits, thoughts, and behaviors). The third session will be one month after intervention and will also consist of the same follow-up questionnaires.

Risks of Study Participation

The study has the following risks: The risks involved with participation in this study are minimal. Sensitive personal topics will be discussed throughout the study, including mental

health symptoms, and some people may become emotionally upset during tasks and Questionnaires. If this occurs and you wish to discuss it, you may contact the Principal Investigator to speak about such concerns. Additionally, national mental health resources will be provided on a debriefing form you will receive upon completing your participation in this study.

This study also involves a clinician-administered suicide risk assessment. If this assessment indicates that you may be at imminent risk for harming yourself or others, Florida law requires contacting the appropriate authorities to ensure you are provided with emergency treatment. If this occurs, the Principal Investigator will first speak with you prior to contacting authorities. You will also be allowed to skip any items or questionnaires that you choose to skip and/or to end your participation at any time you wish and for any reason, including personal discomfort.

Benefits of Study Participation

The benefits to study participation are: Direct benefits anticipated from participation in this study include compensation via a free gun lock and entry into a raffle which may result in winning either a \$100 or \$50 Visa gift card. Indirectly, this research may be helpful to society at large. Specifically, this study may further the scientific community's understanding of discussing firearm safety with at-risk individuals.

Alternatives to Study Participation

If you elect not to participate in the study, you can find information for obtaining a cable lock similar to the one used in the study here: (<https://www.projectchildsafe.org/safety/find-a-safety-kit>) and you can find instructions for its proper use here (<http://www.wcso.net/data/childsafe.pdf>)

Study Costs/Compensation

All eligible participants will receive a free gun lock, and 2 out of 64 participants (selected at random in a raffle after the study is complete) will receive a \$100 Visa Gift Card, and 6 out of 64 participants (selected at random in a raffle after the study is complete) will receive a \$50 Visa Gift Card. The study is conducted online and by phone over 3 sessions in a one-month period. The first session takes approximately 1 hour. The second session at two weeks and the third session at one month each take approximately 15-30 minutes.

Conflict of Interest

There are no conflicts of interest regarding the research team and this study.

Confidentiality

The records of this study will be kept private and confidential, to the extent allowed by law. In any publications or presentations, we will not include any information that will make it possible to identify you as a subject. All data will be collected securely via FSU's Qualtrics online software. No identifiable data will be collected via Qualtrics. Email address and home address may be provided directly to the Principal Investigator for initial scheduling and/or for mailing study materials, but this information will be destroyed as soon as participant completes the study.

Voluntary Nature of the Study

Participation in this study is voluntary. Your decision whether or not to participate in this study will not affect your current or future relations with the University. If you decide to participate, you are free to withdraw at any time without affecting those relationships.

Contacts and Questions

The researchers conducting this study are Bruno Chiurliza and Dr. Thomas Joiner. You may ask any questions you have now, or if you have questions later, you are encouraged to contact them at [REDACTED].

If you have any questions or concerns regarding the study and would like to talk to someone other than the researcher(s), you are encouraged to contact the FSU IRB at telephone number [REDACTED]. You may also contact this office by email at [REDACTED], or by writing or in person at [REDACTED]. You will be given a copy of this form for your records.

Statement of Consent

I have read the above information I have asked questions and have received answers. I consent to participate in this study.

Signature of Subject Date

Signature of Investigator Date

APPENDIX D

DEBRIEFING FORM

The primary focus of this study is to determine the impact of two variables on lethal means counseling. Specifically, this study aimed to see if 1) providing a gun lock and instructional video and/or if 2) degree of familiarity with guns influenced individuals' self-reported engagement in lethal means safety, adherence to clinician recommendations regarding lethal means safety, and the degree to which individuals found lethal means counseling to be acceptable. In order to test this, we randomly assigned participants with elevated suicide risk and some firearm familiarity to one of two conditions: 1) a *psychoeducation with gun lock and instructional video* group and 2) a *psychoeducation without gun lock or instructional video* group.

How This Study Tested This Question

This study required you to provide various information. This included demographic information (e.g., age, race), information on firearm familiarity (e.g., ownership, access, intentions to obtain a firearm in the future), and mental health (e.g., symptoms of depression). After providing this information, you were administered a standardized suicide risk assessment to ensure you received a standard form of intervention that is indicated by supported practices. In addition, you received lethal means counseling in which the experimenter discussed with you firearm safety, according to the most recently establish standards. Finally, depending on your intervention group (of two possible groups), you may have received a gun lock and viewed an instructional video demonstrating its proper use. The gun lock and video were the only experimental manipulations in the study with one intervention group receiving them and the other not receiving them.

