The world through gun sights: Salient weapons may incompletely help owners deal with psychological threat

All data, materials, and analysis scripts can be found at
https://osf.io/4zb6q/?view_only=edfeb0e4904d4bbf9d37678c54a3b0fa

Abstract

When gun owners say that their weapons help them feel safe, what do they mean? We argue that, for American protective gun owners, this sense of safety extends beyond physical protection, encompassing protection against threats to fundamental psychological needs. In a 14-day experience-sampling study, we find that gun owners randomly-assigned to think about their weapons felt safer, more in control, and that their lives were more meaningful than those not reminded. This sense of reassurance may have come at a cost, however, as when they had their weapons accessible, these gun owners were more vigilant, more anxious, and felt that their immediate environment was more chaotic - results that held even when the external environment is held constant. We parallel these findings in a preregistered within-subjects laboratory experiment where we find that participants from gun-owning households, when holding a non-firing pistol, have a diminished threat response to anticipated electric shock.

Statement of Relevance

American gun culture is a prominent outlier among similarly-developed countries. What benefits do so many Americans see in owning a gun despite the manifold dangers that gun ownership brings? Using both experience-sampling and experimental methods, we find having a gun made salient helps gun owners to cope with psychological stressors in their environment. Gun owners, in other words, may be deriving psychological protection from their ownership. This benefit may come with a cost, however, as having a gun accessible is associated with seeing the world as a more dangerous place.

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"If you buy a Colt's rifle or pistol, you feel certain that you have one true friend, with six hearts in his body, and can always be relied on." - Advertisement for Colt's Patent Firearms, 1860

More than 17.25 million United States citizens held a legal license to carry a handgun in public in 2018 (Lott, 2018), and an estimated 9 million Americans carry their weapons at least once a month (Rohani-Rahbar et al., 2017). Why do Americans carry guns? Unlike most of the rest of the developed world, Americans tend to report owning their weapons as a way of feeling safe; two-thirds of American gun owners, and an even greater percentage of new gun owners, say that they own a gun for the purpose of personal protection (Eurobarometer, 2013; Parker et al., 2017; Wertz et al., 2018). Yet despite the prevalence of protection-motivated gun carriers, surveys suggest that personal weapons are only utilized in a defensive manner in fewer than 1% of reported crimes in America (Hemenway & Solnick, 2015; Planty & Truman, 2013). Instead, handguns are much more frequently used as a means of intimidation and in the violent victimization of others (Hemenway, Azrael, & Miller, 2000). Increases in the rates of concealed carry are associated with increased crime in an area (Ayres & Donohue, 2003; Donohue, Aneja, & Weber, 2018), and instead of offering effective protection, meta-analytic evidence suggests that having a gun in one's home doubles the likelihood that a household member will die of violent homicide and triples the likelihood of household death by violent suicide (Anglemyer et al., 2014).

'Feeling safe,' however, is a psychological state, and does not have to match the external demands of the world. Personal safety and self-protection are primary human motivations (Hart, 2014; Maslow, 1970; Kenrick et al., 2010; Neel et al., 2016). In addition to physical threats, individuals can also perceive symbolic threats to their sense of personal control and personal

meaning. The general sense that life is orderly and coherent is a precursor to personal meaning (Heintzelman, Trent, & King, 2013; Heintzelman & King, 2014), and threats to this sense of coherence initiates compensatory efforts to reinstate a sense of meaning or personal control (Heine, Proulx, & Vohs, 2006; Kay, Whitson, Gaucher, & Galinsky, 2009; Kay, Gaucher, Napier, Callan, & Laurin, 2008; Proulx & Inzlicht, 2012).

American protective weapons owners may be particularly sensitive to threats to their fundamental psychological needs of safety, control, and meaning (Buttrick, 2020). Research suggests that Americans who own guns for personal protection are more likely to think that the world is a dangerous place (e.g., Shepperd et al, 2018) and that the institutions of the state are unable or unwilling to keep them safe (e.g., Glaeser & Glendon, 1998; Warner & Thrash, 2020). Owners may be not be using their guns just to deal with perceived threats to their physical safety; more psychological worries have been demonstrated to motivate ownership as well, such as general negative affect (Bryan et al., 2020); the threat of loss of status in society (Carlson, 2015; Warner & Steidley, 2022); perception that patriotic American values are under attack (Filindra, 2023; Utter & True, 2000); a general sense of disempowerment (Leander et al., 2019); intolerance of uncertainty (Anestis & Bryan, 2021); threat sensitivity more generally (Anestis et al. 2023); and the economic hardship resulting from the COVID-19 pandemic (Lacombe et al., 2022).

These increased perceptions of threat, both to one's physical and psychological self, then lead to increased worries about one's safety (e.g., Stroebe et al., 2017), to worries about one's control and self-efficacy (e.g., Freeman & Bentall, 2017), and one's belongingness (e.g., Kohn, 2004). In turning to their guns to help them cope with these concerns, protective owners believe that owning a gun helps them stay safe (e.g., Parker et al., 2017); helps them retain control and

efficacy (e.g., Shepherd & Kay, 2018); and helps them to find meaning through belonging to valued social groups (e.g., Carlson, 2015), taking on important roles in the community (e.g., Grossmann & Christensen, 2004), and addressing worries about one's status in society (Leander et al., 2019; Steidly & Kosla, 2017).

However, guns may bring with them certain affordances that counteract this coping effect. Gun ownership, especially gun carrying, may heighten everyday vigilance (Conley & Higgins, 2018; Hauser & Kleck, 2013), making the world seem more dangerous. Ethnographic work finds that concealed-carry training instructors actively promote a fear of victimization and then highlight that this fear can be offset by carrying a handgun (Carlson, 2015; Shapira & Simon, 2018). Gun owners frequently report greater awareness of their surroundings when carrying their guns, and report increased worries about being victimized because of their gun-carrying (Carlson, 2015, Kohn, 2004; Barnhart et al., 2018; Baumann & Desteno, 2010). While a gun may help owners to cope with worries in the moment (Dowd-Arrow et al., 2019), when those who regularly carry their weapon are actively prevented from doing so, they find that the world looks especially dangerous (Shapira & Simon, 2018). One multi-wave survey suggests that feelings of threat may motivate the purchase of a weapon, but that the acquisition of a gun does not make owners feel any less threatened (Hauser & Kleck, 2013).

In sum, then, we propose that guns, especially when they are salient, should help owners to feel more safe, more in control, and that their lives are more meaningful, but should also maladaptively heighten their vigilance to threat, making the world seem more dangerous (see Buttrick, 2020 for a theoretical review and model). We present two studies; one that explores how guns operate in the everyday lives of their owners, and one conducted in-lab to examine, in

a more controlled setting, the ways that salient guns help gun-owners cope with psychological threat.

