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**MASCULINITY IDEOLOGY AS A MODERATOR ON THE EFFECTS
OF LETHAL MEANS COUNSELING AND DISTRIBUTION OF CABLE
LOCKS ON FIREARM STORAGE PRACTICES AMONG NATIONAL
GUARD PERSONNEL**

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MASCULINITY IDEOLOGY AS A MODERATOR ON THE EFFECTS OF LETHAL
MEANS COUNSELING AND DISTRIBUTION OF CABLE LOCKS ON FIREARM
STORAGE PRACTICES AMONG NATIONAL GUARD PERSONNEL

by

Samantha E. Daruwala

A Dissertation
Submitted to the Graduate School,
the College of Education and Human Sciences
and the School of Psychology
at The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy

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ABSTRACT

Safer firearm storage practices, which may reduce suicide risk, can be promoted by lethal means counseling (LMC). A recent trial found that providing a single LMC session or distributing cable locks can lead to sustained changes in firearm storage practices within a sample of firearm-owning National Guard personnel (Anestis et al., 2021). An important next step is to consider if the intervention effects may differ based on participant characteristics. One particularly relevant sociodemographic characteristic to consider is traditional masculine norms, which are evident in the military and firearm cultures and associated with several negative outcomes. The current study evaluated if overall adherence to masculinity ideology (1) is associated with firearm storage pre-intervention, (2) differentiates the effectiveness of receiving either intervention (LMC, cable locks) versus the control conditions, and (3) predicts storage changes over time among those who received the active interventions. For exploratory purposes, we examined three factors of masculinity ideology (Status, Toughness, Anti-Femininity) as predictors in our models. Results from our primary analyses did not support our hypotheses for Aims 1 and 3, suggesting that overall masculinity ideology is not associated with baseline firearm storage practices nor changes in firearm storage practices among those receiving LMC or cable locks. For Aim 2, all three-way interactions were probed regardless of statistical significance. Results suggest that neither intervention may be effective in changing rates of locking device use among those with high adherence to masculinity ideology, particularly in relation to the norms of Toughness and/or Anti-Femininity. This finding is particularly troubling given that high masculinity ideology is linked to several negative outcomes (e.g., reduced psychological

help-seeking) related to suicide risk; therefore, the interventions may not be reaching those who are at higher risk for firearm suicide. While additional research is needed, these findings provide preliminary support that the interventions may need to be modified (e.g., content, who delivers the interventions) to expand their reach to individuals who strongly adhere to masculinity ideology.

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DEDICATION

To my parents, Bela and Eruch Daruwala, who provided me with never-ending support and encouragement as I pursued my goals. Knowing that they believed in me and supported my path, no matter where it took me, got me through graduate school.

To Meena Patel – I wish you could be here to witness this final step in my graduate school career.

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CHAPTER I - INTRODUCTION

Firearms are considered the most lethal means for suicide (Miller et al., 2004; Vyrostek et al., 2004) and are the predominant method used in suicide deaths among United States (U.S.) military personnel (Department of Defense, 2021). The risk of suicide death is amplified when firearms are stored unsafely (Brent; 2001; Kellerman et al., 1992; Shenassa et al., 2004). Accordingly, reducing access to and/or increasing the safe storage of firearms, may reduce suicide risk. Safer firearm storage practices can be encouraged by lethal means counseling (LMC), which consists of discussing ways an individual can limit their access to a specific method for suicide. A recent randomized controlled trial (RCT), titled Project Safe Guard (PSG), found that the provision of a single LMC session or distributing cable locks can lead to sustained changes in firearm storage practices within a sample of firearm-owning National Guard personnel (Anestis et al., 2021). An important next step is to evaluate if the intervention effects vary across subgroups of the population based on individual characteristics. Such moderator analyses can help identify which subgroups of individuals the intervention is most (or least) suitable for and inform if the intervention needs to be modified to meet the needs of certain subgroups. One potential sociodemographic characteristic that may differentiate the observed treatment effects is adherence to traditional masculine norms. Such norms are evident within the military and firearm cultures and are associated with several negative behavioral and mental health outcomes (e.g., risk-taking behaviors, Courtenay, 2000). Accordingly, the current study will examine if masculinity ideology moderates the effectiveness of either intervention (i.e., LMC or cable locks) on firearm storage practices over time.

Firearms and Suicide Risk

Firearms are the predominant method used for suicide within the U.S.'s general and military populations, with approximately 90% of attempts with a firearm resulting in death (Conner et al., 2019). Multiple ecological, individual-level, and case-control studies have consistently demonstrated that firearm access increases the risk of suicide (see Studdert et al., 2020; Swanson et al., 2021 for a review), with one study finding the risk of suicide death is 300% greater for all household members in homes with a firearm (Anglemyer et al., 2014). Additional studies have shown that firearm ownership is associated with suicide death, even after accounting for a variety of covariates, such as demographic and geographic factors, psychopathology, and prior suicidal thoughts and behavior (Anestis & Houtsma, 2018; Miller et al., 2013; Miller et al., 2007; Miller et al., 2016; Miller et al., 2015, Opoliner et al., 2014). Furthermore, such findings indicate that the association between firearms and suicide is not better explained by higher rates of psychopathology in states with more firearms. Importantly, the risk of suicide death is amplified when firearms are stored unsafely (e.g., loaded and/or in a non-secure location; Brent; 2001; Kellerman et al., 1992; Shenassa et al., 2004).

The suicide rate within the U.S. military is particularly concerning given its rising trend. According to the Department of Defense (DoD), the annual suicide rates of Active Duty service members significantly increased from calendar year 2011 to 2020 (Department of Defense, 2021). Additionally, the suicide rate among U.S. military service members and veterans has been steadily increasing at a faster rate than that of the general population (Stone et al., 2018). Troublingly, service members are at significantly higher risk of dying by suicide by firearm compared to the U.S. population (Department

of Defense, 2021). The risk of firearm suicide may be particularly elevated amongst service members due to their extensive training with firearms during their military careers. Additionally, extant research suggests that service members may be more likely to store their firearms unsafely, which may further amplify their risk. In 2020, the DoD conducted the first-ever Quick Compass Survey of Active Duty Members to examine service members' firearm ownership and storage practices, beliefs and attitudes about safe storage methods, and misconceptions about firearms and suicide risk. Results of the survey suggest that among firearm-owning service members living on-installation, those who believed more misconceptions about firearms and suicide risk (e.g., suicide risk is not related to how a firearm is stored) were less likely to agree with and utilize safer firearm storage practices (Department of Defense, Office of People Analytics, 2020). These survey results are consistent with prior research indicating that firearm storage practices are associated with beliefs and attitudes about firearms and suicide risk (Anestis & Daruwala, 2020; Simonetti et al., 2018).

Khazem and colleagues (2015) found that service members who store their firearms loaded and in a non-secure location reported less fear of dying. In addition, service members who stored their firearms unsafely endorsed a stronger association between current suicidal ideation and self-reported likelihood of a future suicide attempt, a known risk factor for suicide. Another study found that among Active Duty military personnel presenting in primary care settings, almost one third of individuals with a firearm in or around the home stored their firearms unloaded and locked (Bryan et al., 2019). While individuals with recent thoughts about death or self-harm were less likely to have a firearm at home, safe storage practices were less common among those who had a

firearm at home and endorsed a lifetime history of suicide ideation or recent thoughts about death or self-harm (Bryan et al., 2019). Recently, Anestis and colleagues (2020) examined how firearm storage practices are associated with suicide risk factors in a large non-clinical military sample, the majority of which were National Guard members. Similar to previous findings (Bryan et al., 2019), individuals with lifetime suicide ideation were more likely to store their firearms unsafely (loaded and in a non-secure location). Additionally, current depressive symptoms and self-reported perceived likelihood of making a future suicide attempt were both associated with greater odds of unsafe storage practices (Anestis et al, 2020). Overall, these findings, coupled with the fact that personally owned firearms are used in nearly all military firearm suicides (Department of Defense, 2021), underscore how personal firearm access and storage play an important role in military suicides. Promoting strategies that limit access to and/or increase the safe storage of personal firearms, particularly during a crisis, may be beneficial for preventing suicide within the military. Given that safe storage practices of lethal means reduce suicide risk (Kellermann et al., 1992; Kposowa et al., 2016; Miller et al., 2013), it is unsurprising that suicide prevention efforts that focus on reducing access to and/or increasing the safe storage of lethal means, particularly firearms, are a top priority in the White House's Military and Veteran Suicide Prevention Strategy (The White House, 2021).

Promoting Safer Firearm Storage Practices to Reduce Suicide Risk

A plethora of research has shown that means safety, defined as efforts that limit access and/or increase the safe storage and use of lethal means for suicide, is an effective strategy for preventing suicide. Such efforts have demonstrated a 30 to 50% decrease on

the overall suicide rate in the implemented regions (Barber & Miller, 2014) and are useful for a variety of lethal means, such as the detoxification of gas (Kreitman, 1976). Firearm means safety can be promoted by utilizing lethal means counseling (LMC), which consists of discussing ways an individual can limit their access to a specific method for suicide. While LMC is considered a recommended best practice for suicide prevention, research examining its acceptability and effectiveness has been limited thus far (Barber & Miller, 2014).

In order to address this gap, a recent randomized controlled trial (RCT) by Anestis, Bryan, Capron, and Bryan (2021) entitled Project Safe Guard (PSG), evaluated if a single LMC session and/or distributing firearm locking devices (i.e., cable locks) promotes secure firearm storage over time (i.e., 3- and 6-months post-baseline) in a community sample of 232 firearm-owning National Guard members. Using a 2x2 factorial design, participants were randomized to receive (1) LMC versus an active control condition (i.e., health and stress program) and (2) cable locks versus no cable locks. LMC was provided by clinical psychology graduate student clinicians and based on a protocol previously implemented in military populations that uses a motivational interviewing approach (Britton et al., 2016; Bryan & Britton, 2015; Bryan et al., 2011). Specifically, the clinician guided a discussion with a participant that first explored potential methods for increasing firearm safety during or before a suicidal crisis. Then, the clinician reflected the participant's reasons for and against a chosen storage method and leveraged their own rationale for change as a method to increase behavior change. The identified plan was then written down and a copy was given to the participant.

The results of the study were largely consistent with hypotheses and demonstrated that individuals who received LMC or cable locks endorsed safer firearm storage practices over time. Specifically, service members who received LMC endorsed a significant increase in the mean number of safe firearm storage practices used over time ($M = 0.9$ at baseline vs. 1.3 at 6 months). Additionally, the rates of gun safe use (21.2% at baseline vs. 32.2% at 6 months) and locking device use (19.8% at baseline vs. 55.0% at 6 months) significantly increased over time amongst the LMC group. The proportion of individuals utilizing a locking device at 6 months was significantly higher amongst those who received LMC (55.0%) than the control condition (39.0%). Intervention effects were also observed amongst those who received cable locks. Specifically, the mean number of storage practices used ($M = 1.1$ at baseline vs. 1.4 at 6 months) and the rate of locking device use (27.1% at baseline vs. 58.4% at 6 months) significantly increased over time amongst those who received a cable lock. At 3 months, individuals in the cable lock group reported using a higher number of firearm storage practices ($M = 1.41$ vs. 1.11) than those in the control condition (i.e., no cable locks); however, the difference between groups was negligible at 6 months. Additionally, individuals in the cable lock group endorsed a higher rate of locking device use than those in the control condition at 3 months (59.8% vs. 29.9%) and 6 months (58.4% vs. 35.8%). Interestingly, the combination of receiving LMC and cable locks was not superior above and beyond either intervention alone (Anestis et al., 2021).

Overall, the findings from Anestis and colleagues (2021) are promising and suggest that providing LMC or a cable lock may be an effective intervention for promoting safe firearm storage practices among service members. An important next step

is to consider if the intervention effects may differ based on participant characteristics. Moderator analyses can identify if the intervention is effective for certain subgroups and ineffective for others (MacKinnon, 2011). Such analyses can inform which subgroup of individuals may benefit the most from an intervention and lead to specific recommendations. Additionally, moderator analyses can identify if certain subgroups of individuals are unlikely to benefit from the intervention in its current state and inform if the intervention needs to be tailored to increase its effectiveness (Gardner et al., 2010). One sociodemographic characteristic that may be particularly relevant to consider as a moderator is adherence to traditional masculinity, which is dominant within the U.S. firearm and military cultures and linked to firearm ownership (McDermott et al., 2021). Furthermore, adherence to traditional masculine ideology and norms has been linked to poorer physical and mental health outcomes (e.g., Mahalik et al., 2006; Mahalik et al., 2007; Wong et al., 2017). Safer firearm storage practices may be inconsistent with traditional masculine norms and ideology; therefore, adherence to traditional masculine ideology may buffer the effectiveness of LMC or the provision of cable locks on safe firearm storage practices.

Masculinity Ideology

According to Pleck (1995), masculinity ideology is defined as the individual's degree of internalization and endorsement of cultural belief systems about masculinity and the masculine gender role. While there are many different masculinity ideologies, theorists have argued that a common constellation of standards and expectations are associated with the traditional male role in Western society. This constellation is commonly referred to as traditional masculinity ideology (Pleck, 1995) and is viewed as

being a multidimensional construct (Levant & Williams, 2009). Traditional masculinity ideology and norms typically emphasize physical toughness, emotional stoicism, self-reliance, anti-femininity, homophobia, as well as a focus on success, power, and competition (Brannon & David, 1976; Mahalik et al., 2003; O'Neil et al., 1995; Thompson & Pleck, 1986). Masculinity ideology is viewed as being culturally and temporally defined, indicating that different masculine ideologies exist and are influenced by times, places, and groups (Connell, 1995; Connell & Messerschmidt, 2005; Kimmel, 1997; Rowbottom et al., 2012; Thompson & Bennett, 2015). Since masculinity is socially constructed, both men and women can adhere to traditional masculinity ideology and norms (Parent & Smiler, 2013). Further, adherence to masculine norms may be stronger in individuals who identify with certain groups or cultures that emphasize masculinity (Houtsma, 2020). For example, the military culture is typically characterized as a “masculine-warrior” culture (Dunivin, 1994) and the military may socialize service members to conform to traditional masculine ideals (Abraham et al., 2017). In addition, several have argued that the American gun culture emphasizes masculine ideals (e.g., Melzer, 2009; O'Neill, 2007). Importantly, researchers argue that masculinity must be achieved and continually maintained (Bosson et al., 2009; Bosson & Vandello 2011; Kimmel 2008; Vandello et al., 2008). In other words, individuals, particularly men, may need to perform or demonstrate their masculinity (e.g., avoid disclosing distress and displaying emotions, engaging in aggressive and/or risky behaviors).

Masculinity and Firearm Ownership

A small but growing body of literature has examined the links between firearm ownership and masculinity, with several studies arguing that firearms serve as a symbol

of masculinity (Connell, 1995; Gibson, 1994; Melzer, 2009) and that firearm owners view firearm ownership as an expression of masculine values, like strength and independence (O'Neill, 2007; Stroud, 2012; Cukier & Sheptycki, 2012). Some researchers also posit that men carry firearms as a way for them to demonstrate their masculine identity, particularly as protectors of the family (Baker, 2005; Carlson, 2015). This aligns with research showing that the majority of American firearm owners report that they own a firearm for protection/defense (Parker et al., 2017; Siegel & Boine, 2020). In support of this, Warner and colleagues (2021) found that higher endorsement of stereotypical masculine ideals were associated with higher odds of owning a firearm for protection for both men and women. Further, they found that, among non-firearm owners, masculine role attitudes were associated with self-reported likelihood of acquiring a firearm in the future for men and women.

To better understand the association between carrying a concealed firearm and masculinity, Stroud (2012) conducted 20 in-depth interviews with men residing in Texas who held a concealed handgun license. Three main themes were identified as explanations for why men wanted to carry concealed handguns in public: to protect their wives and children from violent crime, to compensate for lost physical strength due to age, and to protect themselves in situations (people, places) they perceive as dangerous. These themes are associated with the traditional masculine norms of strength, dominance, and self-reliance (Stroud, 2012). Overall, Stroud (2012) argues that part of the appeal for men to carry a concealed handgun may be that it allows them to identify with hegemonic masculinity (i.e., a dominant view of masculinity ideology that consists of behaviors and beliefs that legitimize and maintain men's dominance over women; American

Psychological Association, Boys and Men Guidelines Group, 2018; Connell & Messerschmidt, 2005) by imagining violence and self-defense. Relatedly, McDermott and colleagues (2021) found that firearm ownership among men and women was positively predicted by masculine norms of violence (i.e., beliefs and preferences excusing violence), risk-taking, and power over women (i.e., a preference for traditional, patriarchal male dominance over women). Importantly, the relationship between masculinity and firearms is not limited to male firearm owners. Houtsma (2020) found that female firearm owners endorsed higher adherence to masculine norms than their male counterparts. Additionally, masculine themes are evident in women's reasons for carrying a concealed firearm. Stroud (2016) interviewed 16 women with concealed carry permits and noted that many women felt firearms were empowering and made them feel less vulnerable. When considering all of the interviews, Stroud (2016) concluded that both male and female concealed carry holders embrace the cultural ideal of personal responsibility, which aligns with the masculine norm of self-reliance.

Firearm ownership may also be used by men to reinforce their gender role when it is threatened. In support of this, findings from a recent study suggests that threatening a man's masculinity is associated with higher interest in owning firearms (Borgogna et al., 2022). Carlson (2015) conducted a qualitative study with 60 male firearm carriers in Michigan and concluded that, in the face of economic threat, men may use firearm ownership to symbolically demonstrate their masculine identity as protectors of their families. Similarly, Cassino and Besen-Cassino (2020) found that firearm sales increase when economic conditions worsen for men and that higher levels of perceived masculinity threat were associated with less support for gun control measures. Overall,

these findings provide further evidence that firearms may serve as a way for men to demonstrate their masculinity and challenge masculine insecurities

Taken together, there is theoretical and empirical support demonstrating that adherence to traditional masculinity ideology and norms is linked to firearm ownership for men and women. Firearm ownership may be a way for individuals to demonstrate and maintain their masculinity. It may be that limiting access to firearms through safer firearm storage practices is viewed as challenging an individual's masculine ideals and identity.

Masculinity and Firearm Storage Practices

While research suggests that males tend to store their firearms less securely (Parker et al., 2017; Hamilton et al., 2018), there is surprisingly little research examining the impact of adherence to masculinity ideology and norms on firearm storage practices. To our knowledge, there is only one study by Houtsma (2020), which found that firearm owners with stronger adherence to masculine norms endorsed less safe firearm storage practices. Therefore, the patterns between adherence to masculinity ideology and other protective behaviors may be particularly relevant to consider. Individuals who have a stronger adherence to masculine norms appear to be more unwilling to engage in protective behaviors, such as getting a physical exam, seeing a professional for a medical problem, or taking vitamin supplements (Levant et al., 2009). Additionally, traditional masculinity is associated with a variety of health risk behaviors, including increased substance use (Blazina & Watkins, 1996; Mahalik et al., 2003; Neff et al., 1991; Pleck et al., 1994), reckless driving (Schmid et al., 2008), coronary-prone behavior (Watkins et al., 1991), and high-risk sex without a condom (Noar & Morkoff, 2002; Levant et al.,

2009). Similarly, Mahalik and colleagues (2006) found that greater conformity to traditional masculine norms was associated with lower levels of health-promoting behaviors, like being less likely to buckle a safety belt, and lower likelihood of being cautious and avoiding risky situations due to concerns of getting hurt. Individuals who identify with masculine norms may view engaging in protective behaviors like safe firearm storage as a sign of weakness or vulnerability that does not align with their masculine view (Houtsma, 2020).

Current Study

Limiting firearm access and storage may play an important role in preventing suicide, particularly within the military. A recent RCT suggests that providing service members with a single LMC session or distributing cable locks may promote safer firearm storage practices over time. However, it is currently unclear if the interventions are equally effective for all who receive them or if the effects differ across subgroups. Adherence to traditional masculinity, which is associated with firearm ownership and lower levels of health-protective behaviors, may be especially important to consider as a treatment moderator. Accordingly, the current investigation will utilize data from PSG (Anestis et al., 2021) to examine the potential impact of masculinity ideology on the effectiveness of each intervention on firearm storage practices over time. In an effort to add to the limited research base, we will first examine if masculinity ideology is associated with firearm storage practices pre-intervention. It is hypothesized that individuals who endorse higher levels of overall masculinity ideology will engage in less safe storage practices at baseline. Second, we will examine if masculinity ideology is associated with differences in the effect of receiving each intervention (i.e., LMC vs.

H&S or cable locks vs. no cable locks) on storage practices over time. We hypothesize that the effectiveness of each intervention relative to control will be moderated by masculinity ideology, such that differences between conditions on storage behavior changes during follow-up will be smaller among those with higher levels of overall masculinity ideology. Third, we will examine if masculinity ideology predicts storage changes over time among those who received the intervention conditions. We hypothesize that individuals who endorse higher levels of overall masculinity ideology will make less storage changes over time. Masculinity ideology can be examined as a universal or multidimensional construct (Levant et al., 2007; Levant & Williams, 2009). Accordingly, exploratory analyses will examine if three factors of masculinity ideology independently serve as predictors in each of our models.

It is important to note that other factors may confound or better explain the proposed moderation effect. For example, greater endorsement of traditional masculinity ideology has been found to be associated with sex, age, marital status, education, religious activity, race, and ethnicity (see Levant et al., 2007 for a review). These demographic variables could, in theory, better explain the proposed relationships. Therefore, it is necessary to consider including such variables in the models to parse out the true effect of masculinity. Reasons for owning a firearm may also play a role in the proposed model. As mentioned earlier, the majority of American firearm owners report that they own a firearm for protection/defense (Parker et al., 2017; Siegel & Boine, 2020), and protecting oneself and one's family is a stereotypical masculine trait (Kruger & Nesse, 2006; Cukier & Sheptycki, 2012). Protective ownership may be the mechanism through which masculinity impacts the effects of lethal means counseling or,

alternatively, self-reported masculinity may simply serve as a proxy measure of protective ownership. Demonstrating an independent effect of masculinity above this potential confound would thus provide greater evidence for a meaningful and independent role for masculinity itself. It also may be that environmental factors, like perceived neighborhood safety and region (i.e., urban, suburban, rural), contribute to firearm ownership and willingness to change storage practices. Thus, we will examine the impact of masculinity ideology above and beyond these variables in our models. Variables will only be considered in the models as covariates if they are statistically associated with both overall masculinity ideology and the storage practice of interest at baseline (pre-intervention).

Overall, the current study will address a gap in the literature by examining the impact of masculinity ideology on firearm storage practices. Results consistent with hypotheses would suggest that individuals who endorse stronger masculinity ideology may utilize less secure firearm storage practices and be less responsive to LMC or receiving cable locks. This would highlight the need to further modify LMC as a primary suicide prevention approach for firearm-owning service members.

CHAPTER II – METHOD

Participants

The current study utilized archival data from Project Safe Guard (PSG; Anestis, Capron, Bryan, & Bryan, 2021), a longitudinal RCT of lethal means counseling for firearm-owning members of the Mississippi (MS) National Guard. A total of 232 firearm-owning National Guard service members ($M_{\text{age}} = 35.01$; 87.5% male; 76.3% White) were recruited.

Procedure

All relevant regulatory approvals were received prior to the onset of the trial. Participants were recruited online and at in-person events, with the majority being recruited via in-person events at military installments (e.g., post-deployment Yellow Ribbon Events, Soldier Readiness Processing Events). Potential participants were informed the study was examining health and home safety within the National Guard. Individuals were eligible to participate in the study if they endorsed (1) currently being in the MS National Guard, (2) owning at least one firearm, and (3) being between the ages of 18 and 64 years¹. Study eligibility was assessed by having interested service members complete a screening questionnaire. Eligible individuals were then directed to schedule an in-person baseline appointment at the University of Southern Mississippi (USM). Informed consent and privacy practices were reviewed with participants at baseline. After providing informed consent, participants completed two structured interviews assessing lifetime psychopathology and suicidal thoughts and behaviors and a series of self-report questionnaires. Participants were then randomized to receive one of four interventions:

¹ Age limit was set to 18-64 because additional approvals would be required for recruiting older adults (65+ years).