Statistical analyses will be used to compare the relative efficacy of these two groups regarding self-reported engagement in lethal means safety, adherence to clinician recommendations regarding lethal means safety, and the degree to which individuals found lethal means counseling to be acceptable. These comparisons will be made across the various time points at which those outcomes were observed.

Hypotheses and main questions

It is expected that individuals randomly assigned to the gun lock and instructional video condition, compared to the condition without the gun lock and video, will report greater engagement in firearm safety behaviors, will report greater intentions to adhere to clinician recommendations regarding firearm safety, and will find lethal means counseling to be more acceptable.

Why This Topic is Important to Study

Over 40,000 individuals die by suicide yearly in the United States of America. Of these deaths, about half are the result of intentional, self-inflicted gunshot wounds. In fact, 9 out of 10 individuals who attempt suicide with a firearm tragically die in this manner. In clinical settings, a primary focus of the assessment and management of suicide risk is to discuss firearm ownership/access and provide counseling regarding firearm safety (e.g., encourage an at-risk person to store their firearm with a gun lock, with the key stored in a separate room until risk abates). Unfortunately, we have not yet figured out exactly what to do in these assessment and management steps to make individuals more likely to engage in firearm safety behaviors. This study is important because it will help contribute to the findings that have been addressing this gap in suicide research and the broader clinical psychology literature.

How to Find Out More about This Study

To receive a report of this research when it is complete (or a summary of the findings), please contact Bruno Chiurliza (TEXT REDACTED). If you have any concerns about your rights as a participant in this experiment, please contact the FSU IRB Secretary at (TEXT REDACTED). Thank you again. We very much appreciate the time you took to participate in this study.

APPENDIX E

USEFUL RESOURCES

Counseling/Mental Health Services: If you feel that you have experienced some discomfort from participating in this study and you would like to talk to someone, please use one of the following resources:

Psychology Today Treatment Provider Locator

<https://www.psychologytoday.com/us/therapists>

National Suicide Prevention Lifeline

1 – 800 – 273 – 8255

SAMHSA Online Treatment Locator

<https://findtreatment.samhsa.gov/>

Firearm Safety Resources: If you would like more information on steps you can take to ensure you are storing your firearm safely with a cable lock, please refer to one of the following sources:

Washington County Sheriff's Office Website: written and illustrated instructions on how to use a cable gun lock on four different types of firearms can be found at

<http://www.wcso.net/data/childsafepdf>

Ramsey County YouTube Channel: audio and video instructions for how to use a cable gun lock are on three different types of firearms are provided by the Ramsey County Sheriff's Office at the following links:

1) Shotgun:

https://www.youtube.com/watch?v=q_R38jeOnFA&list=PLF277A6ED467FEF4B&index=11

2) Rifle:

<https://www.youtube.com/watch?v=ZkivrwrqHSo&list=PLF277A6ED467FEF4B&index=13>

3) Handgun:

<https://www.youtube.com/watch?v=UF7CsF19Yyo&index=12&list=PLF277A6ED467FEF4B>

APPENDIX F

STUDY SCRIPTS

Standardized Suicide Risk Assessment (Joiner et al., 1999; Chu et al., 2015)

Rather than following a script, the SRA portion of the study will follow the routinized, semi-structured format outlined by Joiner and colleagues (1999) and more recently updated by Chu and colleagues (2015). The template/format of the semi-structured interview utilized can be found at :

<https://psy.fsu.edu/~joinerlab/measures/Joiner%20Lab--Risk%20Assessment.pdf>

Safety Planning for Suicide Risk (Stanley & Brown, 2012)

Safety planning also followed a semi-structured format, rather than a more restricted script. The steps followed can be found in the Methods chapter of this document, but the template/format of the semi-structured safety planning can be found at:

https://suicidepreventionlifeline.org/wp-content/uploads/2016/08/Brown_StanleySafetyPlanTemplate.pdf

Psychoeducational Lethal Means Counseling Script (Stanley et al., 2020)

The following is the script read by the experimenter/clinician during the second part of the intervention phase of the experiment, across all participants, regardless of group:

“I want to first emphasize that guns are not necessarily unsafe. Many people know how to safely store, clean, and use firearms. And people own firearms for various reasons – protection, hunting, occupational responsibilities, etc. However, putting distance between you and firearms is important during times of distress and/or suicidal crises. The distance you place between yourself and firearms will be temporary until your distress or suicidal crisis decreases. There are a number of different steps that you can take to temporarily limit your access to a firearm. Steps could include applying a gun lock, separating the gun from its ammunition, dismantling the firearm and keeping its components locked and/or separated, or safely transferring the firearm to a trusted loved one. Again, I wish to emphasize that these steps are only temporary until you begin to feel

better emotionally. Once you feel better, and your risk for suicide decreases, then we can begin to remove some of the steps we put into place.”