Open Practices Statement

Experiment 1 was not preregistered; the preregistration for Experiment 2 can be accessed at https://osf.io/49hej?view_only=bcbf6f22dcd74975ac59c66fbc58ac39. Deidentified data for both experiments along with their materials and the data-analysis scripts are posted at https://osf.io/4zb6q/?view_only=edfeb0e4904d4bbf9d37678c54a3b0fa

Study 1: Experience Sampling

We recruited a sample of Americans who reported regularly carrying their guns, as well as a sample of non-owning Americans, using an ecological momentary assessment (EMA) methodology (Stone & Shiffman, 1994), consisting of 14 days in which we repeatedly texted participants and asked them what they were doing and feeling. We embedded in an experiment in which we randomly-assigned the gun owners either to respond after thinking about their weapons or did not make their weapons salient (while also including a group of non-owners, who were not asked about any weapons, as a general comparison). We examined both, in a between-subjects analysis, how having a gun top-of-mind affects owners' perceptions of the world; as well as, in a within-subjects analysis (looking just at the participants in the gun-salient condition), how the world looks differently when one does or does not have a gun accessible.

Method

Data and Materials

All data, materials, and analysis scripts can be found at https://osf.io/m2xte/?view_only=1673bc37a0b84bdda3e841e1350056ba

Reporting

We report how we determined our sample size, all data exclusions (if any), all manipulations, and all measures in the study.

Participants

We recruited participants for this study using Qualtrics Panels who indicated a willingness to provide their smartphone phone number and complete the twice daily questionnaires. Qualtrics recruited one sample who reported regularly carrying their firearms (answering yes to the question "Do you regularly carry a gun or have a gun within easy reach during your everyday life?"), and a separate, matched sample that reported not owning a gun. Qualified participants completed an onboarding survey and were sent 28 EMA surveys over the next two weeks. 394 participants responded to our screening survey, of which we were able to retain 108 non-owners and 156 gun-owners (91 in the gun-salient condition; 65 in the non-salient condition[1]) who provided usable phone numbers and who passed our onboarding data checks. Our gun-owning sample had an average age of 41.56 years (*SD* = 13.26), was 50.0% female, 44.9% with a bachelor's degree or higher level of education, median reported annual income band of $50,001-$75,000, 75.6% White, 14.7% Black, 7.1% Hispanic/Latine, 1.9% Asian/Asian American; and was on average slightly politically conservative: *M* = 4.18 (1.77) on a scale from 1 = very liberal to 7 = very conservative, with 4 = Moderate. Our non-owning sample had an average age of 45.54 years (*SD* = 14.72), was 58.9% female, 46.7% with a bachelor's degree or higher level of education, median reported annual income band of $35,001-$50,000, 72.0%

[1] We over-assigned for the gun-salient condition in order to maximize power for the within-subjects analyses presented below

White, 14.0% Black, 6.5% Hispanic/Latine, 7.5% Asian/Asian American; and was on average slightly liberal: $M = 3.71$ (1.84)

Procedure

We sent participants an SMS message with a link to a brief survey twice daily (11 am and 7 pm) for 14 days from April 20-May 3, 2020 (5,146 reports in total). We excluded 202 reports (3.9% of all reports) for either failing to report their current location or for reporting nonsense[2], and excluded an additional 33 reports that came in outside of our two-week window, leaving 4,911 reports in our dataset.

Gun owning participants were randomly assigned to one of two conditions: gun-salient or gun-not-salient. Gun owners in the gun-salient condition were first asked "Is your gun easily accessible to you right now?" Gun-salient owners reported carrying their weapons during 50.1% of returned episode reports. To further increase the salience of their yes or no response, they were then asked to provide an open-ended response to the question: "Why do [don't] you have your gun with you or near you right now?"

With the exception of these additional items to induce gun salience in one condition, participants across all three groups (gun-salient owners, not salient owners, non-owners) completed otherwise identical EMA surveys. First, they were asked to briefly describe what they were doing at that moment and reported the number of people around them at that time. Participants were alone for 57% of reports and had, on average, 1.49 people around ($SD = 0.7$).

To measure a current sense of meaning in life, we used a three-item scale, measured using seven points (anchored at 1 = not at all, 4 = moderately, and 7 = very much so) with the items "I feel like I matter," "I feel like I have a purpose," and "I feel like my life is meaningful,"

[2] Before analysis, we generated a dataset with just the self-reported location response and a numeric linking code, and then excluded any reports that were not obviously locations.

multilevel reliability *RkRn* = .99. To measure a sense of vigilance, we used a four-item seven-point measure (anchored at 1 = not at all, 4 = moderately, and 7 = very much so; Bernstein et al., 2015), sample item = "Currently I am thinking about what I would do (or where I would go) if someone would try to surprise or harm me," multilevel reliability *RkRn* = .99 (see Reville & Condon 2019; Shrout & Lane 2012 for discussions of multilevel reliability and generalizability metrics).

We additionally asked participants the degree to which they were feeling the following emotions on a seven-point scale: anxious, angry, happy, calm, safe, lonely, prepared, in control (anchored at 1 = not at all, 4 = moderately, and 7 = very much so). Exploratory factor analysis (minres with an oblimin rotation, using parallels analysis to determine the number of factors to extract) suggested that the emotions could be reduced to three factors - one factor containing emotions related to anxiety (anxious, angry, lonely), one factor containing emotions related to safety (safe, happy, prepared, in control), and one factor containing just calmness. The full factor-loading matrix can be found in Table S5. We found that both the anxiety and safety factors were highly reliable across our sample: *RkRn* for the anxiety factor = .96; *RkRn* for the safety factor = .97.

Participants also provided appraisals of their current situation as chaotic, unexpected, threatening, relaxing, routine, fun, boring, and interesting (anchored at 1 = not at all, 4 = moderately, and 7 = very much so). A similar exploratory factor analysis for these situational appraisals suggested a three-factor solution - one factor for positive appraisals (relaxing, fun, interesting, and reverse-scored boring), one factor for negative appraisals (chaotic, unexpected, and threatening), and one factor containing just routine. See Table S6 for the full factor-loading matrix. We found that both the positive and negative situational-appraisal factors were highly

reliable across our sample: *RkRn* for positive appraisals = .98, *RkRn* for negative appraisals = .98.

Results

Given our models, power simulations suggest that our sample allows us 80% power to detect between-person pairwise comparisons of ~d = 0.82 (4911 reports nested within 260 individuals), and 80% power to detect within-person differences of ~d = .15 (1,657 reports nested within 89 participants in the gun-salient condition, with owners carrying their weapon for 50.1% of reports). See the analysis script at https://osf.io/ty7d6/?view_only=1673bc37a0b84bdda3e841e1350056ba which has the simulation code embedded.