(1) lethal means counseling only (2) lethal means counseling plus cable locks (3) active control only or (4) active control plus cable locks. Randomization was stratified by gender and prior history of suicidal ideation. After the intervention, participants completed a second series of self-report questionnaires evaluating their openness to safe firearm storage and outcomes discussed in the control condition (e.g., exercise, sleep, diet, stress management).

Follow-up interviews were conducted in-person or over the phone at 3 and 6 months after the baseline visit. At both follow-ups, participants completed the same structured interviews assessing psychopathology and suicidal thoughts and behaviors in the past 3 months and self-report questionnaires administered at baseline. At the conclusion of the 6-month follow up, all participants were offered the other intervention conditions they did not receive at baseline (i.e., lethal means counseling, active control, cable locks). Participants received Amazon gift cards for every appointment they completed; \$50 at baseline and \$75 at each follow-up.

Measures

The following measures were administered to participants at baseline (pre-intervention), 3 months and 6 months post-baseline.

Demographics

Basic (e.g., age, gender, ethnicity, etc.) and military-specific (e.g., branch, rank, etc.) demographics were assessed through a series of questions utilized in the Military Suicide Research Consortium common data elements. For the purposes of the current study, only demographic information collected at baseline was utilized.

Masculinity Ideology

The Male Role Norms Scale (MRNS; Thompson & Pleck, 1986) is 26-item self-report measure that assesses endorsement of masculine role norms. The MRNS is an abbreviated version of the Brannon Masculinity Scale Short Form (BMS-SF; Brannon & Juni, 1984). For each item, participants rate their level of agreement about men's expected behaviors using a Likert scale ranging from 1 (*Very Strongly Disagree*) to 7 (*Very Strongly Agree*). Thompson and Pleck (1986) identified three dimensions of masculinity ideology through factor analysis: Status (i.e., men should achieve status and others' respect), Toughness (i.e., expectation that men should be self-reliant and emotionally and physically tough), and Anti-Femininity (i.e., men should avoid stereotypically feminine behaviors). Researchers using the MRNS have utilized the total score as a measure of traditional masculinity ideology (e.g., Blazina et al., 2007; Good et al., 1995; Jakupcak et al., 2002; Jakupcak et al., 2005; Kilianski, 2003; Magovcevic & Addis, 2008; Sinn, 1997; Thompson & Whearty, 2004) while others have examined the subscales individually (e.g., Bruch, 2007; Leone & Parrott, 2015; Norton et al., 2016). The total score will be utilized for the primary aims while the three subscale scores will be used for exploratory aims. Within the current sample, the internal consistency (i.e., Cronbach's alpha) for the total score was .88. The internal consistency for the three subscales ranged from .73 to .82.

Firearm Storage Practices

Current firearm storage practices at each time point were assessed using items developed by the research team. Participants endorsed dichotomously (*Yes/No*) if they the used three of the following firearm storage practices: storing firearms in a gun safe, using a locking device when the firearm is not in use, and store firearms unloaded. If multiple

firearms were owned, participants were instructed to select the response that reflected the least secured firearm. For example, if a participant owned multiple firearms and one was stored unlocked, they were instructed to select the “unlocked” response.

Reason for Firearm Ownership

Participants were asked to identify their primary reason for owning a firearm. Options included: personal safety at home, personal safety away from home, recreational purposes (e.g., hunting), basic interest (e.g., maintaining a collection of memorabilia), the gun(s) is/are a family heirloom, expression of freedom, and other with the option to specify. Consistent with prior research (Bryan et al., 2020; Butterworth et al., 2020), “personal safety at home” and “personal safety away from home” were categorized as protective ownership and the other responses were categorized as non-protective ownership. For the other text response option, responses were categorized as protective ownership if they specifically mentioned protection and/or safety (e.g., “recreational and personal safety”).

Perceived Neighborhood Safety

Perceived neighborhood safety was assessed by using an item developed by the research team [“How safe do you feel in your current living situation (e.g., risk of violent crime in your immediate neighborhood)?”]. Participants rated their perceived safety using a 5-point Likert scale ranging from 0 (*very unsafe*) to 4 (*very safe*).

Rurality

Participants were asked to report the zip code of their current living area. Population density (people per square mile) was calculated based on zip codes using the zipcodeR package in R (Rozzi, 2021). Rurality was classified as non-metropolitan rural

(i.e., population density less than 500), metropolitan rural (i.e., population density between 500 and 2,499), or urban (i.e., population density of 2,500 or more) using the thresholds of the US Census Bureau and US Department of Agriculture.

Religious Activity

Religious activity was assessed using an item designed by the research team. Participants were asked to rate their frequency of attending religious services in a month. Response options ranged from 0 (*Never*) to 4 (*10+ times*).

Data Analytic Plan

Analyses used a similar data analytic plan as the primary PSG paper (Anestis et al., 2021). All hypotheses were evaluated using intent-to-treat analyses, which included all participants who were enrolled and randomized to a condition. The primary outcome for all analyses was firearm storage practices, which was modeled as a count variable that reflects the sum total of the three firearm storage practices (i.e., gun safe, locking device, unloaded). In addition, we examined each firearm storage practice individually as binary outcomes. The total score of the MRNS was used as a measure of overall masculinity ideology for all main analyses.

For the first aim, a Poisson regression was utilized to examine if masculinity ideology is associated with the degree of firearm storage practices at pre-intervention. Adjusted incidence rate ratios (IRRs) and 95% confidence intervals were calculated to provide information about the relative increase in frequency of storage practices utilized for one unit change in the predictor variable. The robust variance estimator was used to correct for underestimation of standard errors. Three logistic regressions were also

conducted to examine masculinity ideology's association with each storage practice independently.

The second and third aims were evaluated using a series of generalized linear mixed modeling (GLMM) analyses with a random intercept, nesting of repeated assessments within participants, and a sandwich variance estimator. A Satterthwaite approximation was used to minimize Type I error rates (Luke, 2016). For the second aim, eight GLMMs were used to examine if there is an interaction effect between each intervention group ([1] LMC vs. H&S, [2] cable locks vs. no cable locks) and masculinity ideology on firearm storage practices over time. For each intervention group, a total of four GLMMs were conducted to examine the four outcome variables. Intervention group (active condition vs. control), masculinity ideology, time (baseline, 3 months, 6 months), intervention x time, intervention x masculinity ideology, time x masculinity ideology, and intervention x time x masculinity ideology were entered as the independent variables in the models. The interventions were considered in isolation rather than in combination due to results from the primary PSG paper (Anestis et al, 2021), which demonstrated that although each intervention was effective in prompting storage behavior changes, the combination of the two offered no significant benefit above and beyond the provision of either intervention alone. To aid interpretation of the three-way interaction, separate plots of the intervention x time interaction were created at low, medium, and high levels of masculinity ideology based on the estimated means. Masculinity ideology scores were categorized based on frequency distribution into three equal width intervals of 33.33%: low ($\leq 33.33\%$), medium ($> 33.33\%$ and $< 66.66\%$), and high ($\geq 66.66\%$). All three-way interactions were further probed, regardless of statistical significance. Post hoc least

significant difference (LSD) tests were used to identify significant differences between and within groups over time.

For the third aim, eight additional GLMMs were utilized and restricted to individuals who received LMC and those who received cable locks. Masculinity ideology, time, and masculinity ideology x time were entered as independent variables into the models. For all GLMMs, continuous predictor variables were mean centered based on the sample of interest.

In total, the primary aims consisted of 20 analyses. Due to the multiple comparisons, Benjamini-Hochberg's correction (Benjamini & Hochberg, 1995) was utilized to control the false discovery rate, defined as the proportion of incorrectly rejected null hypotheses (i.e., false positives). The Benjamini-Hochberg correction procedure is more powerful than the conservative Bonferroni procedure (An, 2010; Benjamini & Hochberg, 1995), which corrects the family-wise error rate and can lead to a higher probability of Type II errors (i.e., false negatives) (Perneger, 1998). The Bonferroni procedure controls the overall probability of making at least one false discovery by using the same criterion for all tests. In comparison, the Benjamini-Hochberg correction utilizes a different criterion for each ranked test result, rather than all tests, in an attempt to control the rate of false positives. Further, unlike the Bonferroni procedure, the Benjamini-Hochberg correction does not result in reduced power when the number of hypotheses increases and has a lower probability of Type II error. For the current study, the false discovery rate was set at .10.

For exploratory purposes, we examined the three factors of masculinity ideology (Status, Anti-Femininity, Toughness) as separate predictors in all our models. In total, the

exploratory aims consisted of 52 analyses. Again, the Benjamini-Hochberg correction was applied with a false discovery rate of .10.

Selection of Covariates

Covariates were selected by conducting zero-order correlations, chi-square analyses, and ANOVAs examining significant differences ($p < .05$) in demographic (i.e., gender, age, marital status, education, religious activity, race, and ethnicity) and environmental (i.e., reason for firearm ownership, perceived neighborhood safety, and rurality) variables among the moderator and outcome variables within the sample of interest. When the assumption of homogeneity of variance was not met, Welch's adjusted F ratio was utilized for ANOVAs. Variables were only included in the models as covariates if they were statistically associated with both overall masculinity ideology and the storage practice of interest at baseline (pre-intervention). For Aims 1 and 2, covariates were identified by examining significant differences among the overall sample. For Aim 3, covariates were identified by examining significant differences among the LMC subgroup and the cable locks subgroup.

Power Analysis

When the study by Anestis et al. (2021) was designed, a priori power and sample size estimates were calculated using GPower (Faul et al., 2007). A total sample of 200 participants, or 50 per condition, was deemed necessary in order to detect a minimum odds ratio of 2.5 between treatment conditions with 80% power and alpha of .05. An additional 8 individuals per condition were recruited to account for attrition over follow-up. In total, 232 participants were enrolled and randomized to a condition. The primary RCT was underpowered to examine if the combined effect of both interventions, LMC

and cable locks, was superior to either intervention alone. The current study shares the same issue of statistical power with respect to detecting the three-way interaction of interest in Aim 2.

CHAPTER III – RESULTS

Demographic information for the sample is provided in Table 1. Descriptive data for variables of interest are provided in Table 2. Attrition rates were low at both follow-ups (7.3% from baseline to 3-month, 9.1% from baseline to 6-month, 2.3% from 3 month to 6-month). Due to low cell counts, the following variables were dichotomized for all subsequent analyses: race (White vs. Non-White) and rurality (non-metropolitan rural vs. metropolitan rural or urban).

Table 1 *Sample Demographics*

	Overall (<i>N</i> = 232)	Lethal Means Counseling (<i>N</i> = 114)	Health & Safety (<i>N</i> = 118)	Cable Lock (<i>N</i> = 117)	No Cable Lock (<i>N</i> = 115)
	% (n)	% (n)	% (n)	% (n)	% (n)
Age, Mean (SD)	35.01 (10.23)	36.00 (10.54)	34.06 (9.88)	36.01 (10.63)	34.00 (9.75)
Gender					
Male	87.5 (203)	86.8 (99)	88.1 (104)	89.7 (105)	85.2 (98)
Female	12.5 (29)	13.2 (15)	11.9 (14)	10.3 (12)	14.8 (17)
Race					
White	76.3 (177)	75.4 (86)	77.1 (91)	75.2 (88)	77.4 (89)
Black	21.6 (50)	20.2 (23)	22.9 (27)	21.4 (25)	21.7 (25)
Asian	0.4 (1)	0.9 (1)	--	0.9 (1)	--
Other	0.4 (1)	0.9 (1)	--	0.9 (1)	--
Biracial	1.3 (3)	2.6 (3)	--	1.7 (2)	0.9 (1)
Ethnicity					
Non-Hispanic/Latino	95.3 (221)	94.7 (108)	95.8 (113)	94.0 (110)	96.5 (111)
Hispanic/Latino	3.0 (7)	3.5 (4)	2.5 (3)	3.4 (4)	2.6 (3)
Marital Status					
Married	60.3 (140)	59.6 (68)	61.0 (72)	59.8 (70)	60.9 (70)
Unmarried	29.3 (68)	29.8 (34)	28.8 (34)	27.4 (32)	31.3 (36)
Divorced/Separated	10.3 (24)	10.5 (12)	10.2 (12)	12.8 (15)	7.8 (9)
Education					
High school diploma or equivalent	7.8 (18)	8.8 (10)	6.8 (8)	8.5 (10)	7.0 (8)
Some college, no degree	34.9 (81)	32.5 (37)	37.3 (44)	36.8 (43)	33.0 (38)
College Degree	43.5 (101)	43.9 (50)	43.2 (51)	41.9 (49)	45.2 (52)
Advanced Degree	13.8 (32)	14.9 (17)	12.7 (15)	12.8 (15)	14.8 (17)

Table 1 (continued)

Household Income					
Less than \$10,000	5.6 (13)	5.3 (6)	5.9 (7)	4.3 (5)	7.0 (8)
\$10,000 - \$24,999	10.8 (25)	12.3 (14)	9.3 (11)	10.3 (12)	11.3 (13)
\$25,000- \$49,999	14.2 (33)	14.0 (16)	14.4 (17)	12.0 (14)	16.5 (19)
\$50,000 - \$74,999	27.6 (64)	23.7 (27)	31.4 (37)	30.8 (36)	24.3 (28)
\$75,000 - \$99,999	19.0 (44)	21.1 (24)	16.9 (20)	17.9 (21)	20.0 (23)
\$100,000 or more	22.8 (53)	23.7 (27)	22.0 (26)	24.8 (29)	20.9 (24)
Rank					
Enlisted	60.8 (141)	64.0 (73)	57.6 (68)	63.2 (74)	58.3 (67)
Non-Commissioned Officer	12.1 (28)	8.8 (10)	15.3 (18)	12.8 (15)	11.3 (13)
Warrant Officer	3.0 (7)	2.6 (3)	3.4 (4)	3.4 (4)	2.6 (3)
Officer	22.8 (53)	23.7 (27)	22.0 (26)	19.7 (23)	26.1 (30)
Region					
Non-metropolitan rural	82.3 (191)	78.1 (89)	86.4 (102)	84.6 (99)	80.0 (92)
Metropolitan rural	12.9 (30)	14.9 (17)	11.0 (13)	9.4 (11)	16.5 (19)
Urban	2.2 (5)	3.5 (4)	0.8 (1)	2.6 (3)	1.7 (2)
Religious Services per Month					
Never	28.9 (67)	32.5 (37)	25.4 (30)	28.2 (33)	29.6 (34)
1-2 times	31.5 (73)	33.3 (38)	29.7 (35)	33.3 (39)	29.6 (34)
3-5 times	26.3 (61)	22.8 (26)	29.7 (35)	26.5 (31)	26.1 (30)
5-10 times	10.3 (24)	7.9 (9)	12.7 (15)	10.3 (12)	10.4 (12)
10+ times	3.0 (7)	3.5 (4)	2.5 (3)	1.7 (2)	4.3 (5)
Ownership Reason					
Protective	59.1 (137)	62.3 (71)	55.9 (66)	57.3 (67)	60.9 (70)
Non-Protective	40.9 (95)	37.7 (43)	44.1 (52)	42.7 (50)	39.1 (45)
Perceived Safety, Mean (SD)	3.30 (0.85)	3.28 (0.88)	3.32 (0.83)	3.42 (0.77)	3.18 (0.91)

Table 2 *Masculinity Ideology and Storage Practices by Condition*

	Overall	LMC	H&S	Cable Lock	No Cable Lock
	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
MRNS, Baseline^a					
Total	4.03 (0.79)	4.10 (0.74)	3.96 (0.84)	4.03 (0.80)	4.03 (0.79)
Status	4.54 (0.93)	4.59 (0.90)	4.49 (0.96)	4.54 (0.96)	4.54 (0.90)
Toughness	4.23 (1.00)	4.32 (0.92)	4.14 (1.07)	4.16 (1.01)	4.31 (1.00)
Anti-Femininity	3.00 (1.07)	3.09 (1.06)	2.92 (1.08)	3.07 (1.10)	2.93 (1.04)
No. Storage Methods					
Baseline	1.09 (1.01)	1.01 (1.03)	1.17 (0.99)	1.15 (1.02)	1.03 (1.00)
3 mo	1.34 (1.06)	1.41 (1.05)	1.28 (1.07)	1.49 (1.03)	1.21 (1.08)
6 mo	1.33 (1.08)	1.41 (1.08)	1.27 (1.07)	1.41 (1.09)	1.27 (1.06)
	% (n)	% (n)	% (n)	% (n)	% (n)
Gun Safe					
Baseline	31.0 (72)	26.3 (30)	35.6 (42)	32.5 (38)	29.6 (34)
3 mo	31.0 (72)	34.2 (39)	28.0 (33)	31.6 (37)	30.4 (35)
6 mo	30.7 (35)	30.7 (35)	30.7 (35)	30.8 (36)	29.6 (34)
Locking Device					
Baseline	28.4 (66)	25.4 (29)	31.4 (37)	32.5 (38)	24.3 (28)
3 mo	40.9 (95)	41.2 (47)	40.7 (48)	49.6 (58)	32.2 (37)
6 mo	45.6 (52)	45.6 (52)	45.6 (52)	47.0 (55)	35.7 (41)
Unloaded					
Baseline	49.6 (115)	49.1 (56)	50.0 (59)	50.4 (59)	48.7 (56)
3 mo	51.7 (120)	51.8 (59)	51.7 (61)	49.6 (58)	53.9 (62)
6 mo	47.4 (54)	47.4 (54)	47.4 (54)	43.6 (51)	53.9 (62)

Note: LMC = Lethal Means Counseling; H&S = Health and Safety; MRNS = Masculine Role Norms Scale. ^aMRNS total and subscale scores did not differ based on LMC condition nor cable lock condition.

Table 3 Demographic and environmental-related differences based on MRNS scales and storage practices pre-intervention

	Overall Sample (N = 232)							
	MRNS Total	MRNS Status	MRNS Toughness	MRNS Anti-Fem	No. Storage Methods	Gun Safe	Locking Device	Unloaded
Age	$r = -.04,$ $p = .541$	$r = -.05,$ $p = .485$	$r = -.08,$ $p = .239$	$r = .04,$ $p = .594$	$r = .03,$ $p = .686$	$F = 0.28,$ $p = .600$	$F = .08,$ $p = .778$	$F = 2.45,$ $p = .119$
Education	$r = -.13,$ $p = .041$	$r = -.13,$ $p = .041$	$r = -.12,$ $p = .064$	$r = -.06,$ $p = .401$	$r = .04,$ $p = .594$	$F = 0.34,$ $p = .558$	$F = 0.56,$ $p = .457$	$F = 0.02,$ $p = .889$
Religious Activity	$r = -.17,$ $p = .012$	$r = -.19,$ $p = .005$	$r = -.14,$ $p = .040$	$r = -.06,$ $p = .406$	$r = .20,$ $p = .002$	$F = 3.64,$ $p = .058$	$F = 1.85,$ $p = .175$	Welch $F = 10.16,$ $p = .002$
Neighborhood Safety	$r = -.12,$ $p = .061$	$r = -.08,$ $p = .213$	$r = -.14,$ $p = .038$	$r = -.08,$ $p = .217$	$r = .17,$ $p = .012$	$F = 1.10,$ $p = .296$	Welch $F = 10.72,$ $p = .001$	$F = 2.08,$ $p = .151$
Gender	Welch $F = 33.65,$ $p < .001$	$F = 7.61,$ $p = .006$	$F = 27.51,$ $p < .001$	$F = 14.42,$ $p < .001$	$F = 6.06,$ $p = .015$	$\chi^2 = 4.60,$ $p = .032$	$\chi^2 = 11.63,$ $p < .001$	$\chi^2 = 0.02,$ $p = .882$
Marital Status	Welch $F = 0.29,$ $p = .755$	$F = 1.60,$ $p = .204$	Welch $F = 0.22,$ $p = .801$	Welch $F = 0.58,$ $p = .562$	$F = 0.24,$ $p = .784$	$\chi^2 = 0.56,$ $p = .756$	$\chi^2 = 2.22,$ $p = .330$	$\chi^2 = 1.64,$ $p = .441$
Race	$F = 0.21,$ $p = .644$	$F = 5.67,$ $p = .018$	$F = 8.46,$ $p = .004$	$F = 2.06,$ $p = .153$	$F = 2.87,$ $p = .092$	$\chi^2 = 0.42,$ $p = .519$	$\chi^2 = 10.24,$ $p = .001$	$\chi^2 = 0.01,$ $p = .935$
Ethnicity	$F = 0.26,$ $p = .608$	$F = 0.88,$ $p = .350$	$F = 0.34,$ $p = .561$	$F = 0.24,$ $p = .626$	$F = 5.79,$ $p = .017$	$\chi^2 = 5.31,$ $p = .021$	$\chi^2 = 2.79,$ $p = .095$	$\chi^2 = 1.33,$ $p = .249$
Protective Ownership	$F = 0.33,$ $p = .568$	$F = 0.03,$ $p = .858$	$F = 1.62,$ $p = .204$	$F = 0.00,$ $p = .974$	$F = 2.71,$ $p = .101$	$\chi^2 = 0.19,$ $p = .661$	$\chi^2 = 0.36,$ $p = .549$	$\chi^2 = 11.88,$ $p < .001$
Rurality	Welch $F = 3.06,$ $p = .085$	Welch $F = 2.14,$ $p = .148$	Welch $F = 1.14,$ $p = .290$	$F = 1.80,$ $p = .181$	$F = 0.14,$ $p = .705$	$\chi^2 = .02,$ $p = .900$	$\chi^2 = 0.26,$ $p = .610$	$\chi^2 = .03,$ $p = .854$

Table 3 (continued)

LMC Subsample ($N = 114$)								
	MRNS Total	MRNS Status	MRNS Toughness	MRNS Anti-Fem	No. Storage Methods	Gun Safe	Locking Device	Unloaded
Age	$r = -.16,$ $p = .093$	$r = -.11,$ $p = .243$	$r = -.24,$ $p = .011$	$r = -.03$ $p = .766$	$r = .08,$ $p = .426$	$F = 0.00,$ $p = .952$	$F = 0.20,$ $p = .656$	$F = 1.42,$ $p = .235$
Education	$r = -.18,$ $p = .059$	$r = -.18,$ $p = .053$	$r = -.19,$ $p = .038$	$r = -.02,$ $p = .798$	$r = .045,$ $p = .637$	$F = 0.01,$ $p = .905$	$F = 2.53,$ $p = .115$	$F = 0.09,$ $p = .765$
Religious Activity	$r = -.23,$ $p = .015$	$r = -.20,$ $p = .033$	$r = -.26,$ $p = .006$	$r = -.07,$ $p = .461$	$r = .21,$ $p = .022$	$F = 4.85,$ $p = .030$	$F = 0.40,$ $p = .531$	Welch $F = 4.96,$ $p = .028$
Neighborhood Safety	$r = -.09,$ $p = .318$	$r = -.05,$ $p = .595$	$r = -.11,$ $p = .237$	$r = -.07,$ $p = .481$	$r = .19,$ $p = .039$	$F = 1.84,$ $p = .177$	Welch $F = 12.15,$ $p < .001$	$F = 0.49,$ $p = .486$
Gender	$F = 11.94,$ $p < .001$	$F = 4.03,$ $p = .047$	$F = 14.09,$ $p < .001$	$F = 5.93,$ $p = .016$	$F = 3.52,$ $p = .063$	$\chi^2 = 1.67,$ $p = .197$	$\chi^2 = 4.10,$ $p = .043$	$\chi^2 = 0.82,$ $p = .366$
Marital Status	$F = 1.58,$ $p = .211$	$F = 2.01,$ $p = .138$	$F = 2.41,$ $p = .094$	$F = 0.07,$ $p = .932$	$F = 0.75,$ $p = .474$	$\chi^2 = 2.26,$ $p = .323$	$\chi^2 = 2.10,$ $p = .351$	$\chi^2 = 0.08,$ $p = .960$
Race	$F = 0.10,$ $p = .758$	$F = 2.12,$ $p = .148$	$F = 3.80,$ $p = .054$	$F = 0.66,$ $p = .420$	$F = 6.52,$ $p = .012$	$\chi^2 = 3.22,$ $p = .073$	$\chi^2 = 5.94,$ $p = .015$	$\chi^2 = 2.00,$ $p = .158$
Ethnicity	$F = 1.00,$ $p = .320$	$F = 0.25,$ $p = .615$	$F = 0.96,$ $p = .329$	$F = 0.90,$ $p = .345$	$F = 2.11,$ $p = .149$	$\chi^2 = 1.14,$ $p = .286$	$\chi^2 = 1.26,$ $p = .262$	$\chi^2 = 1.11,$ $p = .291$
Protective Ownership	$F = .17,$ $p = .684$	$F = 0.01,$ $p = .936$	$F = 0.18,$ $p = .673$	$F = 0.55,$ $p = .459$	$F = 0.76,$ $p = .386$	$\chi^2 = 0.02,$ $p = .890$	$\chi^2 = 0.17,$ $p = .677$	$\chi^2 = 5.16,$ $p = .023$
Rurality	Welch $F = 1.74,$ $p = .195$	Welch $F = 0.64,$ $p = .429$	Welch $F = 0.66,$ $p = .421$	$F = 1.60,$ $p = .209$	$F = 0.08,$ $p = .774$	$\chi^2 = 0.13,$ $p = .715$	$\chi^2 = 0.01,$ $p = .931$	$\chi^2 = 0.11,$ $p = .737$