Gun Lock Video Script

The script below is the script read in the instructional video for the proper use of the gun lock. The video was only filmed once and will be presented identically to all participants in the *Gun lock* intervention group. At the time of preparing this manuscript, the video is accessible on YouTube at the following link:

<https://youtu.be/jKzROoQANek>

The following is the script:

Welcome to this brief video on how to properly use your cable gun lock. In this video you'll learn how to use this cable lock on a revolver, on a semi-automatic pistol, on a semi-automatic rifle, and on a shotgun. But before you learn how to properly use your cable lock, here are some steps you must take prior to placing the lock on any gun. First, you must always verify that the gun is unloaded. Check your users manual to see how to make sure that your gun is unloaded. Next, you must make sure that your chamber is empty. Again you can check your users manual to see how to properly verify that your firearm's chamber is empty. Next, if your firearm has a safety feature, ensure that the safety is engaged. Refer to your users manual to see if your gun has a safety feature and how to engage it. Lastly, place your lock on a table or on another surface with the key inserted and the cable open so that it can be ready to be applied to any firearm as needed. Once you have verified that these steps are complete, you can place your lock on any gun now, using the steps shown in the rest of this video.

First, I'll show you how to use your gun lock on a revolver. Once you've ensured that your revolver is unloaded, the chamber is empty, the safety is engaged if available and that your lock is ready to go, these are the steps you must take. First, open the cylinder of your revolver like this, you will put the lock through this opening. Next, pass the cable through the opening as shown in the video. Securing the lock in this position will prevent the cylinder from being closed again this will prohibit the gun from being properly loaded or used while the lock is in place. Finally, insert the cable into the padlock portion of the lock, turn and remove the key and verify that the cable is secure.

Next, I'll show you how to use your gun lock on a semi-automatic pistol. Once you've ensured that your handgun is unloaded, the chamber is empty, the safety is engaged if available and that your lock is ready to go, these are the steps you must take. First, ensure that the slide is pulled back on your handgun as shown here so that the ejection port is exposed. Next, you will take the cable portion of the lock and insert it into the empty magazine well. Then you will pull the cable portion out of the ejection port as shown here. Next take the cable portion of the lock and re-insert it into the padlock portion of the lock turn the key, remove it, and verify that it is secure and you're done.

Next I'll demonstrate how to use your cable lock on a shotgun. Before we begin be sure that your shotgun is unloaded, the chamber is empty, the safety is engaged if available, and that the lock is ready to use. First, slide back the forend of your shotgun so that the ejection port and the insertion slot are exposed as shown here. Then take the cable portion of the lock and insert it into the ejection port and out through the insertion slot. Then, take the cable portion of the lock, place it into the padlock portion, turn the key, and remove it. Lastly, verify that the lock is secure.

Next, I'll show you how to use your cable lock on a semi-automatic rifle. Before we begin, make sure that your rifle is unloaded, that the chamber is empty, the safety is engaged if available, and that your lock is ready to go. First, pull back the charging hammer on your rifle, locking it into the open position. This should leave your ejection port exposed, as shown here in the video. Next, go ahead and insert the cable portion of the lock into the ejection port, and out through the empty magazine well, as shown here. Last, you'll insert the cable portion of the lock back into the padlock, remove the key, verify that the lock is secure and you're done.

Finally, regardless of the type of firearm you're using, here are some simple rules you must always follow when using your cable lock. Always keep every portion of the lock outside of your gun's trigger guard. Whenever placing your lock on a gun, always verify that it's securely locked in place when you're done. Never work your gun's action with the lock in place. This can damage the lock or your gun. And finally, if your lock's protective coating is damaged, please replace your lock immediately. Now you know how to properly use your gun cable lock on many types of guns.

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BIOGRAPHICAL SKETCH

Bruno Chiurliza is a doctoral candidate in Florida State University's Clinical Psychology PhD program. Bruno has been a graduate researcher working under the mentorship of Thomas E. Joiner, PhD since 2013, within The Laboratory for the Study and Prevention of Suicide-Related Conditions at Florida State University. During this time, he was also a student trainee within the Military Suicide Research Consortium, a national collaboration between DoD and civilian efforts to curb suicide through multidisciplinary research. At present, Bruno is completing his year-long pre-doctoral internship in Clinical Psychology within the Orlando Veteran Affairs Medical Center's APA-accredited internship program in Orlando, FL.

Bruno's primary research interests include the interpersonal theory of suicide, acquired capability for suicide, and suicide intervention research with an emphasis on lethal means counseling. Other areas of interest have included group differences (e.g., among at-risk groups, such as American Indian/Alaska Natives, Military Service Members, etc.) in acquired capability for suicide, and evolutionary approaches to suicide (e.g., considerations of the occurrence of eusocial behavior in nature across species).