Between-Person Group Differences

We first examined between-subjects differences across the three groups: salient gun owners, non-salient gun owners, and non owners. We first analyzed global evaluations (feelings of safety/control and meaning), and then analyzed situational appraisals (vigilance, anxiety, sense of calm, and appraisals of the current situation as chaotic, as positive and as routine).

In line with our hypotheses, we found that gun owners reported feeling safer/more in control after being prompted to think about their gun. We ran a multilevel model predicting feelings of safety from condition, with a random intercept for participant, omnibus test $F(2, 251.65) = 14.72$, $p < .001$. Uncorrected pairwise tests[3] suggested that gun owners reminded of their weapon felt the most safe ($M = 5.73$, $se = 0.13$), significantly safer than gun owners not reminded of their weapon ($M = 5.32$, $se = 0.15$), $d = 0.53$ [0.028, 1.04], $p = .039$; and

[3] Since there is a three-condition one-way test with a significant omnibus, uncorrected pairwise tests appropriately control the false-positive rate (Maxwell, Delaney, & Kelley, 2017)

significantly safer than non-owners (M = 4.80, se = 0.12), d = 1.22 [0.78, 1.67], p < .001. Gun owners not reminded of their weapon also reported feeling safer than non-owners, d = 0.69 [0.20, 1.18], p = .0055.

Similarly, in line with hypotheses, gun owners generally reported a higher sense of meaning in their lives when thinking about their gun, omnibus test $F($2, 255.86) = 14.17, p < .001. Gun owners reminded of their weapon felt the most meaning (M = 5.95, se = .16), significantly more meaning than gun owners not reminded of their weapon (M = 5.07, se = 0.19), d = 1.20 [0.55, 1.86], p < .001; and significantly more meaning than non-owners (M = 4.84, se = 0.14), d = 1.52 [0.94, 2.10], p < .001. Gun owners not reminded of their weapon did not report feeling more meaning than non-owners, d = 0.32 [-0.31, 0.95], p = .32. See Figure 1.

In looking at situational appraisals, we found no significant differences between owners who had been reminded of their weapons and owners not so reminded. Gun owners, collapsed across condition, reported feeling less anxiety, more calm, and reported that their current situation was more positive and more routine than did non-owners. When we control for demographics (gender, ethnicity, education, household income, age, and political orientation), our conclusions are unchanged. See Table 1 for all results, and see SI for models with demographic controls and for models with all emotions and appraisals disaggregated.

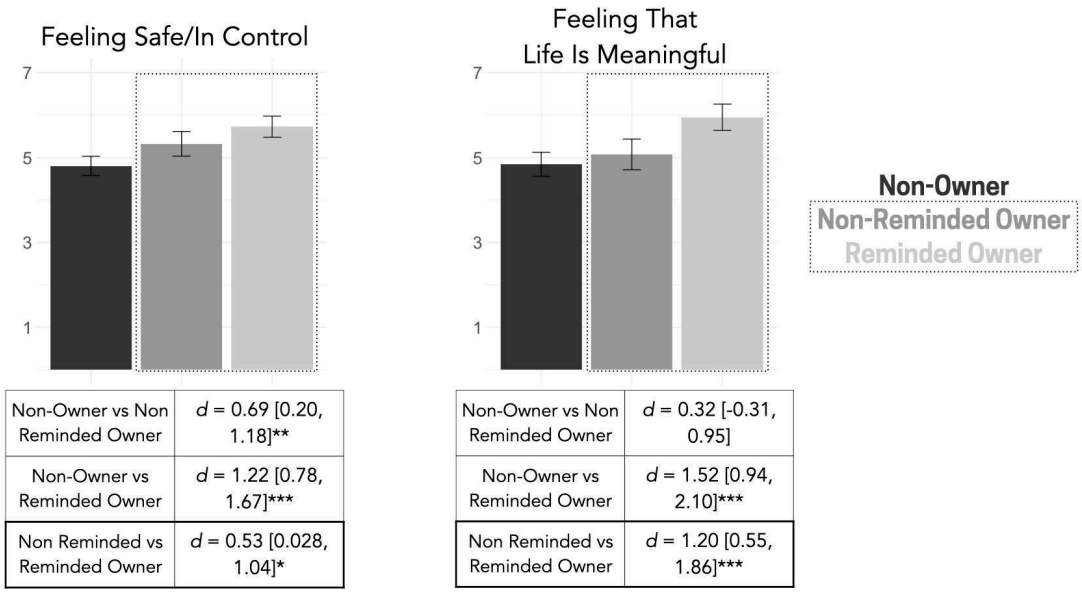

Figure 1: Between-person differences in personal evaluations by condition. Dotted lines represent random assignment of gun-owners to either the *Reminded* or *Non-Reminded* condition. *$p < .05$, **$p < .01$, ***$p < .001$. 95% confidence intervals presented in brackets.

Within-Person (All Events)

We next conducted analyses focusing specifically on gun owning participants who were reminded of their weapons–specifically whether or not they had a gun available to them at the moment–at the beginning of each episode report.

In these analyses, by contrast, we found that having a gun or not affected situational appraisals without affecting global evaluations. As predicted, we found that the world appeared more dangerous and participants were on higher alert when they were carrying their weapons, compared to when they were unarmed. Within-person analyses, predicting the outcome from whether or not the participant had their weapon at hand, with a random intercept for participant and a random slope for weapon-carrying (see Brauer & Curtin 2018) suggested that gun owners were more hypervigilant when armed ($M = 2.38$, $se = 0.15$) than when unarmed ($M = 2.16$, $se =$

0.14), $F(1, 58.66) = 5.86$, $p = .019$, $d = 0.30$ [0.051, 0.54]. Similarly, gun owners felt more anxious when armed ($M = 1.84$, $se = 0.11$) than when unarmed ($M = 1.65$, $se = .089$), $F(1, 57.43) = 9.54$, p = .0030, $d = 0.28$ [0.10, 0.47]; and felt that their current situation was more chaotic when they were armed (M = 1.57, se = 0.11) than when they were unarmed ($M = 1.32$, $se = 0.057$), $F(1, 37.54) = 8.37$, p = .0063, $d = 0.47$ [0.15, 0.80].