Table 3 (continued)

Cable Locks Subsample ($N = 117$)								
	MRNS Total	MRNS Status	MRNS Toughness	MRNS Anti-Fem	No. Storage Methods	Gun Safe	Locking Device	Unloaded
Age	$r = -.07,$ $p = .425$	$r = -.10,$ $p = .243$	$r = -.03,$ $p = .715$	$r = -.02,$ $p = .868$	$r = .01,$ $p = .920$	$F = 0.36,$ $p = .551$	$\text{Welch}F = 0.01,$ $p = .936$	$F = 0.47,$ $p = .495$
Education	$r = -.10,$ $p = .287$	$r = -.17,$ $p = .065$	$r = -.04,$ $p = .642$	$r = .01,$ $p = .884$	$r = -.02,$ $p = .859$	$F = 0.02,$ $p = .888$	$F = 0.01,$ $p = .922$	$F = 0.16,$ $p = .688$
Religious Activity	$r = -.28,$ $p = .002$	$r = -.26,$ $p = .004$	$r = -.20,$ $p = .033$	$r = -.20,$ $p = .033$	$r = .16,$ $p = .083$	$F = 0.88,$ $p = .350$	$F = 1.76,$ $p = .187$	$F = 2.02,$ $p = .158$
Neighborhood Safety	$r = -.07,$ $p = .481$	$r = -.06,$ $p = .539$	$r = -.06,$ $p = .531$	$r = -.04,$ $p = .690$	$r = .20,$ $p = .028$	$F = 1.10,$ $p = .296$	$F = 1.10,$ $p = .296$	$\text{Welch}F = 6.40,$ $p = .013$
Gender	$F = 9.47,$ $p = .003$	$F = 2.52,$ $p = .115$	$F = 11.33,$ $p = .001$	$F = 6.37,$ $p = .013$	$F = 1.54,$ $p = .217$	$\chi^2 = 0.52,$ $p = .473$	$\chi^2 = 1.87,$ $p = .171$	$\chi^2 = 0.33,$ $p = .563$
Marital Status	$F = 1.33,$ $p = .270$	$F = 3.26,$ $p = .042$	$F = 0.20,$ $p = .816$	$F = 0.34,$ $p = .715$	$F = 0.11,$ $p = .899$	$\chi^2 = 2.20,$ $p = .333$	$\chi^2 = 0.57,$ $p = .752$	$\chi^2 = 0.12,$ $p = .944$
Race	$F = 0.05,$ $p = .832$	$F = 3.66,$ $p = .058$	$F = 2.92,$ $p = .090$	$F = 0.06,$ $p = .801$	$F = 0.09,$ $p = .761$	$\chi^2 = 0.42,$ $p = .517$	$\chi^2 = 0.52,$ $p = .470$	$\chi^2 = 0.48,$ $p = .487$
Ethnicity	$F = 0.69,$ $p = .407$	$F = 0.90,$ $p = .346$	$F = 0.59,$ $p = .446$	$F = 0.02,$ $p = .887$	$F = 7.31,$ $p = .008$	$\chi^2 = 8.29,$ $p = .004$	$\chi^2 = 3.24,$ $p = .072$	$\chi^2 = 0.90,$ $p = .344$
Protective Ownership	$\text{Welch}F = 0.20,$ $p = .653$	$F = 0.16,$ $p = .688$	$F = 1.13,$ $p = .290$	$F = 0.26,$ $p = .611$	$F = 2.94,$ $p = .089$	$\chi^2 = 0.49,$ $p = .482$	$\chi^2 = 0.09,$ $p = .761$	$\chi^2 = 6.43,$ $p = .011$
Rurality	$F = 0.07,$ $p = .792$	$\text{Welch}F = 0.00,$ $p = .993$	$F = 0.25,$ $p = .618$	$F = 0.04,$ $p = .849$	$F = 1.74,$ $p = .189$	$\chi^2 = 0.06,$ $p = .800$	$\chi^2 = 0.74,$ $p = .389$	$\chi^2 = 2.59,$ $p = .108$

Note: Bold indicates $p < .05$; LMC = Lethal Means Counseling; MRNS = Male Role Norms Scale; Anti-Fem = Anti-Femininity.

Primary Analyses

Aim 1: Masculinity Ideology and Firearm Storage Practices Pre-Intervention

Selection of Covariates. See Table 3 for all comparisons. Within the overall sample, overall masculinity ideology was significantly associated with education ($r = -.13, p = .041$), religious activity ($r = -.17, p = .012$), and gender (Welch's $F[1, 42.12] = 33.65, p < .001$). Mean number of storage methods was significantly associated with religious activity ($r = .20, p = .002$), perceived neighborhood safety ($r = .17, p = .012$), gender ($F[1, 230] = 6.06, p = .015$), and ethnicity ($F[1, 226] = 5.79, p = .017$). Utilizing a gun safe at pre-intervention was significantly associated with gender ($\chi^2[1] = 4.60, p = .032$) and ethnicity ($\chi^2[1] = 5.31, p = .034$). Utilizing a locking device at pre-intervention was significantly associated with perceived neighborhood safety (Welch's $F[1, 148.59] = 10.72, p = .001$), gender ($\chi^2[1] = 11.63, p < .001$), and race ($\chi^2[1] = 10.24, p = .001$). Storing firearm(s) unloaded at pre-intervention was significantly associated with religious activity (Welch's $F[1, 221.82] = 10.16, p = .002$) and reason for ownership ($\chi^2[1] = 11.88, p < .001$). Based on these results, religious activity and gender served as covariates for the number of storage methods analysis, gender was included as a covariate for the analyses examining gun safe and locking device practices as outcomes, and religious activity served as the covariate for the unloaded storage outcome.

Firearm Storage Practices Pre-Intervention. A Poisson regression was utilized to examine if overall masculinity ideology was associated with number of storage methods at baseline when covarying for gender and religious activity (see Table 4). The overall model was significant ($\chi^2[3] = 13.65, p = .003$). Masculinity ideology was not statistically significant in the model (IRR = 0.99, $p = .869$).

A series of logistic regressions was conducted with gun safe, locking device, and unloaded storage practices pre-intervention serving as the outcome variables (Table 4). The overall model testing associations between masculinity ideology, gender, and gun safe use was non-significant ($\chi^2[2] = 4.33, p = .115$). The overall model testing associations between masculinity ideology, gender, and use of a locking device was significant ($\chi^2[2] = 11.28, p = .004$). Results indicated that masculinity ideology did not significantly predict use of a locking device pre-intervention ($AOR = 0.84, 95\% CI [0.57, 1.25], p = .390$). The overall model examining associations between masculinity ideology, religious activity, and unloaded storage was significant ($\chi^2[2] = 10.02, p = .007$). Results indicated that masculinity ideology did not significantly predict unloaded storage pre-intervention ($AOR = 0.99, 95\% CI [0.71, 1.39], p = .970$).

Table 4 *Regressions examining associations between masculinity ideology and storage practices*

	<i>B</i> (SE)	χ^2	<i>p</i>	IRR [95% CI]
No. Storage Methods				
Gender	0.39 (0.16)	6.23	.013	1.48 [1.09, 2.00]
Religious Activity	0.17 (0.05)	11.77	.001	1.18 [1.07, 1.30]
MRNS Total	-0.01 (0.08)	0.03	.869	0.99 [0.84, 1.15]
	<i>B</i> (SE)	Wald	<i>p</i>	OR [95% CI]
Gun Safe ^a				
Gender	-0.85 (0.43)	4.02	.045	2.35 [1.02, 5.42]
MRNS Total	0.01 (0.19)	0.00	.958	1.01 [0.69, 1.47]
Locking Device				
Gender	1.21 (0.43)	7.87	.005	3.34 [1.44, 7.75]
MRNS Total	-0.17 (0.20)	0.74	.390	0.84 [0.57, 1.25]
Unloaded				
Religious Activity	0.40 (0.13)	9.20	.002	1.48 [1.15, 1.92]
MRNS Total	-0.01 (0.17)	0.00	.970	0.99 [0.71, 1.39]

Note: Bold *p*-value indicates $p < .05$. ^aOmnibus test of model non-significant; MRNS = Male Role Norms Scale; IRR = Incidence Rate Ratio; OR = Odd Ratio; CI = Confidence Interval.

Aim 2: Masculinity Ideology, Intervention, and Firearm Storage Practices

The same covariates identified for Aim 1 were utilized. For each intervention condition, we utilized four GLMMs to examine the three-way interaction of condition, masculinity ideology (MRNS), and time on each firearm storage practice. For all GLMMs, continuous predictor variables were mean centered based on the sample of interest. Next, we probed the three-way interactions, regardless of statistical significance, by examining the Condition x Time interaction on each storage practice among those with low, medium, and high levels of masculinity ideology. The adjusted estimated means of firearm storage methods for each intervention group were compared using post hoc LSD tests to identify significant differences between and within groups over time at

low, medium, and high levels of masculinity ideology. Effect sizes (*d* or *OR*) and confidence intervals were calculated for significant between group differences. Due to low frequencies of females within the sample, gender was not included as a demographic covariate when examining the two-way interaction of condition and time for medium and high levels of MRNS.

Lethal Means Counseling. The three-way interaction of MRNS x Condition x Time was non-significant for number of storage methods, gun safe use, locking device use, and unloaded storage, indicating that the effect of time on the relationships between LMC condition and each storage practice were not conditional upon levels of masculinity ideology ($ps > .05$; Table 5).

Despite the non-significant results, we probed the three-way interactions. With regard to locking device use, the two-way interaction of LMC condition and time was significant at medium ($F[2, 228] = 3.19, p = .043$) levels of masculinity ideology only (Table 5). Within group comparisons demonstrated that among those with medium levels of masculinity ideology, the rate of locking device use significantly increased over time among those who received LMC ($F[2,228] = 18.00, p < .001$; Table 6). The two-way interaction of LMC condition and time on number of storage methods, gun safe use, and unloaded storage was non-significant at low, medium, and high levels of masculinity ideology ($ps > .05$; Table 5). Figure 1 illustrates the effects of LMC vs. H&S and time based on low, medium, and high levels of masculinity ideology.

Several within and between group differences were identified despite the non-significant two-way interactions (Table 6). In the LMC group, the mean number of storage methods used significantly increased over time among those with low ($F[2, 209]$

= 3.75, $p = .025$) and medium ($F[2, 227] = 4.84, p = .009$) levels of masculinity ideology. Additionally, individuals with low levels of masculinity ideology who received LMC endorsed a significant increase in locking device use over time ($F[2, 210] = 5.76, p = .004$). In the H&S group, the rate of storing unloaded increased over time among individuals with low levels of masculinity, ($F[2, 210] = 3.77, p = .025$); post hoc LSD comparisons revealed that the difference was only significant at 6 months compared to baseline ($t[210] = 2.73, p = .007$). Additionally, gun safe use significantly decreased from baseline to 3 months ($t[210] = -2.42, p = .016$) among those with low levels of masculinity ideology who received the H&S intervention. Between group comparisons revealed that, among individuals with low levels of masculinity ideology, those who received LMC endorsed higher mean number of storage methods at 3 months ($M = 1.63$ vs. 1.14; $d = 0.51, 95\% \text{ CI } [0.04, 0.98], p = .041$) and higher rates of locking device use at 6 months (69.0% vs. 38.9%; $\text{OR} = 3.50, 95\% \text{ CI } [1.28, 9.52], p = .041$) than those in the H&S condition.

Table 5 Fixed effects for GLMM examining masculinity ideology as a moderator.
Intervention = Lethal Means Counseling vs. Health & Safety

	Fixed Effects for 3-Way Interaction							
	No. Storage Methods ^a		Gun Safe ^b		Locking Device ^b		Unloaded ^c	
	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>
Condition	0.21	.644	0.05	.823	0.15	.696	0.29	.588
Time	9.16	<.001	0.46	.633	16.98	<.001	1.73	.178
MRNS Total	1.46	.228	0.00	.997	2.56	.111	1.27	.260
Condition x Time	3.22	.041	4.42	.012	3.25	.039	0.18	.839
MRNS x Condition	0.83	.436	2.11	.122	0.05	.948	0.81	.447
MRNS x Time	0.47	.494	0.00	.999	2.58	.110	0.03	.857
MRNS x Condition x Time	1.27	.281	0.30	.744	1.21	.298	1.46	.234

	Fixed Effects for Low, Medium, and High Levels of MRNS Total							
	No. Storage Methods		Gun Safe		Locking Device		Unloaded	
	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>
Low								
Condition	2.46	.123	0.17	.685	2.73	.104	2.01	.162
Time	4.17	.017	0.73	.483	5.76	.004	2.79	.064
Condition x Time	0.85	.430	2.75	.066	0.69	.501	0.73	.481
Medium^d								
Condition	0.44	.511	0.06	.807	0.02	.876	1.22	.273
Time	4.04	.019	0.08	.928	13.35	<.001	1.11	.331
Condition x Time	2.81	.062	1.36	.259	3.19	.043	0.39	.680
High^d								
Condition	0.01	.918	0.10	.752	1.44	.234	0.46	.500
Time	1.84	.161	0.89	.411	1.45	.236	0.17	.846
Condition x Time	0.72	.490	0.93	.398	1.67	.192	0.55	.579

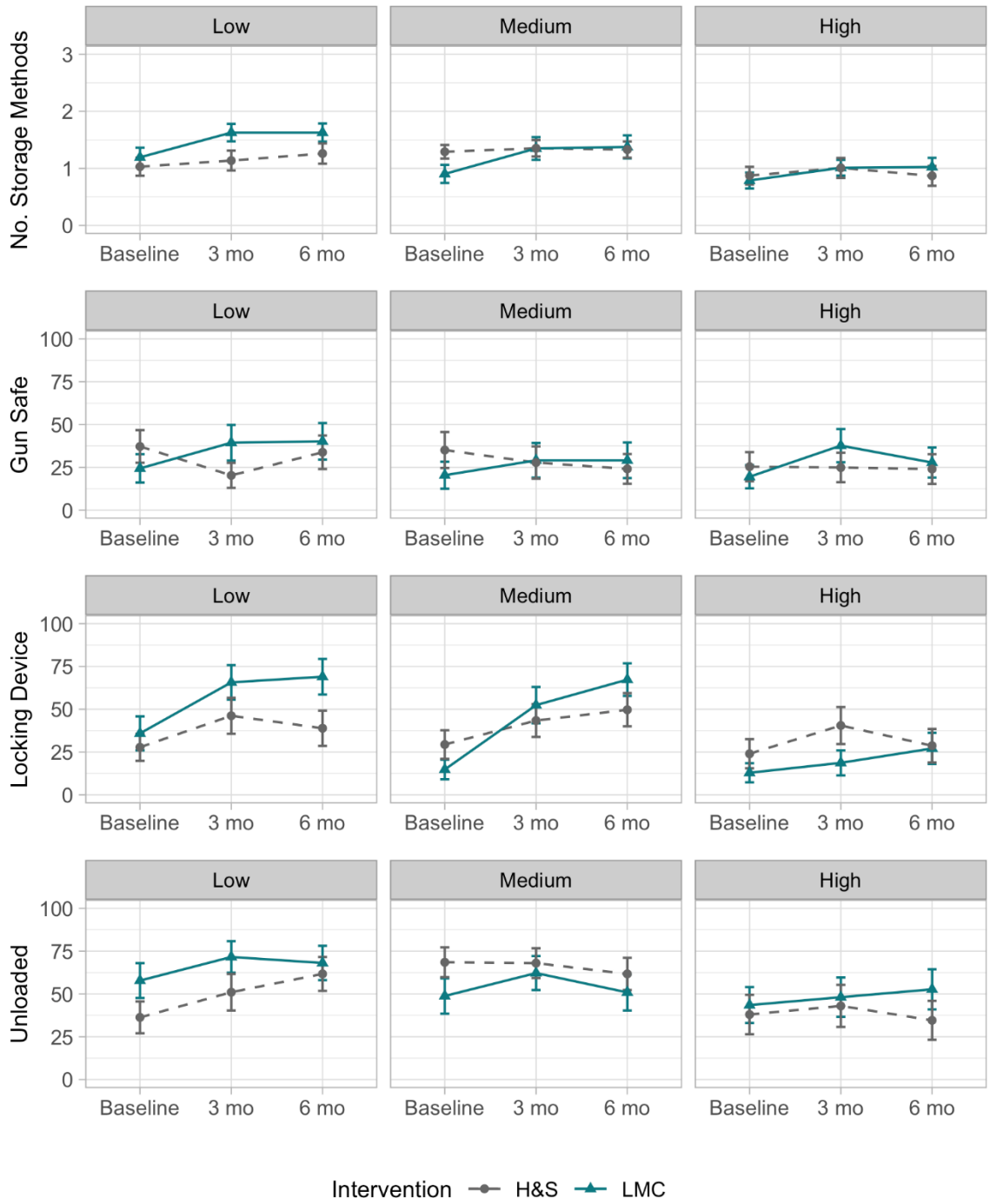
Note: Bold p-value indicates $p < .05$. MRNS = Masculine Role Norms Scale; ^a Covariates: religious activity, gender; ^b Covariates: gender; ^c Covariates: religious activity; ^d Gender removed as covariate at medium and high levels of MRNS total due to low cell counts of females.

Table 6 *Estimated means for firearm storage practices by levels of masculinity ideology. Intervention = Lethal Means Counseling vs. Health & Safety*

	Low MRNS Total			Medium MRNS Total			High MRNS Total		
	LMC	H&S	F _{between}	LMC	H&S	F _{between}	LMC	H&S	F _{between}
No. Storage Methods, M (SE)									
Baseline	1.19 (0.17)	1.03 (0.16)	0.51	0.90 (0.16)	1.29 (0.12)	3.87	0.79 (0.14)	0.87 (0.15)	0.16
3 Mo.	1.63 (0.15)	1.14 (0.17)	4.46*	1.35 (0.20)	1.35 (0.14)	0.00	1.01 (0.14)	1.01 (0.18)	0.00
6 Mo.	1.63 (0.16)	1.26 (0.18)	2.43	1.38 (0.20)	1.33 (0.14)	0.04	1.00 (0.16)	0.87 (0.18)	0.42
F _{within}	3.75*	1.30		4.84**	0.13		2.31	0.90	
Gun Safe, % (SE)									
Baseline	24.4 (8.3)	37.2 (9.5)	1.03	20.4 (7.9)	35.1 (10.5)	0.26	19.5 (6.8)	25.4 (8.5)	0.59
3 Mo.	39.4 (10.4)	20.3 (7.3)	2.25	29.1 (10.1)	27.8 (9.4)	0.93	37.7 (9.7)	24.9 (8.6)	0.32
6 Mo.	40.2 (10.7)	33.8 (9.8)	0.19	29.1 (10.4)	24.1 (8.7)	0.71	27.8 (8.8)	24.0 (8.7)	0.76
F _{within}	1.43	3.68*		0.64	0.86		2.16	0.02	
Locking Device, % (SE)									
Baseline	35.9 (9.9)	27.8 (7.9)	0.41	14.8 (5.7)	29.4 (8.3)	2.10	12.9 (5.6)	24.0 (8.5)	1.19
3 Mo.	65.7 (10.1)	46.2 (10.5)	1.80	52.4 (10.6)	43.4 (9.6)	0.40	18.7 (7.3)	40.5 (10.8)	2.81
6 Mo.	69.0 (10.4)	38.9 (10.3)	4.22*	67.3 (9.5)	49.7 (9.7)	1.68	27.1 (9.10)	28.7 (9.8)	0.02
F _{within}	5.76**	1.50		18.00**	2.11		1.44	1.11	
Unloaded, % (SE)									
Baseline	57.8 (10.2)	36.3 (9.3)	2.41	48.8 (10.3)	68.5 (8.7)	2.11	43.5 (10.5)	38.0 (11.5)	0.12
3 Mo.	71.6 (9.2)	51.0 (10.7)	2.15	62.2 (9.9)	68.0 (8.7)	0.20	48.1 (11.5)	43.0 (12.3)	0.09
6 Mo.	68.1 (10.0)	61.7 (9.9)	0.20	50.9 (10.6)	61.7 (9.4)	0.58	52.7 (11.7)	34.6 (11.4)	1.19
F _{within}	0.65	3.77*		1.39	0.30		0.40	0.75	

Note: * $p < .05$, ** $p < .01$. MRNS = Male Role Norms Scale; LMC = Lethal Means Counseling; H&S = Health and Safety.

Figure 1. Moderation of LMC vs. H&S intervention effect by overall masculinity ideology (low, medium, high)



Note: H&S = Health and Safety; LMC = Lethal Means Counseling.

Cable Lock Distribution. The three-way interaction of MRNS x Condition x Time was non-significant for number of storage methods, gun safe use, locking device use, and unloaded storage, indicating that the effect of time on the relationships between cable lock condition (cable lock vs. no cable lock) and each storage practice were not conditional upon levels of masculinity ideology ($ps > .05$; Table 7).

The non-significant three-way interactions were probed. The two-way interaction of cable lock condition and time on all storage practices was non-significant at low, medium, and high levels of masculinity ideology ($ps > .05$; Table 7). Figure 2 illustrates the effects of cable lock condition and time based on low, medium, and high levels of masculinity ideology.

Despite the non-significant two-way interactions, several within and between group differences were identified (Table 8). Within group comparisons indicated that, among individuals with low levels of masculinity ideology, those in the cable lock group significantly increased the number of storage practices used over time ($F[2, 209] = 4.94, p = .008$). The rate of using a locking device significantly increased over time among those in the cable lock group with low ($F[2, 210] = 7.81, p < .001$) and medium ($F[2, 228] = 4.04, p = .019$) levels of masculinity ideology. Among individuals with medium levels of masculinity ideology, those who were in the control group increased their use of locking device(s) over time ($F[2, 228] = 10.20, p < .001$). Between group comparisons revealed that, among individuals with medium levels of masculinity ideology, those in the cable lock group endorsed significantly higher rates of using a locking device compared to the control group at baseline (40.0% vs. 10.1%; OR = 5.93, 95% CI [1.83, 19.23], $p = .004$), 3 months (67.5% vs. 30.5%; OR = 4.73, 95% CI [1.79, 12.52], $p =$

.003), and 6 months (70.9% vs. 45.1%; OR = 2.97, 95% CI [1.14, 7.73], $p = .044$) post-intervention.