Even though the world appeared more dangerous when holding a weapon, gun owners seem to be able to cope with these dangers, as owners reported feeling no less safe when armed ($M = 5.75$, $se = 0.11$) than when unarmed (M = 5.67, se = 0.11), $F(1, 42.43) = 1.65$, p = .21, $d = 0.13$ [-0.071, 0.32]. See Figure 2. We also found no evidence for differences when armed vs not in participants' self-reported levels of calm, positive situational appraisal, or assessment of the current situation as routine.

As may be expected, a situational change (having one's gun present or absent) did not affect global evaluations; we found no significant difference in safety/control or meaning when owners had their guns present or absent. See Table 2 for all results, and see the SI for models with all emotions and appraisals disaggregated.

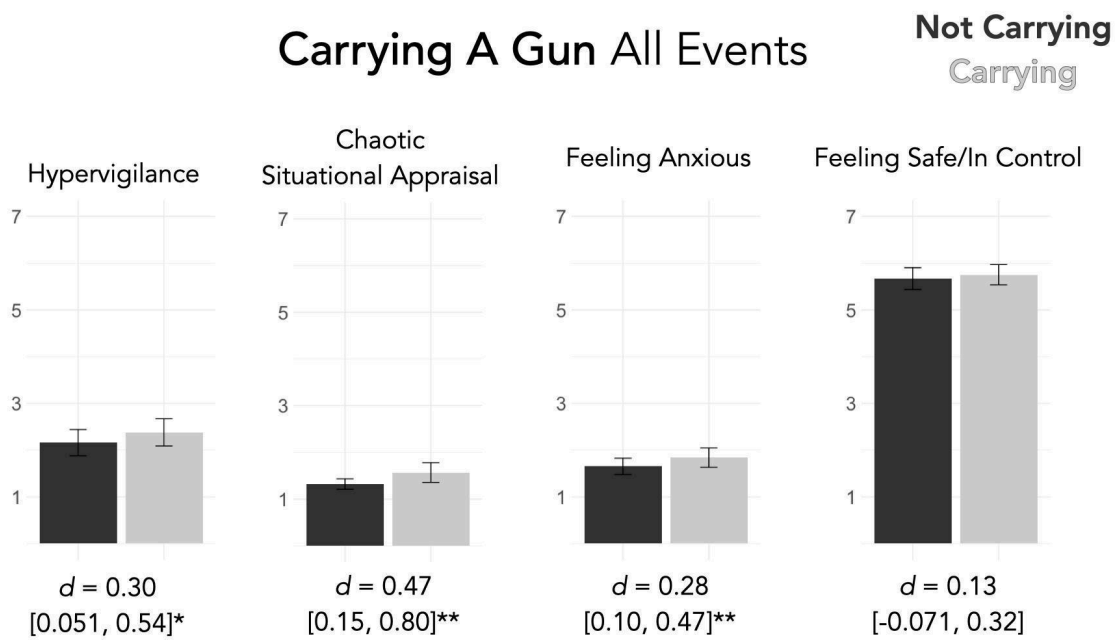

Figure 2: Within-person differences in situational appraisals by whether participant had a gun accessible or not. *$p < .05$, **$p < .01$. 95% confidence intervals presented in brackets.

Within-Person (Just Television)

The within-person findings from the gun-salience condition above are consistent with two alternate interpretations, either that people are seeing the world as more dangerous when they are currently armed (a *perceptual* explanation) or that, when armed, they are exposing themselves to more dangerous situations (a *situation-choice* explanation). To attempt to investigate which of these explanations was more likely, we reanalyzed the within-person data, restricting ourselves to just those episodes when the participant reported that they were at home watching television (462 episodes within 69 participants, carrying their weapon for 57.3% of episodes; this sample gives us 80% power to detect an effect of ~$d = .32$). Television-watching was by far the most frequent reported activity in our dataset, which is maybe not entirely surprising given that we were collecting data during the lockdowns of the early-COVID

pandemic. As watching television at home is likely to be a similar activity for the same person both when they do and do not have their weapon, this allows us to hold the situation relatively constant, helping us to better isolate the effect of perception.

We find broadly similar results for television watching episodes as in all episodes, suggesting that even in objectively similar situations, having a gun affects situational construal. Using the same within-person analytic strategy, we find that when just watching television at home, gun owners are directionally more hypervigilant when armed (M = 2.26, se = 0.17) than when unarmed (M = 1.96, se = 0.19), F(1, 28.34) = 3.05, p = .092, d = 0.48 [-0.096, 1.06]; that gun owners, when just watching television, feel more anxious when armed (M = 1.79, se = 0.14) than when unarmed (M = 1.51, se = 0.094), F(1, 22.99) = 4.53, p = .044, d = 0.44 [0.00099, 0.89]; and that gun owners, when just watching television, felt that their situation was more chaotic when armed (M = 1.40, se = 0.12) than when unarmed (M = 1.09, se = 0.031), F(1, 39.84) = 7.25, p = .010, d = 0.85 [0.18, 1.51]. Again, being armed while watching television made participants feel no safer (M = 5.79, se = 0.14) than when unarmed (M = 5.88, se = 0.13), F(1, 25.23) = 0.50, p = .49, d = -0.13 [-0.53, 0.27]. As in the full sample of reports, we additionally found no significant differences in assessments of the current situation as positive or routine, or in feelings of calm, safety, or meaning. See Figure 3, and see Table 3 for all results. See the SI for models with all emotions and appraisals disaggregated.

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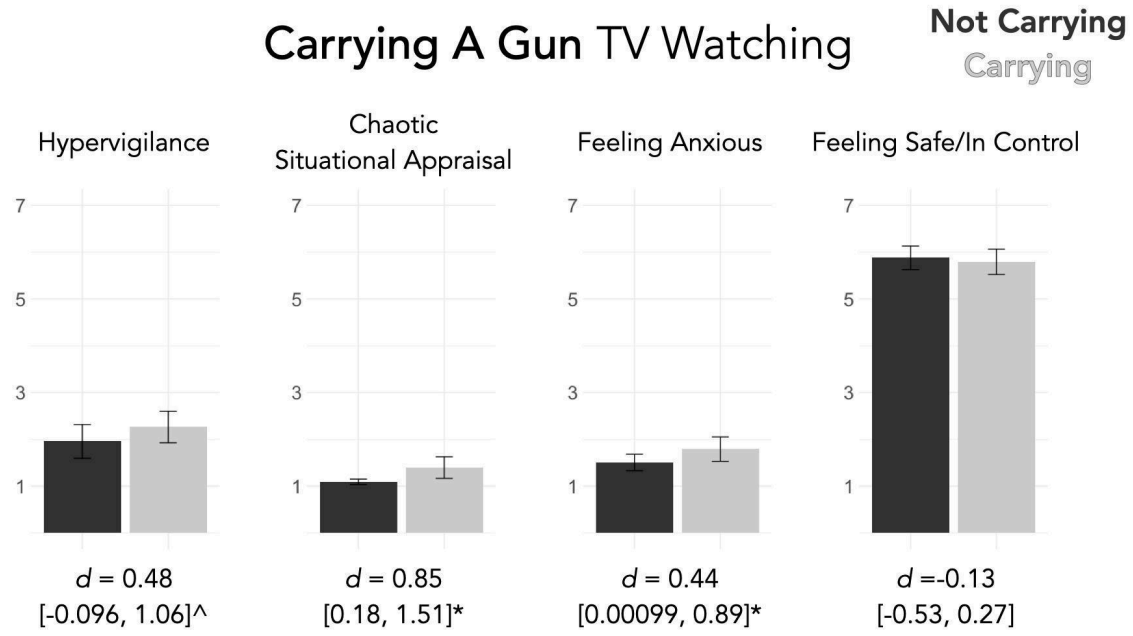

Figure 3: Within-person differences in situational appraisals by whether participant had a gun accessible or not, restricted to just participant-reported television-watching situations. ^$p < .10$, *$p < .05$. 95% confidence intervals presented in brackets.

Coding of Reasons for Access

We conducted some exploratory analyses of the reasons why our participants reported having their guns accessible or not. We asked participants to freely-respond to the question of why they did or did not have access to their gun at the moment, and participant responses generally fell into one of three categories - an active choice to have a weapon accessible or not (e.g., accessible: “I'm walking down the street in a not so good part of town”, 9.2% of pings; inaccessible: “Its put away, don't feel i need it right now”, 32.0% of pings) , a passive choice to have a weapon accessible or not (e.g., accessible: “It just so happens to be next to me”, 25.6% of pings; inaccessible: “Getting ready for bed. It's in the next room.” 17.8% of pings), and a third set of responses that took a more abstract, expressive approach to answering the question of why

they had access to a gun (e.g., “protection”, “self-defense”, 11.5% of pings). 3.8% of pings did not fit this coding scheme.

When participants were making active choices about their weapon-access, patterns of situational attribution appear similar to those in the main text, with those who were coded as having actively chosen to have their weapon more accessible (as compared to those who actively chose not have their weapon accessible) reporting that the world looked significantly more chaotic (d = 0.71 [0.30, 1.12], p = .011) and they themselves were more vigilant (d = 0.46 [0.10, 0.82], p = .0092), albeit with no evidence for differences in anxiety (p > .23). By contrast, when choices around access are being made passively, the pattern of results looks somewhat different, with no evidence for significant differences in anxiety, vigilance, or chaotic situational appraisals (all p’s > .08). These responses can be somewhat hard to parse, however, since they are often just a few words, and they therefore don’t provide a completely clear impression for whether owners were actively or passively choosing to have access to their weapons. Any analyses that make use of them should be treated as essentially descriptive, and so they (along with the crosstabs) are presented in full in the online supplement.

Discussion

How do guns function in the everyday psychological lives of their owners? In a two-week experience-sampling study during a period of high threat (i.e., April 2020, the early days of the COVID lockdowns), we found evidence that thinking about their gun helps gun owners to feel better about themselves, but that actually having their gun present makes the world seem to be a more dangerous place. When randomly-assigned to be reminded of their weapons before answering, gun owners reported feeling safer, more in control, and that their lives were more

meaningful compared to both gun owners who were not reminded of their weapons and to non-owners. These bolstered self-appraisals may come at a cost, however, as when a gun was actually present in the moment, the same owners reported feeling more vigilant, more anxious, and that the overall situation was more chaotic versus when they did not have a gun present. We find intriguing evidence that these altered perceptions of the dangers of the world are at least in part perceptual - when we attempt to control for the objective dangers of the places where our participants were reporting from, analyzing just data from when participants were watching television in their own homes, we still find that the world seems more dangerous when owners have their guns at hand.

The idea of a gun may be operating differently in the lives of its owner than the gun itself. Being prompted to think about one's weapon seemed to influence more global perceptions of one's life, while actually having the gun present seemed to influence one's immediate assessment of the environment. Merely thinking about one's gun, whether present or not, may be activating the abstract symbolic functions that guns play in the lives of their owners, helping them to cope with larger worldview threats; while the psychical presence of the gun may be forcing gun owners to think about the concrete details of their everyday lives. This work suggests, therefore, that guns can be construed at different levels of analysis (see e.g., Soderberg et al., 2015 for a review of the relationship between construal and abstraction), and that the precise construal taken up by gun owners may affect the ways that they can use weapons to deal with stress.

These findings dovetail with recent EMA studies of those who regularly carry firearms versus those that do not (Bryan et al., 2023). While these researchers did not experimentally make guns salient, they too found that those who regularly carry are more likely to view the world as more dangerous than non-carrying owners and non-owners, and that they were more

emotionally reactive to changes in the environment (and slower to return to baseline), especially when it comes to negative feelings, such as anxiety or threat. These researchers argue then, that those who regularly-carry firearms, and therefore have them especially salient, have increased anticipatory anxiety towards the threats of the world.

While we gain critical ecological validity from our EMA approach in Study 1, we do trade that off against some experimental control, as while we could randomly-assign participants to think about their weapons or not, we did not have the ability to randomly-assign when they were actually carrying their weapons. Our TV-watching analyses help to narrow down causality, but it is still possible that there is some third, unmeasured, factor that predicts both sense of threat and determines when an owner wishes to have their gun present. It is also true, of course, that even if we could control whether or not a gun was present in the environment, the mere fact of that gun does change the environment rather drastically. A gun is a dangerous thing, and a situation is objectively more dangerous when one is present. Gun owners may be accurately reporting the threats they see, even if they, themselves are the bearers of that danger.

A further open question lies in exactly what sort of comfort American protective gun owners are receiving from their weapon. Are they simply responding differently to surveys when reminded of their weapons as part of a culturally-understood display of machismo (e.g. Stroud, 2012)? Or are they truly receiving actual psychological benefits above and beyond self-report biases?

Study 2: Electric Shock

To address these questions, we turn to a well-validated paradigm designed to non-verbally measure coping in the face of a threatening situation. In this paradigm, participants

are hooked up to a shock-generator and repeatedly and randomly shocked. Being shocked is an aversive state, likewise the anticipation of shock. Prior work in this paradigm finds that holding the hand of a close relational partner, compared to holding the hand of a stranger or holding no hand at all, diminishes the threat of shock, indicated by reduced activity in pain-related neural circuits, decreased heartrate, and less self-reported pain (Che, Cash, Fitzgerald, & Fitzgibbon, 2018; Coan, Schaefer, & Davidson, 2006; Coan et al., 2017; López-Solà et al., 2019; see Gross & Medina-Devilliers, 2020 for a review).