Table 7 *Fixed effects for GLMM examining masculinity ideology as a moderator. Intervention = Cable Lock vs. No Cable Lock*

	Fixed Effects for 3-Way Interaction							
	No. Storage Methods ^a		Gun Safe ^b		Locking Device ^b		Unloaded ^c	
	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>
Condition	2.89	.091	0.68	.411	10.00	.002	0.04	.852
Time	8.96	<.001	0.43	.653	15.81	<.001	1.77	.172
MRNS Total	1.34	.248	0.01	.935	1.85	.176	1.19	.277
Condition x Time	0.86	.422	0.02	.983	1.68	.187	1.23	.292
MRNS x Condition	0.57	.453	2.25	.136	0.00	.992	0.00	.995
MRNS x Time	0.78	.460	2.27	.105	0.18	.832	0.96	.384
MRNS x Condition x Time	0.77	.462	0.15	.863	0.20	.815	1.01	.364

	Fixed Effects for Low, Medium, and High Levels of MRNS Total							
	No. Storage Methods		Gun Safe		Locking Device		Unloaded	
	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>
Low								
Condition	0.19	.668	0.90	.348	1.64	.206	0.48	.493
Time	4.21	.016	0.65	.522	5.48	.005	3.02	.051
Condition x Time	2.11	.124	0.47	.624	2.83	.061	0.97	.380
Medium^d								
Condition	3.02	.087	0.10	.751	10.87	.002	0.02	.897
Time	3.75	.025	0.02	.981	11.58	<.001	1.07	.346
Condition x Time	0.24	.785	2.13	.121	0.57	.569	0.25	.777
High^d								
Condition	2.26	.138	4.38	.040	1.21	.294	0.10	.757
Time	1.90	.186	0.94	.392	1.37	.256	0.20	.823
Condition x Time	0.19	.831	0.04	.960	0.86	.426	0.79	.456

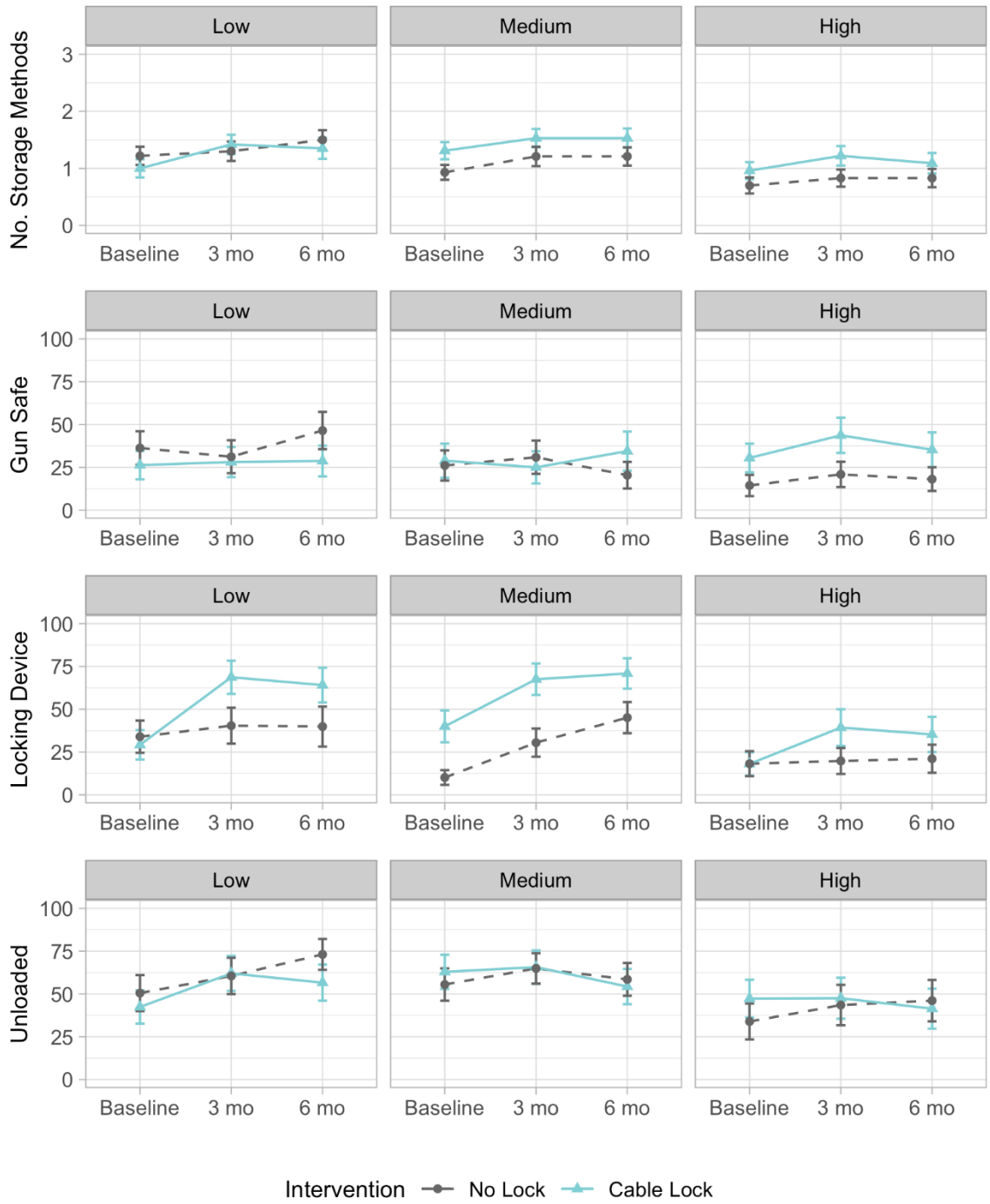
Note: Bold p-value indicates $p < .05$. MRNS = Masculine Role Norms Scale; ^a Covariates: religious activity, gender; ^b Covariates: gender; ^c Covariates: religious activity; ^d Gender removed as covariate at medium and high levels of MRNS total due to low cell counts of females.

Table 8 *Estimated means for firearm storage practices by levels of masculinity ideology. Intervention = Cable Lock vs. No Cable Lock*

	Low MRNS Total			Medium MRNS Total			High MRNS Total		
	CL	No CL	F _{between}	CL	No CL	F _{between}	CL	No CL	F _{between}
No. Storage Methods, M (SE)									
Baseline	1.00 (0.16)	1.22 (0.16)	0.95	1.31 (0.15)	0.93 (0.13)	3.52	0.96 (0.15)	0.70 (0.14)	1.53
3 Mo.	1.42 (0.17)	1.30 (0.17)	0.27	1.53 (0.16)	1.21 (0.17)	1.85	1.22 (0.17)	0.83 (0.15)	3.03
6 Mo.	1.35 (0.18)	1.50 (0.17)	0.36	1.53 (0.17)	1.21 (0.16)	1.80	1.09 (0.18)	0.83 (0.16)	1.11
F _{within}	4.94 ^{**}	2.25		1.24	2.54		2.40	0.45	
Gun Safe, % (SE)									
Baseline	26.3 (8.3)	36.3 (9.8)	0.60	28.9 (10.0)	26.1 (8.8)	0.04	30.5 (8.4)	14.4 (6.2)	2.36
3 Mo.	28.1 (8.8)	31.2 (9.6)	0.05	25.0 (9.4)	30.9 (9.7)	0.19	43.7 (10.3)	20.9 (7.4)	3.23
6 Mo.	28.7 (9.0)	46.5 (10.9)	1.61	34.5 (11.4)	20.4 (7.8)	1.05	35.3 (10.1)	18.1 (6.9)	1.97
F _{within}	0.03	0.97		1.28	0.95		1.07	0.24	
Locking Device, % (SE)									
Baseline	29.2 (8.6)	34.0 (9.4)	0.14	40.0 (9.3)	10.1 (4.3)	8.53 ^{**}	18.1 (6.8)	18.2 (7.3)	0.00
3 Mo.	68.7 (9.7)	40.4 (10.5)	3.86	67.5 (9.2)	30.5 (8.2)	8.99 ^{**}	39.3 (10.7)	19.8 (7.6)	2.21
6 Mo.	64.1 (10.1)	39.9 (11.7)	2.41	70.9 (8.9)	45.1 (9.1)	4.12 [*]	35.3 (10.3)	21.1 (8.2)	1.78
F _{within}	7.81 ^{**}	0.31		4.04 [*]	10.20 ^{**}		2.06	0.05	
Unloaded, % (SE)									
Baseline	42.4 (9.7)	50.5 (10.5)	0.32	62.9 (10.0)	55.5 (9.4)	0.29	47.3 (11.0)	33.9 (10.5)	0.74
3 Mo.	62.0 (10.2)	60.5 (10.6)	0.01	65.7 (9.7)	64.9 (8.9)	0.00	47.5 (12.0)	43.5 (11.8)	0.06
6 Mo.	56.6 (10.5)	73.1 (9.0)	1.44	54.3 (10.3)	58.5 (9.6)	0.09	41.4 (11.7)	46.1 (12.1)	0.08
F _{within}	1.94	2.91		0.70	0.62		0.28	0.61	

Note: * $p < .05$, ** $p < .01$. MRNS = Male Role Norms Scale; CL = Cable Lock

Figure 2. Moderation of Cable Lock vs. No Lock intervention effect by overall masculinity ideology (low, medium, high)



Aim 3: Masculinity Ideology and Storage Practices Among Those Receiving LMC or Cable Locks

Covariate Selection. Within the LMC subsample, overall masculinity ideology was significantly associated with religious activity ($r = -.23, p = .015$) and gender ($F[1, 112] = 11.94, p < .001$; Table 3). Mean number of storage methods was significantly associated with religious activity ($r = -.21, p = .022$), perceived neighborhood safety ($r = .19, p = .039$), and race ($F[1, 112] = 6.52, p = .012$). Utilizing a gun safe at pre-intervention was significantly associated with religious activity ($F[1, 112] = 4.85, p = .030$) while utilizing a locking device was significantly associated with perceived neighborhood safety (Welch's $F[1, 82.76] = 1.15, p < .001$), gender ($\chi^2[1] = 4.10, p = .043$), and race ($\chi^2[1] = 5.94, p = .015$). Storing firearm(s) unloaded at pre-intervention was significantly associated with religious activity (Welch's $F[1, 105.61] = 4.96, p = .028$) and reason for ownership ($\chi^2[1] = 5.16, p = .023$). Based on these results, covariates for the analyses within the LMC subgroup were: religious activity for the analyses examining number of storage methods, gun safe use, and unloaded storage as outcomes; gender for the locking device use outcome.

Within the cable locks subsample, overall masculinity ideology was significantly associated with religious activity ($r = -.28, p = .002$) and gender ($F[1, 115] = 9.47, p = .003$) (Table 3). Mean number of storage methods was significantly associated with perceived neighborhood safety ($r = -.20, p = .028$) and ethnicity ($F[1, 112] = 7.31, p = .008$), while utilizing a gun safe at pre-intervention was significantly associated with ethnicity ($\chi^2[1] = 8.29, p = .004$). Storing firearm(s) unloaded at pre-intervention significantly associated with perceived neighborhood safety (Welch's $F[1, 109.87] =$

6.40, $p = .013$) and reason for ownership ($\chi^2[1] = 6.43, p = .011$). No demographic or environmental variables were associated with both overall masculinity ideology and storage practice pre-intervention; thus, no covariates were included in the analyses limited to the cable locks subsample.

Firearm Storage Practices. A series of GLMMs were utilized to examine the two-way interaction of overall masculinity ideology and time among those who received LMC and those who received cable locks. For all GLMMs, continuous predictor variables were mean centered based on the sample of interest. Among those receiving LMC, the two-way interaction of overall masculinity ideology and time was non-significant on number of storage practices ($F[2, 310] = 0.06, p = .944$), gun safe use ($F[2, 310] = 0.66, p = .520$), locking device use ($F[2, 310] = 0.38, p = .682$), and unloaded storage ($F[2, 310] = 0.58, p = .559$; Table 9). Among those receiving cable locks, the two-way interaction of overall masculinity ideology and time was non-significant on number of storage methods ($F[2, 315] = 0.72, p = .488$), gun safe use ($F[2, 315] = 1.61, p = .201$), locking device use ($F[2, 315] = 0.14, p = .867$), and unloaded storage ($F[2, 315] = 1.79, p = .168$; Table 9)².

² Similar to Anestis et al. (2021), we initially planned to conduct a series of exploratory sensitivity analyses that repeated these analyses in the subgroup of participants that denied using each storage practice at baseline. We were unable to run the analyses due to small cell counts that led to inflated F-values. Results of the sensitivity analyses conducted by Anestis et al. (2021) did not change the direction or significance of the main findings.

Table 9 *Fixed effects for GLMMs examining masculinity ideology as a moderator of time on storage practices among those receiving either intervention*

	LMC Subgroup							
	No. Storage Methods ^a		Gun Safe ^a		Locking Device ^b		Unloaded ^a	
	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>
MRNS Total	1.96	.164	0.00	.997	3.98	.048	0.70	.407
Time	9.64	<.001	3.55	.030	16.22	<.001	1.31	.273
MRNS x Time	0.06	.944	0.66	.520	0.38	.682	0.58	.559

	Cable Locks Subgroup							
	No. Storage Methods		Gun Safe		Locking Device		Unloaded	
	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>
MRNS Total	0.67	.414	0.47	.495	1.88	.173	1.62	.206
Time	7.42	<.001	0.36	.702	11.75	<.001	1.01	.364
MRNS x Time	0.72	.488	1.61	.201	0.14	.867	1.79	.168

Note: Bold p-value indicates $p < .05$. MRNS = Masculine Role Norms Scale; LMC = Lethal Means Counseling; ^a Covariate: religious activity; ^b Covariate: gender.

Exploratory Analyses

For exploratory purposes, the three factors of masculinity ideology (Status, Anti-Femininity, Toughness) were examined as predictors in all our models. Prior to running analyses, collinearity between the three MRNS subscales was evaluated. Variance Inflation Factor (VIF) values for the MRNS subscales of Status (VIF = 1.35), Toughness (VIF = 1.64), and Anti-Femininity (VIF = 1.41) were all below 5, indicating that multicollinearity was not a concern.

Firearm Storage Practices Pre-Intervention

Selection of Covariates. Within the overall sample, MRNS Status was significantly associated with religious services ($r = -.19, p = .005$), education ($r = -.13, p = .041$), gender ($F[1, 230] = 7.61, p = .006$), and race ($F[1, 230] = 5.67, p = .018$) (Table 3). MRNS Toughness was significantly associated with religious services ($r = -.14, p = .040$), perceived neighborhood safety ($r = -.14, p = .038$), gender ($F[1, 230] = 27.51, p <$

.001), and race ($F[2, 230] = 8.46, p = .004$), while MRNS Anti-Femininity was significantly associated with gender ($F[1, 230] = 14.42, p < .001$). Based on significant associations between the MRNS subscales and the outcomes of interest, the following covariates were identified: Religious activity, perceived neighborhood safety, and gender for the number of storage methods outcome; gender for the gun safe use outcome; perceived neighborhood safety, gender, and race for the locking device use outcome; religious activity for the unloaded storage outcome.

Exploratory Results. The Poisson regression model examining the effects of the MRNS subscales of Status, Toughness, and Anti-Femininity on number of storage methods at baseline was significant, ($\chi^2 [6] = 22.43, p = .001$). All three MRNS subscales were statistically non-significant in the model (Table 10).

A series of logistic regressions was conducted with gun safe, locking device, and unloaded storage practices pre-intervention serving as the outcome variables (Table 10). The overall model testing associations between the three MRNS subscales and gun safe use was non-significant, ($\chi^2[4] = 5.09, p = .278$). The overall model testing associations between the MRNS subscales and locking device use was significant, ($\chi^2[6] = 28.10, p < .001$). All three MRNS subscales were statistically non-significant in the model, indicating that Status ($AOR = 0.90, 95\% CI [0.60, 1.33], p = .582$), Toughness ($AOR = 1.10, 95\% CI [0.73, 1.66], p = .661$), and Anti-Femininity ($AOR = 0.89, 95\% CI [0.63, 1.26], p = .507$) did not significantly predict use of a locking device pre-intervention. The overall model examining the associations between the three MRNS subscales and unloaded storage was statistically significant, ($\chi^2[4] = 14.72, p = .005$). Results indicated that higher levels of Anti-Femininity were significantly associated with a decreased

likelihood of storing firearm(s) unloaded pre-intervention, (*AOR* = 0.73, 95% CI [0.54, 0.99], *p* = .043).

Table 10 *Regressions examining associations between masculinity ideology subscales and storage practices*

	<i>B</i> (SE)	χ^2	<i>p</i>	IRR [95% CI]
No. Storage Methods				
Gender	0.37 (0.16)	5.14	.023	1.44 [1.05, 1.98]
Religious Activity	0.18 (0.50)	13.00	<.001	1.20 [1.09, 1.32]
Neighborhood Safety	0.18 (0.08)	5.59	.018	1.20 [1.03, 1.40]
MRNS Status	0.08 (0.07)	1.54	.215	1.09 [0.95, 1.24]
MRNS Toughness	0.04 (0.07)	0.33	.563	1.04 [0.91, 1.20]
MRNS Anti-Fem	-0.11 (0.07)	2.63	.105	0.90 [0.79, 1.02]
	<i>B</i> (SE)	Wald	<i>p</i>	OR [95% CI]
Gun Safe ^a				
Gender	0.83 (0.43)	3.65	.056	2.29 [0.98, 5.33]
MRNS Status	0.12 (0.18)	0.43	.513	1.13 [0.79, 1.60]
MRNS Toughness	-0.00 (0.20)	0.00	.994	1.00 [0.69, 1.45]
MRNS Anti-Fem	-0.10 (0.16)	0.42	.516	0.90 [0.66, 1.24]
Locking Device				
Gender	1.13 (0.46)	6.06	.014	3.12 [1.27, 7.66]
Race	1.04 (0.37)	7.91	.005	2.83 [1.37, 5.84]
Neighborhood Safety	0.59 (0.22)	7.64	.006	1.81 [1.19, 2.76]
MRNS Status	-0.11 (0.20)	0.30	.582	0.90 [0.60, 1.33]
MRNS Toughness	0.01 (0.21)	0.19	.661	1.10 [0.73, 1.66]
MRNS Anti-Fem	-0.12 (0.18)	0.44	.507	0.89 [0.63, 1.26]
Unloaded				
Religious Activity	0.43 (0.13)	10.44	.001	1.54 [1.19, 2.01]
MRNS Status	0.15 (0.17)	0.73	.394	1.16 [0.83, 1.62]
MRNS Toughness	0.16 (0.18)	0.85	.356	1.18 [0.83, 1.66]
MRNS Anti-Fem	-0.31 (0.15)	4.08	.043	0.73 [0.54, 0.99]

Note: Bold *p*-value indicates *p* < .05. ^aOmnibus test of model non-significant; MRNS = Male Role Norms Scale; Anti-Fem = Anti-Femininity subscale; IRR = Incidence Rate Ratio; OR = Odd Ratio; CI = Confidence Interval.

Factors of Masculinity Ideology, Intervention, and Firearm Storage Practices

For each intervention condition, a series of GLMMs were used to examine the three-way interaction of condition, the specified MRNS subscale (Status, Toughness, or Anti-Femininity), and time on each firearm storage practice. For all GLMMs, continuous predictor variables were mean centered based on the sample of interest. Next, we probed the three-way interactions, regardless of statistical significance, by examining the Condition x Time interaction on each storage practice among those with low, medium, and high levels of the specified MRNS subscale. The adjusted estimated means of firearm storage practices for each intervention group were compared using post hoc LSD tests to identify significant differences between and within groups over time at low, medium, and high levels of the MRNS subscale of interest. Effect sizes (d or OR) and confidence intervals were calculated for significant between group differences. Due to low frequencies of females within the sample, gender was not included as a demographic covariate when examining the two-way interaction of condition and time for medium and high levels of each MRNS subscale.

Covariate Selection. For the analyses examining MRNS Status as a moderator, the following demographic covariates were included: religious activity for the number of storage methods and unloaded storage outcomes; gender for the gun safe use outcome; gender and race for the locking device outcome (Table 3). The covariates for the analyses examining MRNS Toughness as a moderator were: religious activity, neighborhood safety, and gender for the number of storage methods outcome; gender for the gun safe use outcome; neighborhood safety, gender, and race for the locking device outcome; religious activity for the unloaded storage outcome. For the analyses examining MRNS

Anti-Femininity as a moderator, gender was included as a covariate for the number of storage methods, gun safe use, and locking device use outcomes; no covariates were included for the unloaded storage outcome. In all analyses, the remaining two MRNS subscales were also included as covariates.

MRNS Status and LMC. The three-way interaction of MRNS Status x Condition x Time was non-significant for number of storage methods, gun safe use, locking device use, and unloaded storage, indicating that the effect of time on the relationships between LMC condition and each storage practice were not conditional upon levels of the masculine norm of Status ($ps > .05$; Table 11).

Despite the non-significant results, the three-way interactions were probed. The two-way interaction of LMC condition and time on number of storage methods, gun safe use, locking device use, and unloaded storage was non-significant at low, medium, and high levels of the masculine norm of Status ($ps > .05$; Table 11). Figure 3 illustrates the effects of LMC condition and time based on low, medium, and high levels of MRNS Status.

Despite the non-significant two-way interactions, several within group differences were identified (Table 12). In the LMC group, the number of storage methods used and the rate of locking device use significantly increased over time among individuals with low, medium, and high levels of MRNS Status ($ps < .05$). Additionally, those who received LMC had higher rates of gun safe use among individuals with low levels of MRNS Status ($F[2, 206] = 4.42, p = .013$); post-hoc LSD comparisons revealed that the difference was only significant at 6 months compared to baseline (38.8% vs. 16.3%; $t[206] = 2.79, p = .006$). The rate of storing firearm(s) unloaded changed over time

among those who received LMC and endorsed medium levels of MRNS Status ($F[2, 218] = 6.15, p = .003$). Specifically, higher rates of storing firearm(s) unloaded were observed at 3 months compared to baseline (83.7% vs. 53.1%; $t[218] = 3.21, p = .002$); however, the rate significantly decreased from 3 months to 6 months post-intervention (63.4%; $t[218] = -2.46, p = .015$).

In the H&S group, rates of gun safe use significantly decreased over time among those with medium levels of MRNS Status ($F[2, 219] = 3.58, p = .030$); however, this difference was only significant at 6 months compared to baseline (15.9% vs. 24.4%; $t[219] = -2.19, p = .030$). The rate of storing unloaded increased over time among individuals who were in the H&S group and endorsed low levels of MRNS Status, ($F[2, 206] = 3.90, p = .022$); post hoc LSD comparisons revealed that the difference was only significant at 6 months compared to 3 months (57.8% vs. 40.4%; $t[206] = 2.26, p = .025$). Additionally, the change in the number of storage methods used over time among individuals with low levels of MRNS Status who received the H&S condition was approaching significance ($F[2, 206] = 3.03, p = .050$); post-hoc LSD comparisons indicated that the number of storage methods used significantly increased from 3 months to 6 months ($t[206], = 2.43, p = .016$).

Table 11 *Fixed effects for GLMM examining MRNS Status as a moderator. Intervention = Lethal Means Counseling vs. Health & Safety*

	Fixed Effects for 3-Way Interaction							
	No. Storage Methods ^a		Gun Safe ^b		Locking Device ^c		Unloaded ^a	
	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>
Condition	0.46	.501	0.06	.810	0.20	.653	0.46	.500
Time	9.58	<.001	0.42	.659	17.72	<.001	1.91	.149
MRNS Status	4.27	.041	0.43	.511	0.40	.526	2.27	.134
Condition x Time	3.33	.036	4.58	.011	3.56	.029	0.13	.878
Status x Condition	0.00	.948	0.05	.825	0.76	.383	0.16	.694
Status x Time	0.72	.488	2.71	.067	0.94	.391	0.26	.772
Status x Condition x Time	1.10	.333	0.03	.976	0.22	.802	1.44	.237

	Fixed Effects for Low, Medium, and High Levels of MRNS Status							
	No. Storage Methods		Gun Safe		Locking Device		Unloaded	
	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>
Low								
Condition	0.39	.535	0.11	.737	0.68	.413	0.32	.575
Time	4.64	.011	3.46	.033	3.60	.029	0.98	.379
Condition x Time	1.63	.199	2.78	.064	0.72	.489	1.66	.193
Medium^d								
Condition	0.32	.572	0.56	.458	0.15	.696	0.20	.657
Time	6.23	.002	0.81	.446	7.15	<.001	5.31	.006
Condition x Time	2.27	.106	1.60	.205	0.80	.452	1.49	.228
High^d								
Condition	0.03	.867	0.01	.926	0.05	.820	0.42	.519
Time	3.08	.048	0.53	.589	6.68	.002	1.42	.244
Condition x Time	0.81	.446	2.01	.137	2.36	.097	0.44	.647

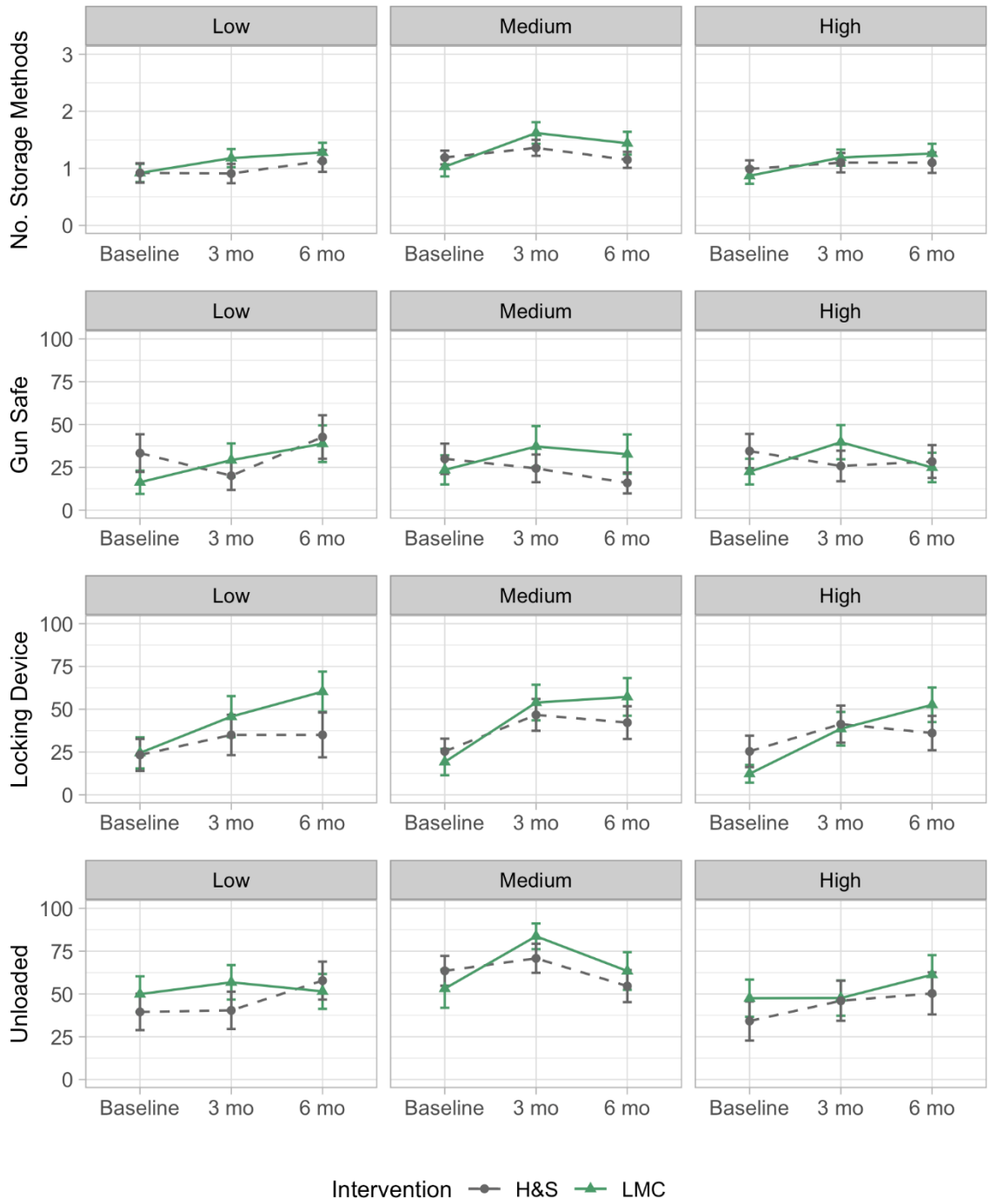
Note: Bold p-value indicates $p < .05$. MRNS Status = Masculine Role Norms Scale, Status Subscale; ^a Covariates: religious activity, MRNS Toughness, MRNS-Anti-Femininity; ^b Covariates: gender, MRNS Toughness, MRNS-Anti-Femininity; ^c Covariates: gender, race, MRNS Toughness, MRNS-Anti-Femininity; ^d Gender removed as covariate at medium and high levels of MRNS Status due to low cell counts of females.

Table 12 *Estimated means for firearm storage practices by levels of MRNS Status. Intervention = Lethal Means Counseling vs. Health & Safety*

	Low MRNS Status			Medium MRNS Status			High MRNS Status		
	LMC	H&S	F _{between}	LMC	H&S	F _{between}	LMC	H&S	F _{between}
No. Storage Methods, M (SE)									
Baseline	0.92 (0.16)	0.92 (0.17)	0.00	1.03 (0.17)	1.19 (0.12)	0.64	0.87 (0.14)	0.99 (0.15)	0.32
3 Mo.	1.18 (0.16)	0.91 (0.17)	1.41	1.62 (0.19)	1.36 (0.14)	1.17	1.19 (0.14)	1.10 (0.17)	0.17
6 Mo.	1.28 (0.17)	1.13 (0.19)	0.39	1.44 (0.20)	1.15 (0.14)	1.45	1.26 (0.17)	1.10 (0.18)	0.44
F _{within}	3.41*	3.03		5.99**	1.64		3.84*	0.40	
Gun Safe, % (SE)									
Baseline	16.3 (6.8)	33.3 (11.0)	1.68	23.5 (8.5)	30.0 (8.9)	0.28	22.5 (7.5)	34.5 (10.0)	0.93
3 Mo.	29.2 (9.8)	20.1 (8.3)	0.47	37.2 (11.9)	24.4 (8.1)	0.78	39.7 (10.0)	25.8 (8.9)	1.07
6 Mo.	38.8 (10.7)	42.7 (12.7)	0.05	32.7 (11.5)	15.9 (6.1)	1.68	24.9 (8.6)	28.4 (9.6)	0.08
F _{within}	4.42*	2.92		0.64	3.58*		1.59	0.57	
Locking Device, % (SE)									
Baseline	24.5 (9.1)	23.3 (9.3)	0.01	19.2 (7.7)	25.4 (7.4)	0.34	12.3 (5.2)	25.4 (9.2)	1.60
3 Mo.	45.7 (12.0)	35.0 (11.8)	0.39	53.9 (10.4)	46.7 (9.3)	0.26	38.6 (9.8)	41.3 (10.8)	0.03
6 Mo.	60.3 (11.7)	35.0 (13.1)	2.05	57.2 (11.0)	42.2 (9.6)	1.05	52.6 (10.1)	36.1 (10.0)	1.34
F _{within}	5.47**	0.66		5.51**	2.94		10.63**	0.84	
Unloaded, % (SE)									
Baseline	49.9 (10.4)	39.5 (10.6)	0.49	53.1 (11.2)	63.5 (8.7)	0.52	47.5 (10.9)	34.2 (11.4)	0.72
3 Mo.	56.8 (10.1)	40.4 (10.9)	1.21	83.7 (7.5)	70.8 (8.5)	1.29	47.6 (10.3)	46.0 (11.7)	0.01
6 Mo.	51.5 (10.2)	57.8 (11.1)	0.18	63.4 (11.0)	54.6 (9.4)	0.37	61.2 (11.5)	50.3 (12.3)	0.42
F _{within}	0.18	3.90*		6.15**	1.61		0.90	0.97	

Note: * $p < .05$, ** $p < .01$. MRNS = Male Role Norms Scale; LMC = Lethal Means Counseling; H&S = Health and Safety.

Figure 3. Moderation of LMC vs. H&S intervention effect by MRNS Status (low, medium, high)



Note: H&S = Health and Safety; LMC = Lethal Means Counseling.

MRNS Status and Cable Lock Distribution. The three-way interaction of MRNS Status x Condition x Time was non-significant for number of storage methods, gun safe use, locking device use, and unloaded storage, indicating that the effect of time on the relationships between cable lock condition and each storage practice were not conditional upon levels of the masculine norm of Status ($ps > .05$; Table 13).

We then probed the non-significant three-way interactions (Table 13). The two-way interaction of cable lock condition and time on unloaded storage was significant among those with high levels of MRNS status ($F[2, 204] = 3.09, p = .047$); however, all between- and within-group differences were non-significant (Table 14). Figure 4 illustrates the effects of cable lock condition and time based on low, medium, and high levels of MRNS Status.

Several within and between group differences were observed despite the non-significant two-way interactions. In the cable lock group, the number of storage methods used significantly changed over time among those with medium ($F[2, 218] = 4.56, p = .012$) and high ($F[2, 204] = 3.13, p = .046$) levels of MRNS Status. Post-hoc LSD comparisons showed that among those who received cable locks and had medium levels of MRNS Status, the number of storage methods used significantly increased from baseline ($M = 1.08$) to 3 months ($M = 1.62; t[218] = 2.86, p = .005$); however, there was a significant decrease in storage methods used from 3 months to 6 months ($M = 1.28; t[218] = -2.35, p = .020$) post-intervention (Table 14). Among those who had received cable locks and had high levels of MRNS status, the increase in number of storage methods used was only significant at 6 months compared to baseline ($t[204] = 2.18, p = .030$). Additionally, among those with medium ($F[2, 218] = 7.14, p < .001$) and high

($F[2, 204] = 8.75, p < .001$) levels of MRNS Status, those who received cable locks significantly increased their locking device use over time. The rate of storing unloaded significantly changed over time among those who received cable locks and endorsed medium levels of MRNS Status ($F[2, 218] = 4.27, p = .015$). Specifically, the rate of storing unloaded significantly increased from baseline (55.3%) to 3 months (79.2%; $t[218] = 2.16, p = .032$) but decreased from 3 months to 6 months (53.3%; $t[218] = -2.59, p = .010$). Within the control group, the mean number of storage methods used significantly increased over time among those with low levels of MRNS Status ($F[2, 206] = 4.40, p = .013$), with higher rates observed at 6 months ($M = 1.17$) compared to baseline ($M = 0.80; t[206] = 2.41, p = .017$) and compared to 3 months ($M = 0.84; t[206] = 2.65, p = .009$).

Between group differences were observed for locking device use. Among individuals with low levels of MRNS Status, those who received a cable lock reported significantly higher rates of using a locking device than those in the control group at 3 months (58.5% vs. 20.7%; $OR = 5.40, 95\% CI [1.87, 15.60], p = .009$;). Additionally, individuals with medium levels of MRNS Status and were in the cable lock condition reported significantly higher rates of locking device use than those in the control group at 3 months (71.1% vs. 31.2%; $OR = 5.43 95\% CI [1.98, 14.90], p = .001$).

Table 13 *Fixed effects for GLMM examining MRNS Status as a moderator. Intervention = Cable Lock vs. No Cable Lock*

	Fixed Effects for 3-Way Interaction							
	No. Storage Methods ^a		Gun Safe ^b		Locking Device ^c		Unloaded ^c	
	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>
Condition	3.07	.082	0.69	.407	9.96	.002	0.01	.920
Time	9.27	<.001	0.40	.669	16.70	<.001	1.84	.160
MRNS Status	4.25	.041	0.33	.567	0.72	.396	1.82	.179
Condition x Time	0.94	.390	0.03	.975	1.81	.165	1.06	.347
Status x Condition	0.00	.980	0.04	.850	1.35	.246	0.30	.583
Status x Time	0.98	.377	2.66	.070	0.98	.376	0.13	.876
Status x Condition x Time	0.65	.525	0.07	.936	0.18	.836	1.99	.138

	Fixed Effects for Low, Medium, and High Levels of MRNS Status							
	No. Storage Methods		Gun Safe		Locking Device		Unloaded	
	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>
Low								
Condition	1.35	.252	1.01	.320	4.73	.035	0.02	.902
Time	5.56	.004	3.84	.023	3.91	.022	0.85	.430
Condition x Time	2.57	.079	0.34	.712	1.19	.308	1.87	.157
Medium^d								
Condition	0.14	.706	0.96	.331	5.08	.028	0.04	.849
Time	5.70	.004	0.90	.409	7.23	<.001	4.22	.016
Condition x Time	1.29	.278	0.23	.795	1.74	.177	0.72	.489
High^d								
Condition	2.85	.100	1.73	.193	0.84	.364	0.40	.531
Time	3.36	.037	0.63	.535	6.19	.002	1.38	.254
Condition x Time	0.31	.733	0.02	.977	0.88	.416	3.09	.047

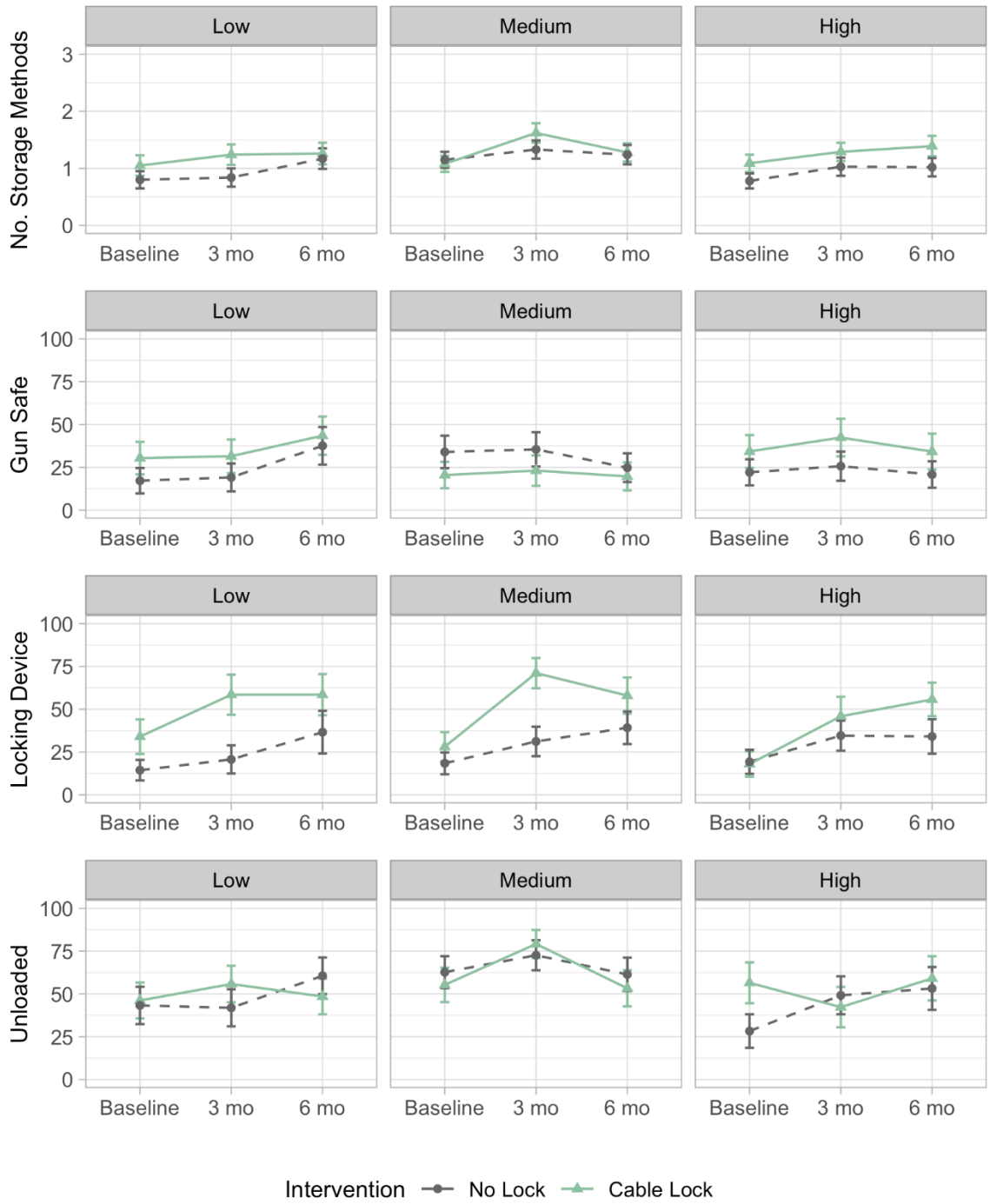
Note: Bold p-value indicates $p < .05$. MRNS Status = Masculine Role Norms Scale, Status Subscale; ^a Covariates: religious activity, MRNS Toughness, MRNS Anti-Femininity; ^b Covariates: gender, MRNS Toughness, MRNS Anti-Femininity; ^c Covariates: gender, race, MRNS Toughness, MRNS Anti-Femininity; ^d Gender removed as covariate at medium and high levels of MRNS Status due to low cell counts of females.

Table 14 *Estimated means for firearm storage practices by levels of MRNS Status. Intervention = Cable Lock vs. No Cable Lock*

	Low MRNS Status			Medium MRNS Status			High MRNS Status		
	CL	No CL	F _{between}	CL	No CL	F _{between}	CL	No CL	F _{between}
No. Storage Methods, M (SE)									
Baseline	1.05 (0.18)	0.80 (0.15)	1.12	1.08 (0.14)	1.15 (0.14)	0.13	1.09 (0.15)	0.78 (0.13)	2.45
3 Mo.	1.24 (0.18)	0.84 (0.16)	2.74	1.62 (0.17)	1.33 (0.16)	1.54	1.29 (0.16)	1.03 (0.16)	1.36
6 Mo.	1.26 (0.19)	1.17 (0.18)	0.12	1.28 (0.16)	1.24 (0.17)	0.03	1.39 (0.18)	1.02 (0.16)	2.56
F _{within}	2.29	4.40*		4.56*	1.16		3.13*	1.51	
Gun Safe, % (SE)									
Baseline	30.4 (9.5)	17.2 (7.4)	1.19	20.5 (7.7)	34.0 (9.5)	1.26	34.3 (9.6)	22.1 (7.6)	0.96
3 Mo.	31.5 (9.8)	19.1 (8.1)	0.94	23.1 (8.9)	35.5 (10.0)	0.85	42.4 (11.0)	25.7 (8.5)	1.38
6 Mo.	43.5 (11.2)	37.6 (11.0)	0.14	19.7 (8.2)	24.8 (8.4)	0.18	34.2 (10.5)	20.8 (7.7)	1.03
F _{within}	0.89	2.82		0.14	1.05		0.51	0.24	
Locking Device, % (SE)									
Baseline	34.0 (10.1)	14.4 (6.0)	2.82	28.1 (8.5)	18.4 (6.4)	0.83	18.0 (7.4)	19.3 (7.0)	0.02
3 Mo.	58.5 (11.7)	20.7 (8.2)	6.99**	71.1 (8.8)	31.2 (8.6)	10.51**	45.9 (11.4)	34.6 (8.8)	0.62
6 Mo.	58.5 (12.0)	36.6 (12.5)	1.62	58.0 (10.6)	39.2 (9.5)	1.74	55.7 (9.8)	34.1 (10.1)	2.29
F _{within}	2.83	1.65		7.14**	3.03		8.75**	1.51	
Unloaded, % (SE)									
Baseline	46.2 (10.5)	43.3 (10.9)	0.03	55.3 (10.1)	62.7 (9.3)	0.29	56.5 (11.9)	28.3 (9.8)	3.15
3 Mo.	55.8 (10.7)	41.9 (10.8)	0.82	79.2 (8.2)	72.6 (8.8)	0.30	42.3 (11.8)	49.2 (11.1)	0.16
6 Mo.	48.5 (10.4)	60.6 (10.7)	0.66	53.3 (10.6)	61.4 (9.8)	0.31	59.1 (12.9)	53.2 (12.5)	0.10
F _{within}	0.47	2.10		4.27*	1.03		1.75	2.13	

Note: * $p < .05$, ** $p < .01$. MRNS = Male Role Norms Scale; CL = Cable Locks

Figure 4. Moderation of Cable Lock vs. No Lock intervention effect by MRNS Status (low, medium, high)



MRNS Toughness and LMC. The three-way interaction of MRNS Toughness x Condition x Time was statistically significant for locking device use ($F[2, 638] = 4.03, p = .018$), indicating that the moderating effect of time on the relationship between LMC condition (LMC vs. H&S) and locking device use was conditional upon levels of the masculine norm of Toughness; however, the effect was non-significant after applying the Benjamini-Hochberg correction. The two-way interaction of LMC condition and time on locking device use was significant only at medium levels of Toughness ($F[2, 229] = 4.12, p = .018$; Table 15). Specifically, within group comparisons demonstrated that locking device use significantly increased over time among individuals with medium levels of MRNS Toughness who received LMC ($F[2, 229] = 15.22, p < .001$; Table 16).

Despite the non-significant two-way interactions of LMC condition and time, between and within group differences were observed on locking device use among those low and high MRNS Toughness. The rate of locking device use significantly increased over time among individuals with low ($F[2, 211] = 9.11, p < .001$) levels of MRNS Toughness. Between group differences indicated that among those with low levels of MRNS Toughness, individuals in the LMC group endorsed significantly higher number locking device use than the H&S group at 6 months (77.1% vs. 46.8%; $OR = 3.83, 95\% CI [1.36, 10.80], p = .023$;) post-intervention. Among those with high levels of MRNS Toughness, individuals in the LMC group endorsed a significantly lower rate of locking device use than those in the H&S group at the 3-month follow up (43.2% vs. 11.8%; $OR = 0.18, 95\% CI [0.05, 0.63], p = .023$); however, this difference was non-significant at 6 months post-intervention. Figure 5 illustrates the effects of LMC vs. H&S and time based on low, medium, and high levels of MRNS Toughness.

The moderating effects of time on the relationships between LMC condition and number of storage practices, gun safe use, and unloaded storage were not conditional upon levels of MRNS Toughness ($ps > .05$; Table 15). The remaining non-significant three-way interactions were then probed. The two-way interaction of LMC condition and time on number of storage methods was significant at medium ($F[2, 229] = 3.26, p = .040$) levels of MRNS Toughness only. Specifically, within group comparisons revealed that the number of storage methods significantly increased over time among those who received LMC ($F[2,229] = 6.11, p = .003$; Table 16).

The two-way interaction of LMC condition and time on gun safe use and unloaded storage was non-significant at low, medium, and high levels of MRNS Toughness ($ps > .05$; Table 15). Despite this, within and between group differences were observed (Table 16). Within group comparisons demonstrated that individuals who endorsed medium levels of MRNS toughness and received LMC had higher rates of gun safe use over time ($F[2, 231] = 3.30, p = .039$); post hoc LSD comparisons showed that gun safe use significantly increased from baseline (25.3%) to 3 months (42.0%; $t[231] = 2.00, p = .046$) post-intervention. Additionally, the number of storage methods increased over time among those with high levels of MRNS Toughness, ($F[2, 184] = 3.38, p = .036$); post hoc LSD comparisons revealed that the difference was only significant at 3 months compared to baseline ($t[184] = 2.55, p = .012$). Between group differences revealed that among those with low levels of Toughness, individuals in the LMC group endorsed significantly higher number of storage practices compared to the control group at 3 months (1.73 vs. 1.28; $d = 0.52, 95\% \text{ CI } [0.05, 0.98], p = .030$) post-intervention.