We adapt this paradigm to test our question of interest. In a within-person experiment, we randomly assign participants to either hold the hand of a friend, hold a control object, or to hold a non-firing pistol, therefore directly measuring, via changes in heartrate, the degree to which a gun acts as a 'true friend with six hearts,' helping gun-owners (but not non-owners) to deal with threats to core psychological needs.

Methods

Preregistration

After data had been collected, but before the end of data-cleaning, we built the analysis script, which automatically blinded the analyst to condition by randomly-shuffling conditions, thus breaking the relationship between IV and DVs. Models were refined on this shuffled data, and then once finalized, we registered the script, which included steps to take in case of model non-convergence. Only after registration were the data unshuffled and analysis completed. The registration can be found at https://osf.io/49hej?view_only=bcbf6f22dcd74975ac59c66fbc58ac39, and the registered analysis

script, which additionally contains the power simulations, can be found at https://osf.io/f249k/?view_only=bcbf6f22dcd74975ac59c66fbc58ac39

Data and Materials

All data and materials can be found at https://osf.io/fm4sq/?view_only=bcbf6f22dcd74975ac59c66fbc58ac39

Reporting

We report how we determined our sample size, all data exclusions (if any), all manipulations, and all measures in the study.

Participants

We aimed to recruit around 100 participants based on resource and participant availability within an academic year. We brought 104 undergraduate participants in same-sex friendship pairs, recruited from a psychology department participant pool (before the COVID-19 pandemic), into the lab (stopping data collection at the end of an academic year), of which we could extract self-report data from 90 participants (61% from gun-owning households, 62% female, age $M = 18.84$, $SD = 0.85$).

Simulation-based power analyses using the statistical model presented in the results (see the analysis script at https://osf.io/pgrv8/?view_only=bcbf6f22dcd74975ac59c66fbc58ac39, which contains the simulation scripts) suggests that this sample provides us 80% power (at an alpha level of 0.05) to detect a within subjects/between-subjects interaction (Block Condition x Gun Ownership) in heartrate, our primary outcome of interest, of *partial eta*^{2} = 0.063, and 80% power to detect a between-subjects main effect for self-report measures of *partial eta*^{2} = 0.093. While they may be interesting, we did not power this study to detect fully between-person main effects.

We could extract reliable heartrate data from 43 participants (54% from gun-owning households, 63% female, age $M = 18.79$, $SD = 0.75$), with an average of 570.64 beats per condition per person. Simulation-based power analyses suggest that this sample provides us 80% power to detect the hypothesized three-way within-subjects/between-subjects interaction (Block Condition x Trial Threat x Gun Ownership) of *partial eta*^{2} = 0.00015, and 80% power to detect a two-way within/between interaction (Block Condition x Gun Ownership) of *partial eta*^{2} = 0.00016. This reliable heartrate sample is well within the range of prior studies that have made use of this paradigm - Coan et al. (2006) is based on 16 participants; Coan et al. (2013) is based on 22 participants; Maresh et al. (2013) is based on 25 participants; and López-Solà et al. (2019) is based on 30 participants.

Procedure

Participants were informed about the shock and informed consent was collected from both the participant and the same-sex friend that they brought to the study session. Participants and friends were seated at separate computers to complete a series of questionnaires assessing multiple personality and relationship characteristics. Upon completion of questionnaires, participants were fitted with ECG electrodes on their left wrist and right below their right clavicle and shoulder. Ankle shock electrodes were placed on the ankle (counterbalanced for side) and calibrated to a level of shock (0.2-4.0 milliamps) that was uncomfortable but not painful.

Participants were then taken into a small room, behind a curtain, and completed three within-subjects blocks in a randomized order. During each block, participants were placed in front of a computer screen that presented 48 trials. Before each trial, the screen presented a fixation cross. In ‘safety’ trials, the screen presented an O, indicating that there would be no

shock in that trial. In 'threat' trials, the screen presented an X, indicating that there was a 20% chance that they would be shocked during the next 10 seconds. There were an equal number of threat and safety trials in each block, and trial order was counterbalanced across blocks and participants. In the Object condition, participants completed the block while continuously holding a small metal weight. In the Handholding condition, participants completed the block while continuously holding the hand of the same-sex friend that they brought to the study with them, who was sitting on the other side of the curtain, and therefore could only interact through touch. In the Gun condition, participants completed the block while continuously holding a non-firing handgun. The handgun looked and felt like a Beretta M9 pistol (the standard sidearm for the US military from 1985-2017), but had no internal firing mechanism. At the end of each block, valence, arousal, and pain measures were recorded using a 9-point computerized version of the SAM Scales. After one participant had completed all three blocks, their partner was then set up with the electrodes, and roles were reversed. Upon completion of the task, participants were debriefed.

Materials

Pre-shock survey. Before undergoing the experimental blocks, participants completed a short survey that began with the single-item, Inclusion of Other in the Self Scale (IOS; Aron, Aron, & Smollan, 1992), anchored with circles that are non-overlapping (1) on one end and nearly-totally overlapping (7) on the other. Participants then filled out the Multidimensional Scale of Perceived Social Support (MSPSS; Zimet, Dahlem, Zimet & Farley, 1988), a 12-item scale, anchored at 'very strongly disagree' (1) and 'very strongly agree' (7), alpha = .94 [.93, .96]; and the Behavioral Inhibition and Activation scales (BIS/BAS; Carver & White, 1994), a 24-item scale, anchored at 'very true for me' (1) and 'very false for me' (4), BIS alpha = .79 [.73,

.85], BAS-Drive alpha = .74 [.66, .82], BAS-Fun Seeking alpha = .61 [.49, .73], and BAS-Reward alpha = .64 [.53, .75].

Participants were then presented with a set of sliders to indicate whether they thought that gun laws should be made 'less strict' (left anchor), 'kept as they are now' (middle anchor), or made 'more strict' (right anchor); whether having a gun in the house made it 'safer' (left anchor), 'no difference' (middle anchor), or 'more dangerous' (right anchor); whether the idea of carrying a gun made them 'more nervous' (left anchor), 'no difference' (middle anchor), or 'more confident' (right anchor); whether, if more people carried firearms, the place where they lived would be 'safer' (left anchor), 'no difference' (middle anchor), or 'more dangerous' (right anchor); whether they thought of a gun as an ordinary tool, like a hammer or fishing pole, 'not at all' (left anchor) to 'very much' (right anchor); and whether they thought of a gun as a symbol or instrument of liberty, 'not at all' (left anchor) to 'very much' (right anchor).