Table 15 *Fixed effects for GLMM examining MRNS Toughness as a moderator. Intervention = Lethal Means Counseling vs. Health & Safety*

	Fixed Effects for 3-Way Interaction							
	No. Storage Methods ^a		Gun Safe ^b		Locking Device ^c		Unloaded ^d	
	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>
Condition	0.33	.565	0.06	.800	0.22	.641	0.48	.489
Time	9.16	<.001	0.44	.645	18.47	<.001	1.55	.212
MRNS Tough	2.38	.125	0.12	.733	2.68	.104	0.20	.658
Condition x Time	3.67	.026	4.42	.012	3.77	.023	0.22	.801
Tough x Condition	2.01	.158	0.04	.834	6.76	.010	0.90	.343
Tough x Time	0.44	.646	0.72	.486	0.70	.497	1.55	.212
Tough x Condition x Time	0.85	.430	0.11	.896	4.03	.018	1.69	.186

	Fixed Effects for Low, Medium, and High Levels of MRNS Toughness							
	No. Storage Methods ^d		Gun Safe		Locking Device		Unloaded	
	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>
Low								
Condition	5.38	.021	0.47	.495	3.92	.053	1.91	.172
Time	2.78	.064	0.11	.897	7.80	<.001	1.62	.201
Condition x Time	0.32	.730	1.20	.302	1.22	.296	0.42	.656
Medium^e								
Condition	0.53	.468	0.09	.769	0.28	.598	0.96	.330
Time	3.46	.033	0.66	.516	10.38	<.001	1.25	.289
Condition x Time	3.26	.040	3.02	.051	4.12	.018	0.46	.631
High^e								
Condition	3.00	.090	0.17	.678	3.14	.083	1.53	.222
Time	2.43	.091	1.00	.372	2.80	.064	0.17	.843
Condition x Time	1.13	.326	1.86	.159	2.02	.136	0.62	.541

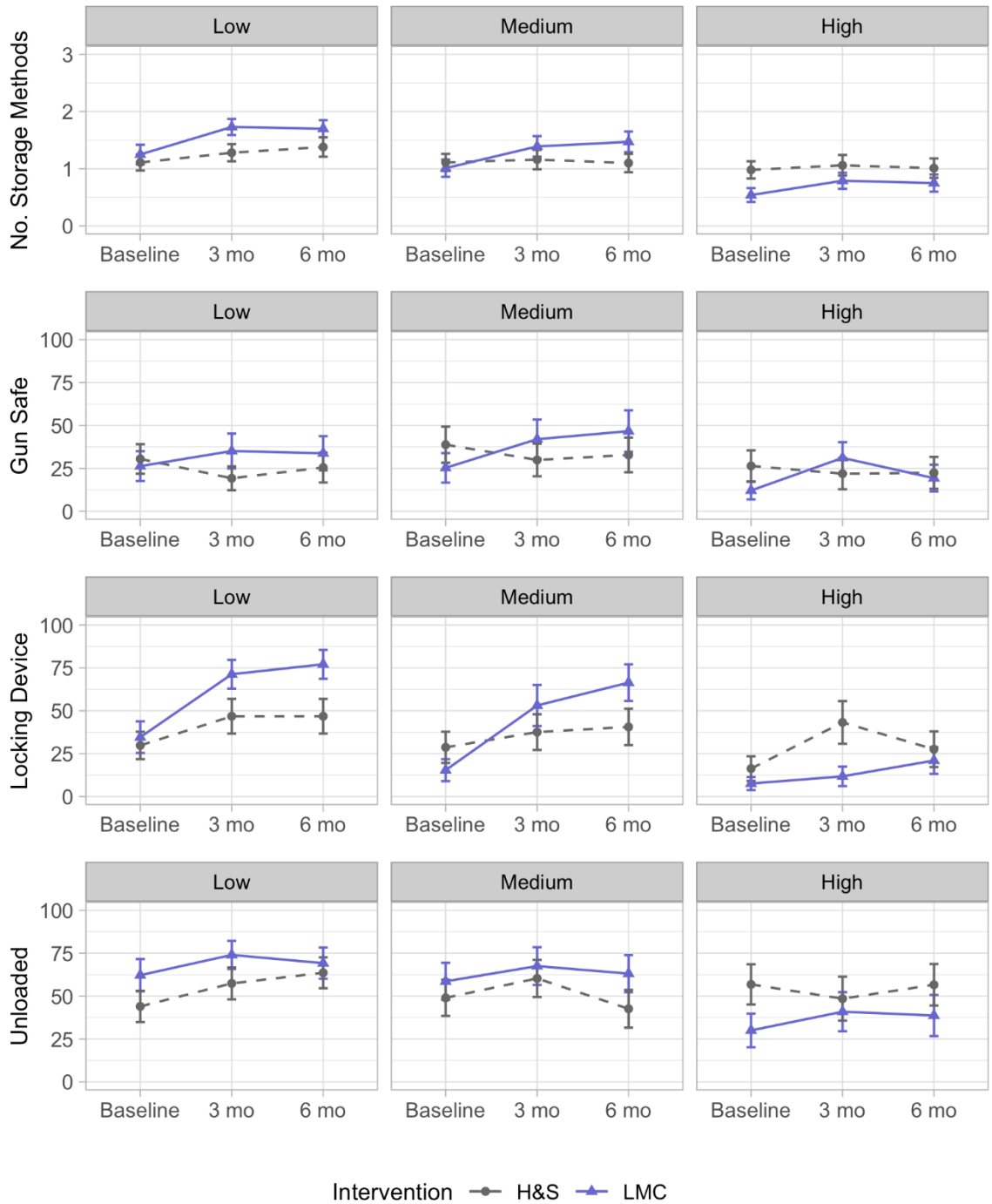
Note: Bold p-value indicates $p < .05$. Italicized p-value indicates effect statistically non-significant when applying Benjamini-Hochberg correction. MRNS Tough = Masculine Role Norms Scale, Toughness Subscale; ^a Covariates: religious activity, neighborhood safety, gender, MRNS Status, MRNS Anti-Femininity; ^b Covariates: gender, MRNS Status, MRNS Anti-Femininity; ^c Covariates: gender, race, neighborhood safety, MRNS Status, MRNS Anti-Femininity; ^d Covariates: religious activity, MRNS Status, MRNS Anti-Femininity; ^e Gender removed as covariate at medium and high levels of MRNS Toughness due to low cell counts of females; ^d Random intercept removed from analysis looking at two-way interaction among those with Low MRNS Toughness.

Table 16 *Estimated means for firearm storage practices by levels of MRNS Toughness. Intervention = LMC vs. Health & Safety*

	Low MRNS Toughness			Medium MRNS Toughness			High MRNS Toughness		
	LMC	H&S	F _{between}	LMC	H&S	F _{between}	LMC	H&S	F _{between}
No. Storage Methods, M (SE)									
Baseline	1.25 (0.17)	1.11 (0.14)	0.44	1.01 (0.15)	1.11 (0.15)	0.23	0.54 (0.12)	0.98 (0.15)	5.20*
3 Mo.	1.73 (0.14)	1.28 (0.15)	4.78*	1.39 (0.18)	1.16 (0.17)	0.92	0.79 (0.14)	1.06 (0.18)	1.43
6 Mo.	1.70 (0.15)	1.38 (0.17)	2.08	1.47 (0.18)	1.10 (0.16)	2.46	0.75 (0.15)	1.01 (0.17)	1.24
F _{within}	2.73	0.84		6.11**	0.21		3.38*	0.25	
Gun Safe, % (SE)									
Baseline	26.3 (8.7)	30.5 (8.6)	0.11	25.3 (8.6)	38.8 (10.5)	0.98	12.1 (5.2)	26.4 (9.1)	1.88
3 Mo.	35.1 (10.2)	19.2 (6.9)	1.66	42.0 (11.5)	29.9 (9.5)	0.65	31.1 (9.2)	21.9 (9.1)	0.50
6 Mo.	33.8 (10.0)	25.5 (8.7)	0.40	46.7 (12.1)	32.8 (10.1)	0.73	19.3 (7.8)	22.4 (9.3)	0.07
F _{within}	0.35	2.00		3.30*	0.49		2.38	0.71	
Locking Device, % (SE)									
Baseline	34.6 (9.2)	29.8 (8.0)	0.15	15.4 (6.4)	28.7 (9.1)	1.35	7.6 (3.8)	16.3 (7.2)	1.19
3 Mo.	71.3 (8.4)	46.8 (10.1)	3.45	53.1 (12.0)	37.6 (10.4)	0.91	11.8 (5.7)	43.2 (12.4)	5.28*
6 Mo.	77.1 (8.4)	46.8 (10.1)	5.28*	66.4 (10.7)	40.6 (10.6)	2.80	21.0 (7.8)	27.6 (10.4)	0.25
F _{within}	9.11**	1.59		15.22**	0.79		1.44	2.60	
Unloaded, % (SE)									
Baseline	62.2 (9.4)	44.0 (9.1)	1.91	58.6 (10.8)	49.0 (10.5)	0.40	30.0 (9.8)	56.8 (11.7)	2.99
3 Mo.	74.0 (8.2)	57.4 (9.3)	1.81	67.5 (11.0)	60.3 (10.8)	0.21	40.9 (11.4)	48.5 (12.8)	0.19
6 Mo.	69.2 (9.1)	63.6 (9.0)	0.19	63.1 (10.8)	42.6 (11.0)	1.74	38.7 (12.0)	56.6 (12.1)	1.06
F _{within}	0.50	2.00		0.22	2.85		0.82	0.38	

Note: * $p < .05$, ** $p < .01$. MRNS = Male Role Norms Scale; LMC = Lethal Means Counseling; H&S = Health and Safety.

Figure 5. Moderation of LMC vs. H&S intervention effect by MRNS Toughness (low, medium, high)



Note: H&S = Health and Safety; LMC = Lethal Means Counseling.

MRNS Toughness and Cable Lock Distribution. The three-way interaction of MRNS Toughness x Condition x Time was non-significant for number of storage methods, gun safe use, locking device use, and unloaded storage, suggesting that the effect of time on the relationships between LMC condition and each storage practice were not conditional upon levels of the masculine norm toughness ($p_s > .05$; Table 17).

The non-significant three-way interactions were probed. The two-way interaction of cable lock condition and time on all storage practices was non-significant at low, medium, and high levels of MRNS Toughness ($p_s > .05$; Table 17). Figure 6 illustrates the effects of cable lock condition and time based on low, medium, and high levels of MRNS Toughness.

Several within and between group differences were identified, despite the non-significant two-way interactions (Table 18). Among those with low MRNS Toughness, those in the cable lock group significantly increased the number of storage practices used over time ($F[2, 211] = 5.08, p = .007$). In the cable lock group, locking device use significantly increased over time for those with low ($F[2, 211] = 7.16, p = .001$), medium ($F[2, 229] = 3.79, p = .024$), and high ($F[2, 184] = 3.61, p = .029$) levels of MRNS Toughness. Post hoc LSD comparisons revealed that the difference in locking device use among those with high MRNS Toughness was only evident at 3 months compared to baseline (43.4% vs. 12.8%; $t[184] = 2.62, p = .010$). Surprisingly, locking device use increased over time among those with medium levels of MRNS Toughness and were in the control condition ($F[2, 229] = 4.75, p = .009$); this difference was evident at 6 months compared to baseline ($t[229] = 2.99, p = .003$). Between group differences revealed that, among those with low MRNS Toughness, those in the cable lock group endorsed

significantly higher rates of locking device use than those in the control group at 3 months (73.6% vs. 42.0%; $OR = 3.85$, 95% CI [1.43, 10.36], $p = .016$) and 6 months (75.8% vs. 44.8%; $OR = 3.86$, 95% CI [1.40, 10.68], $p = .026$) post-intervention. Among those with high MRNS Toughness, those who received cable locks endorsed a higher rate of locking device use (43.4%) than those in the control group (11.7%; $OR = 5.79$, 95% CI [1.61, 20.77], $p = .019$) at 3 months post-intervention.

Table 17 *Fixed effects for GLMM examining MRNS Toughness as a moderator. Intervention = Cable Lock vs. No Cable Lock*

	Fixed Effects for 3-Way Interaction							
	No. Storage Methods ^a		Gun Safe ^b		Locking Device ^c		Unloaded ^d	
	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>
Condition	2.98	.086	0.72	.397	9.26	.003	0.00	.951
Time	8.82	<.001	0.42	.658	16.48	<.001	1.64	.195
MRNS Tough	1.48	.227	0.09	.767	0.43	.515	0.09	.764
Condition x Time	1.21	.299	0.02	.978	1.80	.167	1.36	.258
Tough x Condition	2.13	.147	3.38	.068	0.06	.807	0.58	.447
Tough x Time	0.45	.638	0.99	.372	0.04	.965	2.14	.119
Tough x Condition x Time	2.08	.126	0.63	.531	1.98	.139	1.07	.345

	Fixed Effects for Low, Medium, and High Levels of MRNS Toughness							
	No. Storage Methods		Gun Safe		Locking Device		Unloaded	
	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>
Low								
Condition	0.38	.539	0.00	.982	5.30	.025	0.19	.666
Time	4.32	.014	0.09	.914	7.35	<.001	1.76	.174
Condition x Time	0.88	.416	0.10	.908	1.41	.248	0.31	.734
Medium^e								
Condition	0.48	.490	0.00	.953	2.27	.137	0.29	.594
Time	3.05	.049	0.51	.604	8.13	<.001	1.42	.245
Condition x Time	0.14	.874	0.49	.612	0.24	.790	0.55	.579
High^e								
Condition	2.22	.144	2.81	.099	2.85	.098	0.21	.646
Time	2.09	.127	1.11	.333	2.73	.068	0.16	.857
Condition x Time	1.01	.366	0.56	.574	2.16	.119	1.68	.190

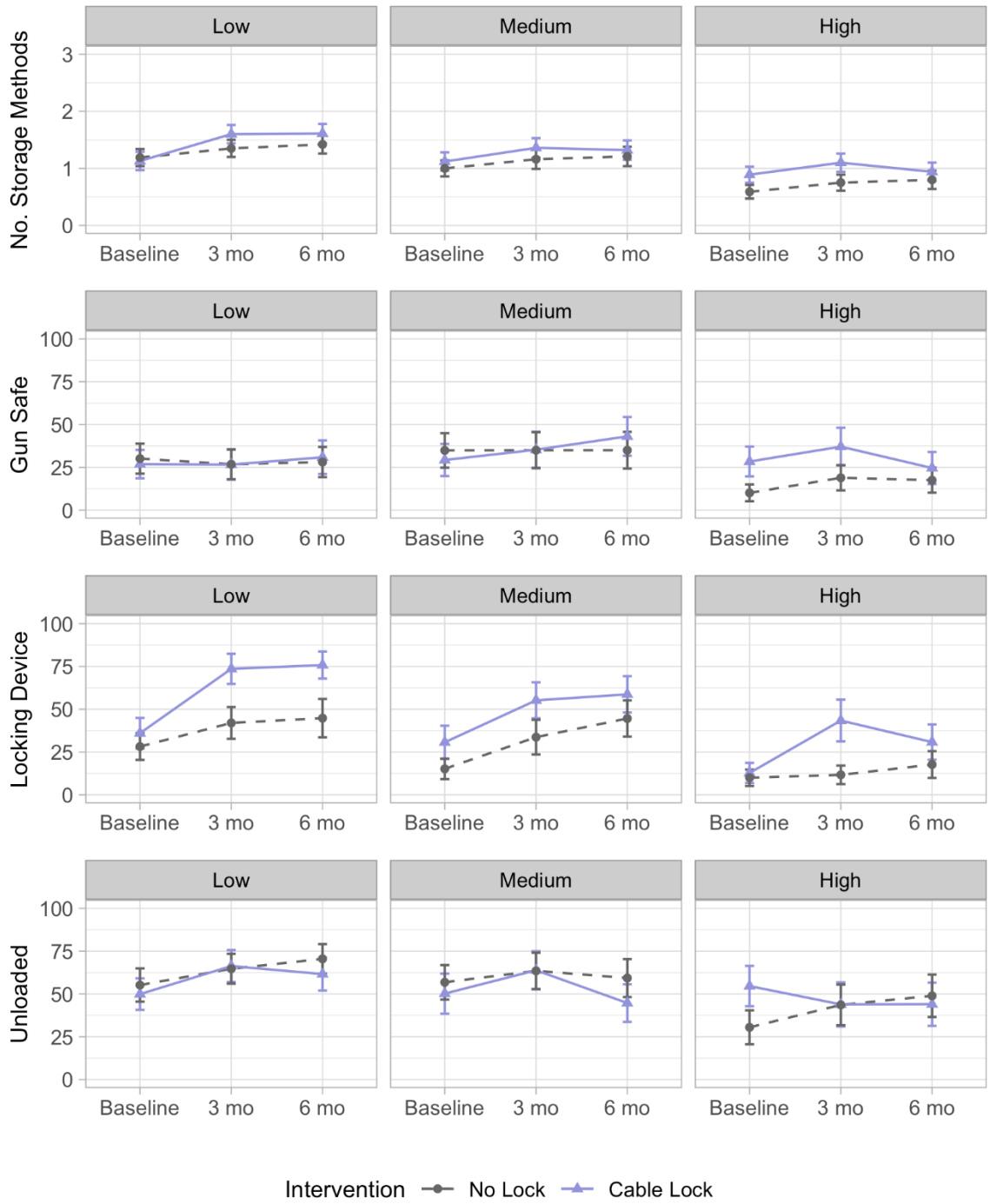
Note: Bold p-value indicates $p < .05$. MRNS Tough = Masculine Role Norms Scale, Toughness Subscale; ^a Covariates: religious activity, neighborhood safety, gender, MRNS Status, MRNS Anti-Femininity; ^b Covariates: gender, MRNS Status, MRNS Anti-Femininity; ^c Covariates: gender, race, neighborhood safety, MRNS Status, MRNS Anti-Femininity; ^d Covariates: religious activity, MRNS Status, MRNS Anti-Femininity; ^e Gender removed as covariate at medium and high levels of MRNS Toughness due to low cell counts of females.

Table 18 *Estimated means for firearm storage practices by levels of MRNS Toughness. Intervention = Cable Lock vs. No Cable Lock*

	Low MRNS Toughness			Medium MRNS Toughness			High MRNS Toughness		
	CL	No CL	F _{between}	CL	No CL	F _{between}	CL	No CL	F _{between}
No. Storage Methods, M (SE)									
Baseline	1.13 (0.16)	1.19 (0.15)	0.08	1.12 (0.16)	1.00 (0.14)	0.31	0.89 (0.14)	0.59 (0.12)	2.94
3 Mo.	1.60 (0.16)	1.35 (0.15)	1.36	1.36 (0.17)	1.16 (0.17)	0.69	1.10 (0.16)	0.75 (0.14)	2.83
6 Mo.	1.61 (0.17)	1.42 (0.16)	0.64	1.32 (0.17)	1.21 (0.17)	0.24	0.94 (0.16)	0.80 (0.16)	0.34
F _{within}	5.08**	0.89		2.20	1.24		2.27	1.12	
Gun Safe, % (SE)									
Baseline	26.9 (8.3)	30.1 (8.8)	0.07	29.3 (9.4)	34.9 (10.1)	0.16	28.4 (8.7)	10.1 (4.9)	3.32
3 Mo.	26.6 (8.8)	26.8 (8.7)	0.00	35.3 (10.5)	35.0 (10.5)	0.00	37.1 (11.0)	18.9 (7.4)	1.88
6 Mo.	30.9 (9.8)	28.1 (8.8)	0.05	43.1 (11.3)	35.0 (10.7)	0.27	24.6 (9.4)	17.5 (7.3)	0.37
F _{within}	0.14	0.06		0.00	1.04		0.89	0.55	
Locking Device, % (SE)									
Baseline	36.0 (8.9)	28.2 (7.8)	0.44	30.7 (9.7)	15.2 (6.0)	1.76	12.8 (5.9)	10.0 (4.8)	0.14
3 Mo.	73.6 (8.8)	42.0 (9.3)	5.92*	55.2 (10.5)	33.7 (10.1)	2.13	43.4 (12.2)	11.7 (5.4)	5.62*
6 Mo.	75.8 (7.9)	44.8 (11.2)	5.03*	58.7 (10.6)	44.6 (10.6)	0.86	30.8 (10.3)	17.7 (7.8)	1.03
F _{within}	7.16**	1.80		3.79*	4.75**		3.61*	0.47	
Unloaded, % (SE)									
Baseline	49.9 (9.2)	55.2 (9.7)	0.16	50.2 (11.7)	56.8 (10.1)	0.18	54.6 (11.8)	30.5 (9.9)	2.38
3 Mo.	66.3 (9.3)	64.7 (8.7)	0.02	63.8 (11.2)	63.5 (10.6)	0.00	43.9 (12.9)	43.6 (11.9)	0.00
6 Mo.	61.6 (9.6)	70.5 (8.6)	0.49	44.7 (11.0)	59.3 (11.1)	0.88	44.0 (12.6)	48.9 (12.4)	0.07
F _{within}	1.23	0.98		1.74	0.17		0.57	1.16	

Note: * $p < .05$, ** $p < .01$. MRNS = Male Role Norms Scale; CL = Cable Locks

Figure 6. Moderation of Cable Lock vs. No Lock intervention effect by MRNS Toughness (low, medium, high)



MRNS Anti-Femininity and LMC. The three-way interaction of MRNS Anti-Femininity x Condition x Time was non-significant for number of storage methods, gun safe use, locking device use, and unloaded storage, suggesting that the effect of time on the relationships between LMC condition and each storage practice was not conditional upon levels of the masculine norm Anti-Femininity ($ps > .05$; Table 19).

The non-significant three-way interactions were probed (Table 19). With regard to gun safe use, the two-way interaction of LMC condition and time was statistically significant at low ($F[2, 203] = 3.20, p = .043$) and medium ($F[2, 221] = 4.72, p = .010$) levels of MRNS Anti-Femininity only. Within group differences revealed that the changes in gun safe use were among those with low MRNS Anti-Femininity who received the control condition ($F[2, 203] = 3.58, p = .030$). Specifically, those who were in the control condition endorsed significantly lower rates of gun safe use at 3 months compared to baseline (22.2. % vs. 36.1%; $t[203] = 2.13, p = .034$). Among those with medium levels of MRNS Anti-Femininity, the rates of gun safe use significantly decreased over time among those in the control condition ($F[2, 221] = 5.04, p = .007$). The two-way interaction of LMC condition and time on number of storage methods, locking device use, and unloaded storage was non-significant at low, medium, and high levels of MRNS Anti-Femininity ($ps > .05$; Table 19). Figure 7 illustrates the effects of LMC condition and time based on low, medium, and high levels of MRNS Anti-Femininity.

Several within and between group differences were identified despite the non-significant two-way interactions (Table 20). Within group differences showed that, among those with low ($F[2, 203] = 3.54, p = .031$) and medium ($F[2, 221] = 6.35, p =$

.002) levels of MRNS Anti-Femininity, the mean number of storage methods used significantly increased over time among those in the LMC group. In addition, the rate of locking device use significantly increased over time among those who received LMC and endorsed low ($F[2, 203] = 4.57, p = .012$) and medium ($F[2, 221] = 25.23, p < .001$) levels of MRNS Anti-Femininity. Between group differences demonstrated that, among those with low MRNS Anti-Femininity, those who received LMC endorsed higher rates of locking device use (65.9%) than those in the control group (36.7%; $OR = 3.33, 95\% CI [1.21, 9.22], p = .043$) at 6 months post-intervention. Among those with medium levels of MRNS Anti-Femininity, those who received LMC endorsed higher rates of using a locking device than the control group at 3 months (71.6% vs. 42.6%; $OR = 3.40, 95\% CI [1.30, 8.88], p = .036$) and 6 months (71.6% vs. 42.0%; $OR = 3.48, 95\% CI [1.32, 9.16], p = .037$) post-intervention.