Participants were asked if they or anyone in their household had ever owned a gun; and were presented with sliders asking how common were guns in their life growing up with 'never saw one' (left anchor) to 'pretty much everyone I knew had one' (right anchor); and disregarding local gun laws or the price of a firearm, whether they would like to own a gun in the future, with 'absolutely would not' (left anchor) to 'absolutely would' (right anchor). Participants then reported the postal code in which they grew up, their age, and their gender. The full text for the survey can be found at https://osf.io/49pq6/?view_only=bcbf6f22dcd74975ac59c66fbc58ac39

Post-block survey. Additionally, after each within-subjects block (i.e., three times in total), participants filled out the Self-Assessment Manikin (SAM) Scales (Bradley and Lang, 1994). The SAM Scales are non-verbal measures used by participants to rate their current subjective feelings of valence and arousal. The valence scale shows pictures ranging from a

smiling, happy figure to a frowning, unhappy figure, and the arousal scale shows pictures ranging from an excited, wide-eyed figure to a relaxed, sleepy figure. These scales involve choosing on a nine- point pictorial scale one's subjective emotional valence and arousal in the moment. The valence scale is anchored by very negative (1) on one end and very positive (9) on the other. The arousal scale is anchored by not at all aroused (1) on the one end and very aroused on the other (9). Participants additionally self-reported the amount of pain that they felt during the block, using a scale anchored by 'no pain' (1) on one end and 'worst imaginable pain' (9) on the other. The scales can be found at https://osf.io/zs6dp/?view_only=bcbf6f22dcd74975ac59c66fbc58ac39

ECG Recording and Data Reduction

The electrocardiogram (ECG) was recorded using the SynAmps2 amplifier system within the Curry8 program (Compumedics) and exported in Neuroscan's CNT format. We attached Ag-AgCl electrodes to the lower left forearm and right inner clavicle with electrode conductive cream. The ECG was acquired continuously and digitised at a sampling rate of 1 kHz. Raw signal was offline filtered (bandpass filter 5-35 Hz) and hand-corrected for artifacts, such as missed, erroneous, or ectopic beats.

Continuous ECG data was exported to QRSTool and CMetX software programs (Allen et al., 2007; http://psychofizz.org). Inter-beat interval (IBI) series were first derived from the raw ECG by identifying heartbeats by hand and using QRStool to extract the IBI series, and Cardiac Metric X software (CMetX) to derive the resulting metrics. IBIs were epoched in 5 second segments (at the start of the safe/threat cue and throughout the fixation cue). IBIs were then exported as TXT files and analyzed using R, where we excluded any inter-beat interval less than

or greater than 3x the interquartile range within each participant's heartrate data before beginning analysis.

Analytic Strategy

We built a set of separate multilevel models to investigate the effect of condition on both heartrate (our primary outcome of interest) and on self-reported feelings, with p-values based on Satterthwaite approximations as per package-defaults. We then predicted the average inter-beat interval of every epoch in the session from the fixed-effect three-way interaction of block condition (i.e., handholding, gun, or control object), of whether the trial was a threat or a safety trial, and whether or not the participant came from a gun-owning household. For the random effects, we registered that we would estimate both a random slope of the condition by threat interaction, and a random intercept for participant nested within their dyad. If that model did not converge (as, in fact it did not), we registered that we would simplify it by iteratively simplifying the random slopes. Based on convergence and singular-fit issues we ultimately ended with a random-effects term containing just the random intercept for participant nested within dyad.

For testing the self-reported effects, after each block, of arousal, pain, and valence, we fit three separate models, predicting each of the DVs from the fixed-effect interaction of block condition and gun-ownership, with a random slope for condition and a random intercept for participant nested within dyad. If that model did not converge (as, in fact it did not), we registered that we would simplify it by iteratively dropping the random slopes, ultimately ending with just the random intercept for participant nested within dyad.

We predicted that, if the gun was acting as a metaphorical security blanket, that we would see a reduced threat response for gun owners when threatened with shock in the gun-holding condition than in the object-holding condition: longer IBIs (i.e., a slower heartrate), along with

lower self-reported arousal, less pain, and a more positive valence. By contrast, when it came to non-owners, we expected to see the opposite pattern: an increased threat response in the gun-holding condition when threatened relative to threat in the object-holding condition. We expected that holding a gun would look like holding a hand for gun-owners across all DVs, leading to a relatively reduced threat response; but for non-owners, we predicted that holding the gun would be more threatening than holding the control object, while holding the hand would be less threatening than holding the control object.

Owing to the size of our anticipated sample, we made no a priori predictions about main-effect comparisons between gun owners and non-owners.

Results

Deviations from registered analyses

While we originally brought 104 participants into the lab, due to recording errors or datafile corruption, we were only able to extract usable heartrate data from 43 participants across 27 dyads. Simulation-based power analyses suggest that this sample provides us 80% power to detect the hypothesized three-way within-subjects/between-subjects interaction (Block Condition x Trial Threat x Gun Ownership) of *partial eta*^{2} = 0.00015, and 80% power to detect a two-way within/between interaction (Block Condition x Gun Ownership) of *partial eta*^{2}.

We iteratively simplified the random-effects terms of our models to deal with singular fit in the random effects (as per our registration), with a final model that contained the full fixed-effect three-way-interaction between block-condition, trial-threat, and gun-ownership, but with only a random intercept for participant nested within their dyad. See Tables S7 & S8 for the

principal components analyses of the variance-covariance matrices for the random-effects terms in all models, which explain the nature of the singular fit involved.

Effects of Condition on Inter-beat Intervals

For our primary analyses (presented visually in Figure 4), using data from 43 participants (23 from gun-owning households and 20 from non-owning households), we did not find evidence for the expected three-way interaction between block condition, threat trial, and gun ownership, $F(2, 73560) = 0.32$, $p = .73$, *partial eta*^{2} = 0.0000086 [0.00, 0.000076]. We did however, find evidence for an interaction between block condition and gun ownership, $F(2, 73568) = 59.20$, $p < .001$, *partial eta*^{2} = 0.0016 [0.0011, 0.0022] collapsing across threat type. We decomposed the interaction using all pairwise tests, Holm-corrected. For those from gun-owning households, inter-beat intervals were longer when holding a gun (M = 772.01 ms between heartbeats, se = 25.16 ms) than when holding either a metal weight (M = 763.07 ms, se = 25.17), $z = 9.54$, $p < .001$, $d = 0.12$ [0.10, 0.15]; or when holding a partner's hand (M = 752.32 ms, se = 25.17 ms), $z = 20.81$, $p < .001$, $d = 0.26$ [0.24, 0.29]. Holding a metal weight also led to longer inter-beat intervals than when holding a partner's hand, $z = 11.07$, $p < .001$, $d = 0.14$ [0.12, .17].