Table 19 *Fixed effects for GLMM examining MRNS Anti-Femininity as a moderator. Intervention = Lethal Means Counseling vs. Health & Safety*

	Fixed Effects for 3-Way Interaction							
	No. Storage Methods ^a		Gun Safe ^a		Locking Device ^a		Unloaded ^b	
	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>
Condition	0.16	.690	0.07	.787	0.35	.557	0.13	.725
Time	9.88	<.001	0.61	.545	17.73	<.001	1.95	.143
MRNS Anti-Fem	2.80	.095	0.20	.657	1.66	.199	5.06	.025
Condition x Time	3.01	.050	4.45	.012	3.52	.030	0.16	.854
Anti-Fem x Condition	0.07	.791	0.00	.981	0.93	.335	0.02	.893
Anti-Fem x Time	1.06	.347	1.31	.272	0.21	.809	0.95	.386
Anti-Fem x Condition x Time	1.24	.290	1.59	.205	1.35	.260	0.70	.499

	Fixed Effects for Low, Medium, and High Levels of MRNS Anti-Fem							
	No. Storage Methods		Gun Safe		Locking Device		Unloaded	
	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>
Low								
Condition	1.02	.319	0.16	.691	0.57	.455	0.85	.362
Time	2.67	.071	0.44	.643	3.43	.034	1.92	.150
Condition x Time	1.16	.315	3.20	.043	1.94	.146	0.32	.727
Medium^c								
Condition	0.58	.451	0.95	.334	2.13	.151	0.00	.981
Time	3.12	.046	1.33	.266	14.29	<.001	0.27	.765
Condition x Time	2.76	.066	4.72	.010	2.29	.104	0.54	.583
High^c								
Condition	0.65	.422	0.42	.522	1.22	.274	0.03	.867
Time	3.58	.030	2.60	.077	2.77	.065	0.84	.432
Condition x Time	0.20	.822	0.22	.805	0.26	.768	0.54	.583

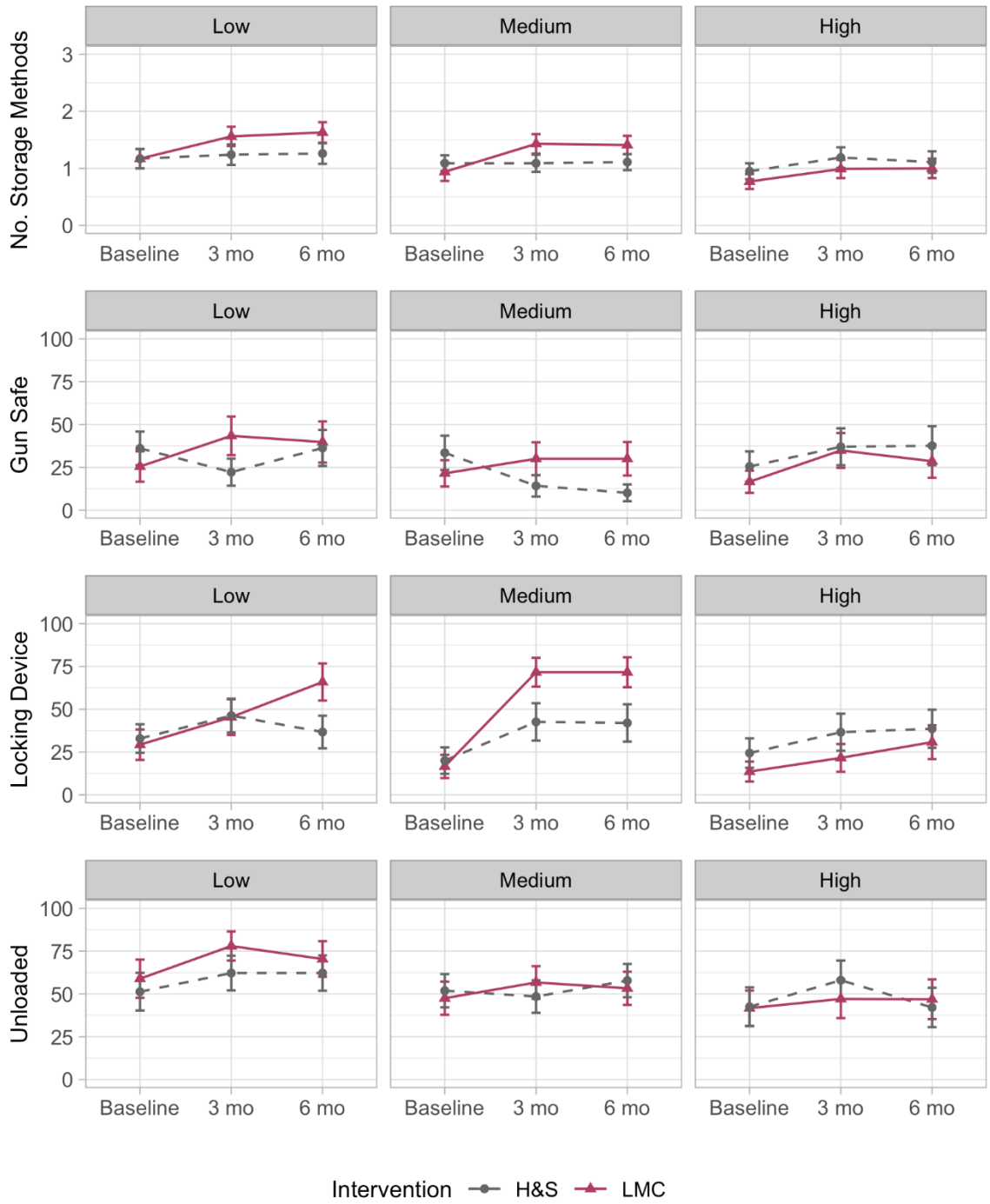
Note: Bold p-value indicates $p < .05$. MRNS Anti-Fem = Masculine Role Norms Scale, Anti-Femininity Subscale; ^a Covariates: gender, MRNS Status, MRNS Toughness; ^b Covariates: MRNS Status, MRNS Toughness; ^c Gender removed as covariate at medium and high levels of MRNS Toughness due to low cell counts of females.

Table 20 *Estimated means for firearm storage practices by levels of MRNS Anti-Femininity. Intervention = LMC vs. Health & Safety*

	Low MRNS Anti-Fem			Medium MRNS Anti-Fem			High MRNS Anti-Fem		
	LMC	H&S	F _{between}	LMC	H&S	F _{between}	LMC	H&S	F _{between}
No. Storage Methods, M (SE)									
Baseline	1.17 (0.17)	1.17 (0.17)	0.00	0.94 (0.16)	1.09 (0.14)	0.45	0.77 (0.13)	0.95 (0.14)	0.86
3 Mo.	1.56 (0.17)	1.24 (0.18)	1.80	1.43 (0.17)	1.09 (0.15)	2.44	0.99 (0.16)	1.19 (0.18)	0.70
6 Mo.	1.63 (0.18)	1.26 (0.18)	0.00	1.41 (0.16)	1.11 (0.14)	2.02	1.00 (0.17)	1.11 (0.19)	0.18
F _{within}	3.54*	0.22		6.35**	0.03		1.92	1.65	
Gun Safe, % (SE)									
Baseline	25.5 (8.9)	36.1 (9.8)	0.63	21.5 (7.7)	33.5 (10)	0.90	16.6 (6.5)	25.5 (8.8)	0.66
3 Mo.	43.4 (11.3)	22.2 (7.9)	2.31	30.0 (9.6)	14.2 (6.3)	1.88	34.9 (10.2)	37.0 (10.8)	0.02
6 Mo.	39.8 (12.0)	36.3 (10.5)	0.05	30.0 (9.8)	10.1 (4.9)	3.30	28.6 (9.7)	37.6 (11.4)	0.36
F _{within}	1.46	3.58*		0.79	5.04**		1.63	1.04	
Locking Device, % (SE)									
Baseline	29.3 (8.9)	32.9 (8.3)	0.09	16.6 (6.8)	20.0 (7.7)	0.11	13.6 (5.8)	24.4 (8.6)	1.08
3 Mo.	45.4 (10.4)	46.3 (9.9)	0.00	71.6 (8.4)	42.6 (10.9)	4.51*	21.6 (8.1)	36.6 (10.8)	1.23
6 Mo.	65.9 (10.8)	36.7 (9.5)	4.14*	71.6 (8.7)	42.0 (10.9)	4.44*	30.8 (9.9)	38.6 (11.1)	0.27
F _{within}	4.57*	0.73		25.23**	2.58		1.69	1.04	
Unloaded, % (SE)									
Baseline	58.9 (11.2)	51.3 (11.0)	0.24	47.5 (9.7)	51.9 (9.7)	0.10	41.7 (10.3)	42.5 (11.3)	0.00
3 Mo.	78.0 (8.5)	62.2 (10.1)	1.43	56.7 (9.5)	48.5 (9.5)	0.37	47.1 (11.2)	58.0 (11.5)	0.46
6 Mo.	70.4 (10.4)	62.2 (10.3)	0.32	53.3 (9.7)	57.8 (9.7)	0.11	46.9 (11.6)	42.1 (11.5)	0.09
F _{within}	1.44	0.69		0.30	0.45		0.21	1.77	

Note: * $p < .05$, ** $p < .01$. MRNS Anti-Fem = Male Role Norms Scale, Anti-Femininity Subscale; LMC = Lethal Means Counseling; H&S = Health and Safety.

Figure 7. Moderation of LMC vs. H&S intervention effect by MRNS Anti-Femininity (low, medium, high)



Note: H&S = Health and Safety; LMC = Lethal Means Counseling.

MRNS Anti-Femininity and Cable Lock Distribution. The three-way interaction of MRNS Anti-Femininity x Condition x Time was non-significant for number of storage methods, gun safe use, locking device use, and unloaded storage, suggesting that the effect of time on the relationships between cable lock condition and each storage practice was not conditional upon levels of the masculine norm Anti-Femininity ($ps > .05$; Table 21).

The non-significant three-way interactions were probed (Table 21). The two-way interaction of cable lock condition and time on locking device use was significant at medium levels of MRNS Anti-Femininity ($F[2, 221] = 3.33, p = .038$). Within group differences revealed that locking device use significantly increased over time among those with medium levels of MRNS Anti-Femininity and received the cable lock condition ($F[2, 221] = 21.38, p < .001$; Table 22). Between group differences showed that compared to the control group, those who received the cable lock condition had significantly higher rates of locking device use at 3 months (88.6% vs. 32.5%; $OR = 7.20$, 95% CI [2.58, 20.09], $p < .001$) and 6 months (77.4% vs. 32.5%; $OR = 7.11$, 95% CI [2.53, 19.98], $p = .001$) post-intervention. All other two-way interactions were non-significant. Figure 8 illustrates the effects of cable lock condition and time based on low, medium, and high levels of MRNS Anti-Femininity.

Despite the non-significant two-way interactions, within group differences were observed (Table 22). Among those with medium levels of MRNS Anti-Femininity, those who received the cable lock condition significantly increased the number of storage methods used over time ($F[2, 221] = 3.23, p = .042$). Surprisingly, those with medium levels of Anti-Femininity and received the control condition stored their firearms

unloaded at a higher rate over time ($F[2, 221] = 3.62, p = .028$); post hoc LSD comparisons showed that the significant difference was evident at 6 months compared to baseline (61.7% vs. 37.2%; $t[221] = 2.43, p = .016$).

Table 21 *Fixed effects for GLMM examining MRNS Toughness as a moderator. Intervention = Cable Lock vs. No Cable Lock*

	Fixed Effects for 3-Way Interaction							
	No. Storage Methods ^a		Gun Safe ^a		Locking Device ^a		Unloaded ^b	
	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>
Condition	2.75	.099	0.81	.369	10.36	.001	0.01	.943
Time	9.24	<.001	0.49	.615	16.07	<.001	1.92	.147
MRNS Anti-Fem	3.94	.048	0.53	.467	3.24	.073	4.41	.037
Condition x Time	0.69	.502	0.02	.976	1.28	.279	0.97	.381
Anti-Fem x Condition	0.19	.667	3.92	.049	0.97	.326	2.25	.135
Anti-Fem x Time	0.71	.493	1.44	.237	0.02	.983	0.87	.419
Anti-Fem x Condition x Time	0.57	.565	0.08	.922	1.32	.268	0.59	.556

	Fixed Effects for Low, Medium, and High Levels of MRNS Anti-Fem							
	No. Storage Methods		Gun Safe		Locking Device		Unloaded	
	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>
Low								
Condition	0.54	.465	0.00	.986	0.79	.377	0.74	.392
Time	2.66	.072	0.41	.661	2.90	.057	2.27	.105
Condition x Time	0.45	.637	0.07	.929	0.65	.522	0.27	.760
Medium^c								
Condition	2.12	.150	0.05	.819	6.96	.011	0.39	.536
Time	3.18	.043	0.96	.383	12.10	<.001	0.32	.728
Condition x Time	0.28	.753	0.63	.532	3.33	.038	2.92	.056
High^c								
Condition	0.01	.944	1.01	.320	2.02	.160	2.72	.105
Time	3.55	.031	2.61	.076	3.31	.039	0.75	.472
Condition x Time	0.68	.506	0.39	.681	0.98	.376	0.28	.759

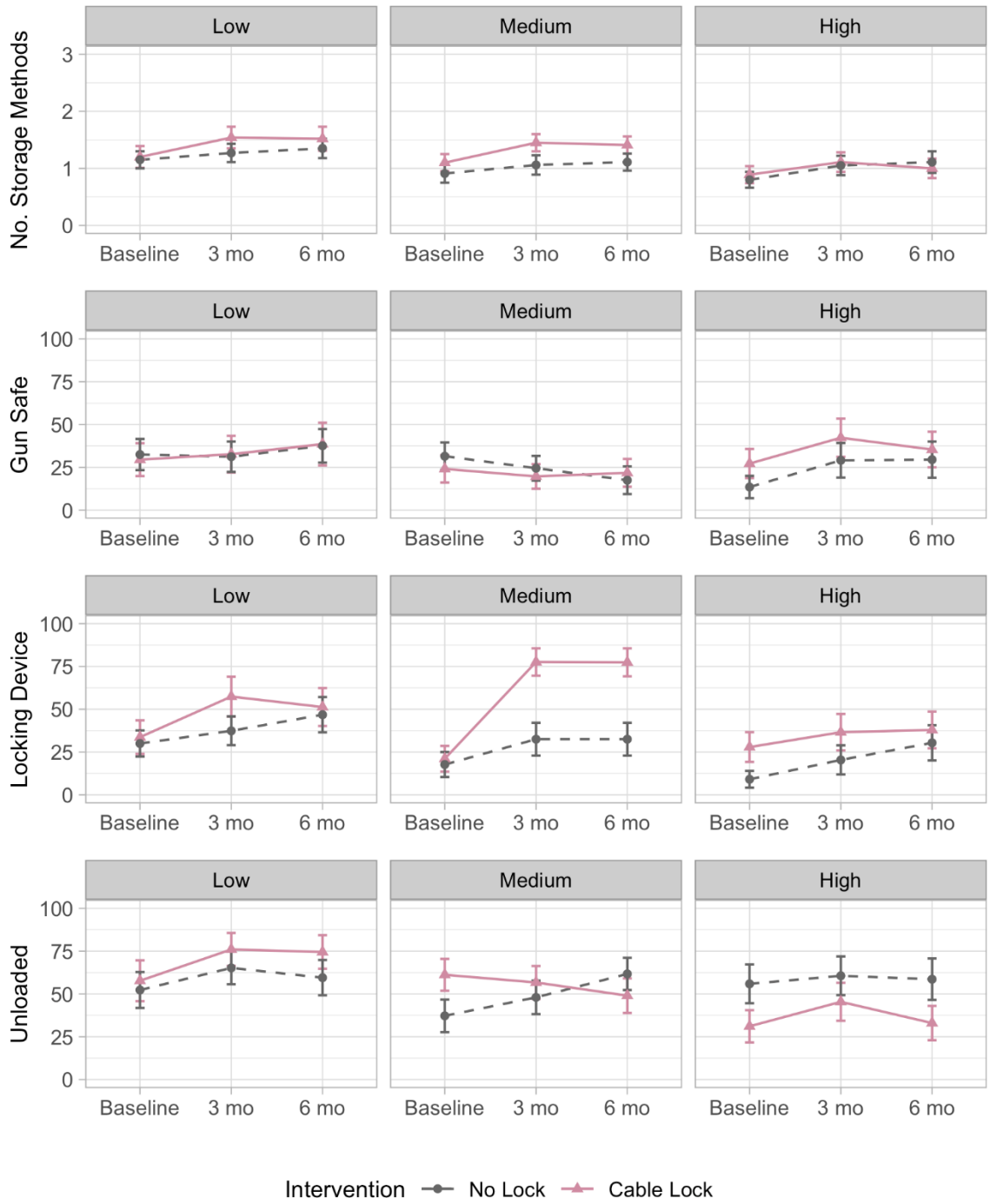
Note: Bold p-value indicates $p < .05$. MRNS Anti-Fem = Masculine Role Norms Scale, Anti-Femininity Subscale; ^a Covariates: gender, MRNS Status, MRNS Toughness; ^b Covariates: MRNS Status, MRNS Toughness; ^c Gender removed as covariate at medium and high levels of MRNS Toughness due to low cell counts of females.

Table 22 *Estimated means for firearm storage practices by levels of MRNS Anti-Femininity. Intervention = Cable Lock vs. No Cable Lock*

	Low MRNS Anti-Fem			Medium MRNS Anti-Fem			High MRNS Anti-Fem		
	CL	No CL	F _{between}	CL	No CL	F _{between}	CL	No CL	F _{between}
No. Storage Methods, M (SE)									
Baseline	1.20 (0.19)	1.15 (0.15)	0.06	1.10 (0.15)	0.91 (0.16)	0.74	0.89 (0.15)	0.80 (0.14)	0.16
3 Mo.	1.54 (0.19)	1.27 (0.16)	1.17	1.45 (0.15)	1.06 (0.17)	3.04	1.11 (0.17)	1.05 (0.17)	0.05
6 Mo.	1.52 (0.21)	1.35 (0.17)	0.40	1.41 (0.15)	1.11 (0.15)	2.02	1.00 (0.17)	1.11 (0.19)	0.17
F _{within}	2.61	0.81		3.23*	1.19		2.11	1.80	
Gun Safe, % (SE)									
Baseline	29.5 (9.6)	32.5 (9.1)	0.05	24.1 (8.0)	31.5 (8.0)	0.32	27.2 (8.5)	13.5 (6.5)	1.59
3 Mo.	32.7 (10.7)	31.2 (8.9)	0.01	19.7 (7.2)	24.5 (7.2)	0.18	42.3 (11.2)	29.1 (10.1)	0.72
6 Mo.	38.6 (12.5)	37.6 (9.8)	0.00	21.8 (8.1)	17.5 (8.1)	0.15	35.4 (10.4)	29.5 (10.6)	0.15
F _{within}	0.26	0.21		0.15	2.28		1.28	1.54	
Locking Device, % (SE)									
Baseline	33.7 (9.8)	30.0 (7.6)	0.09	21.1 (7.5)	17.7 (7.3)	0.11	27.9 (8.7)	9.1 (4.9)	3.39
3 Mo.	57.4 (11.6)	37.4 (8.4)	1.97	77.6 (8.0)	32.5 (9.6)	12.89**	36.6 (10.6)	20.4 (8.5)	1.35
6 Mo.	51.3 (11.1)	46.8 (10.3)	0.09	77.4 (8.2)	32.5 (9.6)	12.50**	37.9 (10.7)	30.4 (10.3)	0.24
F _{within}	2.06	1.34		21.38**	1.71		0.57	2.56	
Unloaded, % (SE)									
Baseline	57.7 (11.9)	52.3 (10.5)	0.12	61.2 (9.3)	37.2 (9.5)	3.27	31.1 (9.4)	55.9 (11.3)	2.77
3 Mo.	76.0 (9.6)	65.2 (9.5)	0.63	56.7 (9.6)	48.0 (9.8)	0.39	45.4 (11.1)	60.6 (11.3)	0.91
6 Mo.	74.5 (9.8)	59.5 (10.3)	1.11	49.0 (10.1)	61.7 (9.4)	0.84	33.0 (10.0)	58.6 (12.1)	2.62
F _{within}	2.31	0.89		0.55	3.62*		0.83	0.08	

Note: * $p < .05$, ** $p < .01$. MRNS Anti-Fem = Male Role Norms Scale, Anti-Femininity Subscale; CL = Cable Locks.

Figure 8. Moderation of Cable Lock vs. No Lock intervention effect by MRNS Anti-Femininity (low, medium, high).



Factors of Masculinity Ideology and Storage Practices Among Those Receiving LMC or Cable Locks

Selection of Covariates. Significant associations between demographic covariates, MRNS subscales, and the four storage outcomes are displayed in Table 3. Within the LMC subsample, the following demographic covariates were included for the analyses examining MRNS Status or MRNS Toughness as a moderator: religious activity for the number of storage methods, gun safe use, and unloaded storage outcomes; gender for the locking device outcome. For the analysis examining MRNS Anti-Femininity as a moderator on locking device use, gender was included as a covariate. Within the cable lock subsample, no demographic or environmental variables were associated with both the MRNS subscale of interest and storage practices pre-intervention; thus, no demographic covariates were included in the analyses limited to the cable locks subsample. In all analyses, the remaining two MRNS subscales were also included as covariates.

Exploratory Results. A series of GLMMs were utilized to examine the interaction of each MRNS factor and time among those who received LMC and those who received cable locks. For all GLMMs, continuous predictor variables were mean centered based on the sample of interest. Fixed effects for these analyses are presented in Tables 23-25. The two-way interaction of MRNS Toughness and time was significantly associated with locking device use among those receiving LMC ($F[2, 308] = 4.79, p = .009$) as well as unloaded storage among those receiving cable locks ($F[2, 313] = 3.04, p = .049$; Table 24); however, both interactions were considered non-significant after applying the Benjamini-Hochberg correction. To probe the interactions, the models were re-run to

assess the main effects of MRNS Toughness on locking device use at each time point.

Among those who received LMC, MRNS Toughness was significantly negatively associated with locking device use at 3 months ($AOR = 0.27$, 95% CI [0.13, 0.53], $p < .001$) and 6 months ($AOR = 0.47$, 95% CI [0.25, 0.90], $p = .024$) post-intervention.

Among those who received cable locks, the main effect of MRNS Toughness was non-significant at baseline ($AOR = 1.57$, 95% CI [0.96, 2.58], $p = .074$), 3 months ($AOR = 0.96$, 95% CI [0.56, 1.65], $p = .891$), and 6 months ($AOR = 0.96$, 95% CI [0.56, 1.64], $p = .874$). The moderating effects of MRNS Status and MRNS Anti-Femininity on time were non-significant across all storage outcomes for both intervention groups (Tables 23, 25).

Table 23 *Fixed effects for GLMMs examining MRNS Status as a moderator of time on storage practices among those receiving either intervention*

		LMC Subgroup							
		No. Storage Methods ^a		Gun Safe ^a		Locking Device ^a		Unloaded ^a	
		<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>
MRNS Status		3.63	.060	0.79	.377	1.69	.197	3.03	.085
Time		10.26	<.001	3.58	.029	16.15	<.001	1.38	.251
Status x Time		0.15	.861	0.89	.410	0.56	.574	0.99	.371

		Cable Locks Subgroup							
		No. Storage Methods ^c		Gun Safe ^c		Locking Device ^c		Unloaded ^c	
		<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>
MRNS Status		0.56	.457	0.02	.886	0.04	.852	1.35	.248
Time		7.63	.001	0.34	.711	11.98	<.001	0.94	.390
Status x Time		0.04	.965	2.02	.135	0.65	.524	1.70	.184

Note: Bold *p*-value indicates $p < .05$. LMC = Lethal Means Counseling; MRNS = Masculine Role Norms Scale; ^a Covariates: religious activity, MRNS Toughness, MRNS Anti-Femininity; ^b Covariates: gender, MRNS Toughness, MRNS Anti-Femininity; ^c Covariates: MRNS Toughness, MRNS Anti-Femininity.

Table 24 *Fixed effects for GLMMs examining MRNS Toughness as a moderator of time on storage practices among those receiving either intervention*

	LMC Subgroup							
	No. Storage Methods ^a		Gun Safe ^a		Locking Device ^a		Unloaded ^a	
	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>
MRNS Tough	4.96	.028	0.14	.710	10.23	.002	1.96	.165
Time	10.00	<.001	3.63	.028	16.79	<.001	1.40	.248
Tough x Time	0.27	.766	0.12	.886	4.79	.009	0.12	.891

	Cable Locks Subgroup							
	No. Storage Methods ^c		Gun Safe ^c		Locking Device ^c		Unloaded ^c	
	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>
MRNS Tough	0.03	.865	0.14	.707	1.70	.196	0.40	.527
Time	7.58	.001	0.37	.694	11.81	<.001	1.03	.358
Tough x Time	2.41	.092	1.00	.370	1.13	.325	3.04	.049

Note: Bold p-value indicates $p < .05$. Italicized p-value indicates effect statistically non-significant when applying Benjamini-Hochberg correction. LMC = Lethal Means Counseling; MRNS Tough = Masculine Role Norms Scale Toughness subscale; ^a Covariates: religious activity, MRNS Status, MRNS Anti-Femininity; ^b Covariates: gender, MRNS Status, MRNS Anti-Femininity; ^c Covariates: MRNS Status, MRNS Anti-Femininity.

Table 25 *Fixed effects for GLMMs examining MRNS Toughness as a moderator of time on storage practices among those receiving either intervention.*

	LMC Subgroup							
	No. Storage Methods ^a		Gun Safe ^a		Locking Device ^b		Unloaded ^a	
	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>
MRNS Anti-Fem	0.34	.563	0.09	.771	0.27	.605	0.61	.436
Time	9.98	<.001	3.59	.029	16.06	<.001	1.43	.241
Anti-Fem x Time	1.00	.368	0.66	.517	1.07	.343	0.56	.571

	Cable Locks Subgroup							
	No. Storage Methods ^a		Gun Safe ^a		Locking Device ^a		Unloaded ^a	
	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>	<i>F</i>	<i>p</i>
MRNS Anti-Fem	2.35	.129	0.18	.672	0.24	.627	8.81	.003
Time	7.59	.001	0.36	.696	11.72	<.001	1.07	.343
Anti-Fem x Time	0.85	.429	0.71	.493	0.59	.557	1.44	.239

Note: Bold p-value indicates $p < .05$. LMC = Lethal Means Counseling; MRNS Anti-Fem = Masculine Role Norms Scale Anti-Femininity subscale; ^a Covariates: MRNS Status, MRNS Toughness; ^b Covariates: gender, MRNS Status, MRNS Toughness.

CHAPTER IV – DISCUSSION

The present study sought to examine if traditional masculinity ideology was associated with service members' firearm storage practices and impacted the effectiveness of LMC or the provision of cable locks on firearm storage practices over time. First, we examined if masculinity ideology was associated with firearm storage practices pre-intervention. Second, we evaluated if adherence to masculinity ideology was associated with differences in the effect of receiving each intervention on storage practices over time. Third, we examined if masculinity ideology predicts storage changes over time among those who received the intervention conditions. For exploratory purposes, we also examined if three factors of masculinity ideology (Status, Toughness, Anti-Femininity) independently serve as predictors in our models. Primary findings did not support our hypotheses regarding the impact of overall masculinity ideology; however, several findings from the exploratory analyses examining the three factors of masculinity ideology were notable, highlighting the impact that specific factors of masculinity ideology may have on firearm storage practices and response to intervention.

Masculinity Ideology and Firearm Storage Practices Pre-Intervention

The hypothesis that higher overall adherence to masculinity ideology would be associated with less safe firearm storage practices pre-intervention was not supported. Findings from the exploratory analyses suggest that higher adherence to a specific masculine norm, Anti-Femininity, is associated with decreased likelihood of storing firearms unloaded pre-intervention. The Anti-Femininity factor reflects beliefs that men should avoid stereotypically feminine behaviors. As noted earlier, firearm ownership may be a way for individuals to express their masculine identity, particularly as protectors,

and serve as a symbol of masculinity among men and women (Baker, 2005; Carlson, 2015; McDermott et al., 2021). Relatedly, higher endorsement of masculine ideals has been associated with higher odds of owning a firearm for protection among men and women (Warner et al., 2021). In addition, firearm marketing does tend to promote firearms as a tool women can use to protect themselves against dangerous individuals and a tool men can use to protect women and other “vulnerable” individuals (Blair & Hyatt, 1995; Finley & Esposito, 2019). It may be that being able to protect oneself and/or others with a firearm particularly aligns with masculine norms and is considered incongruent with feminine norms. Indeed, Butterworth and colleagues (2020) found that firearm owners who own for protection (versus other reasons) were more likely to store their firearms loaded. Firearm owners who view a firearm as tool for protection, which aligns with their masculine identity, may feel that tool should always be accessible in case of an emergency, and therefore store it loaded (Butterworth et al., 2020). In other words, it may be that individuals who are strongly opposed to stereotypically feminine behaviors may view storing firearms unloaded as defeating the purpose of owning a firearm in the first place.

Masculinity Ideology, Intervention, and Firearm Storage Practices

Inconsistent with hypotheses, the three-way interactions of overall masculinity ideology, intervention condition, and time was non-significant for both interventions on all storage outcomes. For exploratory purposes, we examined the three MRNS subscales as potential moderators of the effectiveness of either intervention condition versus control. While the three-way interaction of adherence to the masculine norm of Toughness, LMC intervention condition, and time was significant for locking device use,

this finding was considered non-significant after applying the Benjamini-Hochberg correction to control the false discovery rate. All other three-way interactions in the exploratory analyses were non-significant. Taken together, these findings suggest that the effects of the LMC and cable lock interventions on storage practices over time were not conditional upon levels of overall nor specific facets of masculinity ideology. However, the non-significant findings are not necessarily surprising given that we were underpowered to detect the three-way interactions. Due to this, we chose to probe the non-significant interactions to examine if the intervention effects differed at low, medium, and high levels of masculinity ideology. We recognize that this approach is unconventional; therefore, the following interpretations are considered preliminary and should be viewed with caution.

Individuals Who May Benefit from Either Intervention

Regarding overall masculinity ideology, results of the group differences suggest that the interventions were associated with higher rates of locking device use among those with low or medium levels of overall masculinity ideology. Specifically, compared to the H&S intervention, the LMC intervention was associated with higher rates of locking device use at 6 months among individuals with low levels of overall masculinity ideology. Compared to the control condition, the cable lock condition was associated with higher rates of locking device use among those with medium levels of overall masculinity ideology. While the mean number of overall storage methods significantly increased among those who received LMC and had low levels of masculinity ideology, the difference between LMC and H&S was only significant at 3 months post-baseline. Similar to the primary findings, exploratory analyses indicated that either intervention

was more effective on changing locking device use than the control condition for those with low adherence to the masculine norm of Toughness and low or medium adherence to the norm of Anti-Femininity. Specifically, the LMC intervention was more effective than the H&S condition on locking device use for individuals with low adherence to the norm of Anti-Femininity. In addition, both the LMC and the cable lock conditions were associated with a greater increase in locking device use compared to the control conditions among individuals with low adherence to the norm of Toughness and medium adherence to the norm of Anti-Femininity. Overall, these preliminary findings suggest that individuals with low adherence to the norm of Toughness or medium adherence to the norm of Anti-Femininity may benefit from either intervention; however, individuals with low adherence to the norm of Anti-Femininity may only benefit on changing their locking device use if they receive LMC. It may be that individuals with low adherence to Anti-Femininity are more willing to change their storage practices when the intervention provided contains a conversation about firearm safety. However, further research is needed to better understand why individuals with medium, but not low, adherence to Anti-Femininity benefit from receiving cable locks. Perhaps providing cable locks to individuals with medium levels of adherence allows them to have a sense of agency and autonomy in deciding how to store their firearms, which aligns with their masculine views.

Individuals Who May Not Benefit from Either Intervention

Importantly, neither intervention appeared to be more effective than the control conditions on changing firearm storage outcomes for individuals with high levels of overall masculinity ideology. This finding, which should be interpreted with caution,

suggests that the interventions as they are currently designed may not be reaching those with high endorsement of traditional masculinity ideology. This finding is particularly concerning given that a recent study found that men with high endorsement of traditional masculinity were more than twice as likely to die by suicide compared to men with low endorsement (Coleman et al., 2020). Additionally, greater adherence to traditional masculinity ideology and norms has been shown to be associated with negative mental health outcomes, reduced psychological help-seeking (Wong et al., 2017), suicidal ideation (Coleman et al., 2014) and externalizing behaviors (Jampel et al., 2020). Therefore, the interventions may not be reaching those who are at higher risk for negative outcomes, including dying by suicide. Alternatively, it may be that individuals with high masculinity ideology may be more receptive to the LMC or cable lock interventions when they are experiencing high levels of distress or psychological symptomology. For example, men with high adherence to traditional male role norms may only engage in psychotherapy when they are experiencing significantly high levels of mental health symptoms (Eggenberger et al., 2021). It may be that utilizing more secure firearm storage practices is not viewed as important by firearm-owning individuals who adhere to high masculinity ideology unless they are experiencing high levels of distress themselves and thus view the practice as relevant to their well-being and safety.

The results of the exploratory analyses can be used to better understand if certain facets of masculinity ideology may be driving these preliminary findings. Exploratory findings suggest that neither intervention appeared to be more effective than the control conditions on increasing rates of locking device use over time among those with medium or high adherence to the norm of Toughness and/or high adherence to the norm of Anti-

Femininity. Additionally, there were several instances where the effectiveness of the interventions on storage practices were short-term and not maintained at the 6 months follow up, particularly for the cable lock intervention. Specifically, individuals with low adherence to the norm of Toughness who received LMC endorsed a higher mean number of storage methods than those who received H&S at 3 months, but not 6 months.

Compared to the control condition, individuals who received the cable lock condition and endorsed low or medium adherence to the masculine norm of Status reported higher rates of locking device use at 3 months only. However, the group differences between LMC and H&S were non-significant for all storage practices for those with low, medium, or high adherence to Status. It may be that we were underpowered to detect these effects, which are likely small in magnitude. Conversely, it may be that the strength of adherence to masculine Status does not impact the effectiveness of LMC versus H&S. Therefore, additional research is needed with a larger sample to better determine the effect of adherence to Status on responsiveness to LMC versus H&S. Surprisingly, the cable lock condition did appear to be more effective than the control condition on increasing rates of locking device use among individuals with high adherence to the norm of Toughness; however, this difference was only at 3 months and was not maintained at the final follow-up.

While additional research is needed, these preliminary findings suggest that the interventions as they are currently designed may not be as effective for individuals who strongly adhere to masculinity ideology. It may be that the high adherence to the norms of Toughness and/or Anti-Femininity particularly impact the effectiveness of the interventions. If additional research confirms this trend, modifications to the interventions

may be needed to expand their reach. One possible modification may be to the conversation on safer firearm storage practices itself. However, such a modification should not over-emphasize masculine values, as rigid adherence to such norms can have detrimental effects (e.g., Coleman et al., 2020; Wong et al., 2017). Rather, the intervention may need to be tailored to incorporate a strengths-based approach that recognizes the positive aspects of masculine norms and gender role socialization. For example, Kiselica and Englar-Carlson (2010) proposed the Positive Psychology/Positive Masculinity (PPPM) model as a strength-based approach that helps males identify and embrace adaptive and healthy aspects of traditional masculinity. According to the PPPM model, positive aspects of masculinity include: (1) male relational styles (e.g., developing relationships through shared activities), (2) male ways of caring (e.g., protecting friends and loved ones), (3) generative fatherhood (e.g., helping the next generation lead a more successful life), (4) male self-reliance (e.g., being self-sufficient while also considering advice from others with how to solve problems), (5) male work ethic/providing role (e.g., being a worker and provider), (6) men's respect for women (e.g., refrain from engaging in violent behaviors towards women, challenge others who promote sexism); (7) men's courage, daring, and risk taking (e.g., being courageous by taking risks but not being reckless), (8) group orientation (e.g., socialize and work in groups), (9) male forms of service (e.g., duty to provide service to their community) (10) use of humor (e.g., use humor to demonstrate they care for others), and (11) male heroism (e.g., learn from their heroes) (Kiselica & Englar-Carlson, 2010). Prior to the interventions, we may need to identify positive aspects of masculinity that the individual values and incorporate such aspects into the discussion of secure firearm storage practices for suicide prevention. For

example, for an individual who values being self-reliant, the clinician could emphasize how secure firearm storage demonstrates that they are able to protect themselves without necessarily needing professional help if they were to experience suicidal thoughts.

Another possible modification may be in the context of how the intervention is delivered. In the initial RCT, the clinicians were graduate students, the majority of whom were female civilians. It may be that the interventions may be more effective for firearm-owning service members with high adherence to traditional masculinity ideology when it is delivered by an individual who they perceive to reflect their masculine-driven values, such as a male-identifying individual, a service member, and/or a firearm owner.

Additionally, it may be that firearm-owning service members are more responsive to the interventions when it is delivered by someone they perceive as credible. For example, Anestis, Bond, and colleagues (2021) found that firearm owners and non-firearm owners rank law enforcement, current military personnel, and military veterans as the most credible sources to discuss firearm safety for suicide prevention. Interestingly, all three sources come from masculine-driven cultures or male-dominated fields. Further research is needed to better understand which sources are credible to discuss firearm storage practices for individuals who strongly adhere to masculine norms. Such research should also consider which specific characteristics, in isolation or in combination, of the source are important (e.g., gender, firearm ownership status, military branch, rank).

Individuals Who May Not Benefit Long Term from Either Intervention

As noted earlier, there were several instances where the effectiveness of the interventions was not maintained over time. To further understand these findings, we examined the estimated means across conditions and observed that the rates of locking

device use tended to slightly increase for those in the control conditions, although not to the point of statistical significance. Additionally, the rate of locking device use slightly decreased, albeit non-significantly, from 3 to 6 months for those in the cable lock group with medium adherence to the norm of Status as well as those with high adherence to the norm of Toughness. Taken together, these findings suggest that the superiority of the interventions compared to the control conditions may not necessarily be maintained over time, particularly for those with low or medium adherence of Status or high adherence of Toughness. Individuals who initially improved their storage practices at 3 months but did not maintain them at 6 months may have experienced something that made them feel they needed to have easier access to their firearms. For example, it may have been that individuals with high adherence to the norm of Toughness perceived a threat to their masculinity at some point between the 3- and 6-month follow-ups. As mentioned earlier, men may need to demonstrate their masculinity to maintain their masculine identity (Bosson et al., 2009; Vandello et al., 2008). When men feel their masculine identity is threatened, they may feel the need to engage in compensatory behaviors to regain their masculine image, such as being aggressive towards others (Bosson et al., 2009) or by demonstrating their physical strength (Funk & Werhun, 2011). Given that firearm ownership can be viewed as an expression of masculine values, it may be that easier access to a firearm can be a way for individuals to demonstrate and/or re-gain their masculine image. Additionally, individuals who strongly feel they should be viewed as emotionally and physically tough may believe that easier access to a firearm allows them to demonstrate their tough, masculine identity, particularly when their masculinity is

threatened. However, we did not assess why individuals changed their storage practices over time nor if their masculinity was threatened; therefore, further research is needed.

It is also important to consider that in the context of the current trial, the cable lock condition was always paired with another intervention: LMC or H&S. Furthermore, cable locks tended to be provided to individuals *after* the LMC or H&S interventions; thus, there was not always a conversation about how the provided cable locks could be utilized. It may be that individuals with high adherence to norm of Toughness need additional intervention when being provided with cable locks to sustain their locking device use over time. This discussion may need to emphasize how storing firearms with a locking device can align with their masculine value of being physically tough. For example, the clinician could emphasize how locking devices can prevent unwanted access to firearms and are also relatively quick to remove when needed in an emergency (e.g., an intruder), which would allow the firearm owner to still demonstrate their physical toughness when its warranted. Alternatively, the conversation may need to defuse the connection between firearm storage practices and masculine toughness for these individuals. For example, the clinician could discuss the benefits of secure firearm storage practices and how such individuals could demonstrate and/or maintain their masculine toughness in other healthy, adaptive ways (e.g., physical fitness).

It may also be that providing an additional intervention may lead to more concrete change in secure storage practices. As mentioned earlier, Anestis and colleagues (2021) found that the combination of LMC and cable locks was not superior to either intervention alone. It may be that providing cable locks with a single session of LMC is insufficient; rather, multiple LMC sessions may be needed for individuals with low to

medium adherence to Status and/or high adherence to Toughness to sustain behavioral changes in firearm storage practices. Alternatively, a booster session of LMC may also be appropriate to remind individuals of their motivations for wanting to utilize more secure storage practices over time.

An additional explanation for the effectiveness of the interventions not being maintained may be due to changes in storage practices among those in the control conditions. As mentioned earlier, there were instances where those in the control conditions also slightly increased their rates of locking device use over time (but not to the point of statistical significance), which may have minimized the intervention effect. Cable locks tend to be provided with every new firearm purchase and are relatively cheap and easy to utilize. It may be that those in the control conditions with low or medium levels of Status were more likely to already have a locking device accessible and utilize it after baseline.

The assessment battery during baseline and follow-ups may have also unintentionally influenced storage practices over time among those in the control conditions who already had access to cable locks. In addition to answering items on current firearm storage practices, participants were asked to answer several items assessing their beliefs about firearm ownership, access, and suicide risk, and willingness to store their firearms more securely or temporarily outside of the home during a suicidal crisis. Answering such items may have unintentionally prompted individuals to further consider the risks of easy access to a firearm and to increase their firearm safety by utilizing a practical method, such as a locking device. However, we did not assess what motivated participants to change their firearm storage practices over time, so these

interpretations are preliminary. It would be beneficial for future research to assess why individuals change their storage practices at various times to further understand the factors that may promote or impede more secure firearm storage practices being sustained over time.

Masculinity Ideology and Storage Practices Among Those Receiving Either Intervention

Inconsistent with hypotheses, overall masculinity ideology was not associated with storage practices over time among those receiving the LMC or cable lock interventions. Exploratory analyses did find that the two-way interaction of Toughness and time was significantly associated with locking device use among those receiving LMC, such that higher adherence to the norm of Toughness was associated with a decreased likelihood of using a locking device at 3- and 6-months post-intervention; however, this finding was considered non-significant after applying the Benjamini-Hochberg correction to control the false discovery rate. Taken together, findings from Aim 2 suggest that adherence to masculinity ideology may impact the degree to which the interventions outperform the control conditions; however, findings from Aim 3 suggest that, among those who receive either intervention, masculinity ideology may not influence the magnitude of change in storage practices over time. In other words, adherence to masculinity ideology may not influence who, among those who receive LMC or cable locks, will respond more robustly to the intervention.

Additional research is needed to better understand the impact of adherence to the norm of Toughness on locking device use among those receiving LMC. It may be that those who strongly adhere to this norm are less likely to utilize a locking device after engaging in a discussion on firearm safety for suicide prevention. Perhaps the

conversation on safer firearm storage practices is perceived as challenging their sense of toughness; for example, such individuals may believe that they would be able to prevent themselves from acting on their suicidal thoughts regardless of how their firearms are stored because they are physically and emotionally strong.

Limitations

This study does have its limitations. First, as noted in the primary findings paper (Anestis et al., 2021), we used conservative criteria to assess firearm storage practices, such that all firearms in the household had to be stored using a given practice to be qualified for that storage method (e.g., if any firearm was stored loaded, the criterion for safe storage was not met). Due to this, we were unable to estimate if masculinity moderated the effectiveness of the interventions on changing firearm storage practices for some, but not all, firearms. Relatedly, we did not assess specific storage practices (e.g., cable lock versus trigger lock) and if a combination of storage practices was utilized per firearm. It is interesting to note that the interventions were effective on changing locking device use but not rates of storing unloaded. Most locking devices are designed such that they are not to be used on loaded firearms. Specifically, cable locks are inserted through the magazine well or chamber, preventing a cartridge from being fired. Trigger locks, which fit over the trigger guard, can technically be installed on a loaded firearm; however, this is not recommended as it increases the risk of negligent discharges. Possible explanations for the lack of intervention effect(s) on unloaded storage is that there may have been inconsistencies in self-reported and actual firearm storage behavior, or individuals may be finding ways to store their loaded firearms with a locking device. Alternatively, we may need to consider if specific storage practices at baseline, in

isolation or combination, are associated with more secure storage practices over time. For example, it is possible that individuals who were already storing their firearms unloaded at baseline were more likely to utilize a locking device after receiving an intervention. Ultimately, future research should consider stratifying participants by storage practices at baseline (as recommended by Anestis et al., 2021) and potentially use checks to detect inconsistent responding when assessing firearm storage practices.

A second limitation is that the self-report measure we used to assess adherence to traditional masculinity ideology was developed in 1986 and only captures three factors of masculinity. More recent measures have since been developed and assess multiple domains related to masculinity. For example, the Conformity to Masculine Norms Inventory-46 (Parent & Moradi, 2009) assesses conformity to nine masculine norms: Emotional Control, Winning, Playboy, Violence, Self-Reliance, Risk-Taking, Power Over Women, Primacy of Work, and Heterosexual Self-Presentation. Relatedly, we did not consider other constructs of masculinity, such as masculinity contingency threat (i.e., the degree to which a man's self-worth is threatened by a lack of masculinity; Burkley et al., 2015) or masculine gender role conflict (i.e., degree to which men experience conflict as a result of rigid masculine norms).

Third, as mentioned earlier, we did not assess what motivated participants to change their firearm storage practices over time. Due to this, we were unable to determine why individuals across conditions tended to change their storage practices across time. Relatedly, the final phase of the RCT took place during the first six months of 2020, a time in which the U.S. experienced a global pandemic resulting in stay-at-home orders and high levels of unemployment (Coibion et al., 2020), a surge in firearm

purchasing, protests in support of the racial justice movement, increased civil unrest and riots, and more. Participants in the RCT may have changed their storage firearm practices because of these events/stressors. For example, a recent study suggests that some parents of teens may have been largely motivated by fear to increase their ease of access to firearms during the beginning of the COVID-19 pandemic in an effort to protect their loved ones against possible external threats (Sokol et al., 2021). This may be consistent with some of the current study's findings noted earlier showing a diminishment of intervention effects between 3- and 6-month follow-ups. Participants in the current study may have changed their storage practices numerous times throughout the study, utilizing more secure storage practices at certain times (e.g., family members being in the house more during stay-at-home orders) and less secure practices at other times (e.g., during riots). It would be beneficial for future research to assess when and why individuals change their storage practices at various times to further understand the factors that may promote or impede more secure firearm storage practices being sustained over time, particularly during times of uncertainty and unrest.

Fourth, while we did identify and covary for potential covariates, we chose not to examine other potential moderators of the intervention effects to minimize the number of analyses we ran. Finally, the biggest limitation is that we chose to probe and interpret the non-significant interactions for the second aim. This is not standard in statistical practice; therefore, the interpretations of the findings are considered highly preliminary and should be viewed with caution. Additional research is needed to determine if the current findings replicate in a larger, well-powered sample.

Conclusions

Despite these limitations, we believe the current study's findings provides preliminary support that high adherence to masculinity ideology may somewhat impact the effectiveness of receiving LMC or cable locks on increasing rates of locking device use among firearm-owning service members. However, adherence to masculinity ideology does not appear to be associated with the majority of storage practices pre-intervention nor does it appear to impact the degree of storage changes among those receiving LMC or cable locks. While additional research is needed, it may be that the interventions may need to be modified (e.g., content, who delivers the interventions) to expand their reach to individuals who highly adhere to masculinity ideology, particularly related to the norms of Toughness and/or Anti-Femininity.

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