By contrast, those from non-owning households showed a different pattern of results, where holding on to the metal object (M = 798.18 ms, se = 26.97 ms) led to longer inter-beat intervals than holding on to a gun (M = 791.63 ms, se = 26.97 ms), contrast = 6.46, $z = 6.04$, $p < .001$, $d = 0.086$ [0.058, 0.11]; holding on to a gun led to longer inter-beat intervals than holding on to a partner's hand (M = 777.78 ms, se = 26.97 ms) , $z = 13.22$, $p < .001$, $d = 0.19$ [0.16, 0.21]; and holding on to an object led to longer inter-beat interval than holding on to a partner's hand, contrast = 20.29, $z = 18.20$, $p < .001$, $d = 0.27$ [0.24, 0.30].

We additionally found evidence for an interaction between block condition and threat, $F(2, 73560) = 4.50$, p = .011, *partial eta*^{2} = 0.00012 [0.0000065, 0.00032]. Collapsing across gun-ownership status, participants in the object-holding condition showed longer inter-beat intervals in safety trials (M = 780.07 ms, se = 18.54 ms) than in threat trials (M = 777.54 ms, se = 18.54 ms), $z = 2.54$, $p = .011$, $d = 0.034$ [0.0077, 0.060]. No such difference was detected for gun-holding safety trials (M = 780.39 ms, se = 18.53 ms) vs. threat trials (M = 781.33 ms, se = 18.53 ms), $z = -1.07$, $p = .29$, $d = -0.013$ [-0.038, 0.011]; or for handholding safety trials (M = 763.29 ms, se = 18.53 ms) vs. threat trials (M = 764.31 ms, se = 18.54 ms), $z = -1.19$, $p = .23$, d = -0.015 [-0.04, 0.0098].

We did not design or power the study to detect fully-between differences in gun owners versus non-owners, and we did not detect differences in our heartrate analyses between non-owners and gun-owners when holding objects, $z = 0.96$, $p = 1.00$, $d = 0.47$ [-0.49, 1.43]; hands, $z = 0.70$, $p = 1.00$, $d = 0.34$ [-0.62, 1.30], or guns, $z = 0.54$, $p = 1.00$, $d = 0.26$ [-0.70, 1.22]. We did find an exploratory interaction between gender, gun ownership and condition, $F(2, 73{,}556) = 15.64$, $p < .001$, whereby those who were female and from gun-owning households showed a smaller difference between the gun-holding and object holding condition, $z = 0.16$, d = 0.23, $p = 1.00$, than those who were male and from gun-owning households, $z = 13.72$, d = 19.57, $p < .001$.

Our participants were not as close of friends as we had anticipated them being (IOS M = 4.93 (out of 7), SD = 1.37), which may have affected our hand-holding results. Prior work has shown that the degree of felt closeness moderates the palliative effect of handholding, with close martial partners getting the strongest benefit and total strangers the least benefit (Coan et al., 2006). In this study, we recruited close friends, instead of life partners as in previous work, and it

appears that the friends that we recruited were not as close as they could be (IOS $M = 4.93$ (out of 7), $SD = 1.37$). In line with previous studies, those individuals who felt closer to their partner did have longer inter-beat intervals (i.e., slower heartrate) in the handholding condition, albeit non-significantly (due, we suspect, to the restricted size of our sample), $B = .24$ [-.05, .54], $p = .12$. For those who were less close, it appears that holding their partner's hand may have been actually aversive, more like holding the hand of a stranger than the hand of one's spouse.

In fully exploratory analyses (reported in the Supplemental Materials, as we have less confidence in these analyses than those presented in the main text due to the choice not to power for fully between-person main effects), we found suggestive evidence that this pattern was especially strong when gun owners felt more social support and felt closer to their experimental partner. We speculate that gun owners may have felt that this closeness required that they be able to protect their partner and significant others, recasting friendship as responsibility for others (that they be a "sheepdog" protecting against "wolves;" e.g., Grossmann & Christensen, 2004); as opposed to non-owners, who generally felt more relaxed in the experiment when feeling greater social support.

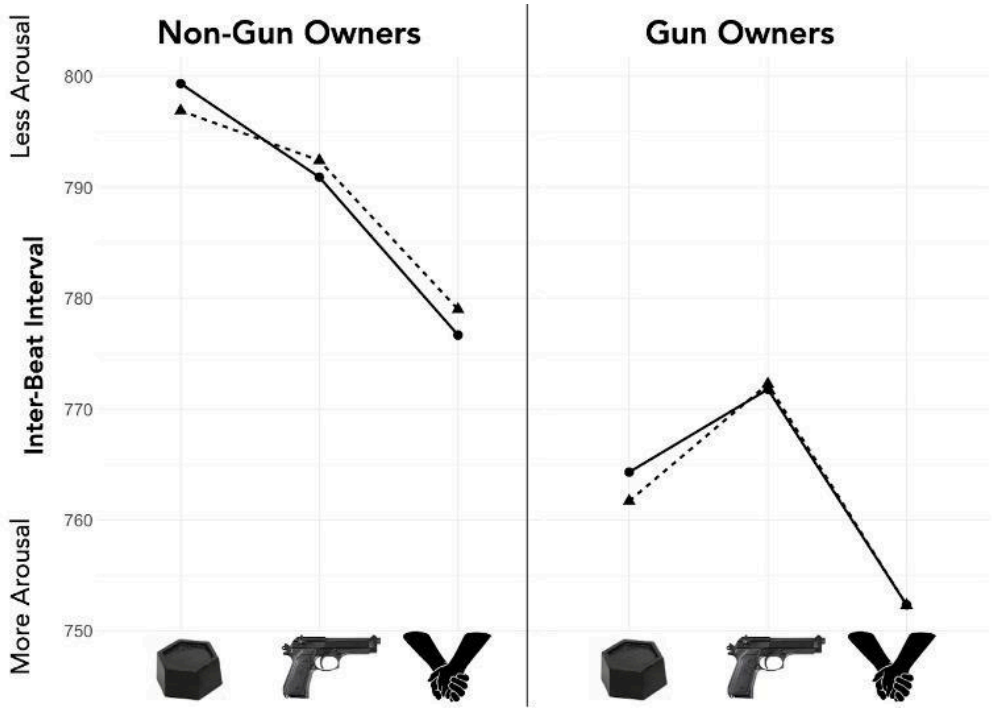

Figure 4: Inter-beat intervals, by condition and gun ownership. Solid lines (with circles) indicate safety trials while dotted lines (with triangles) indicate threat trials. Conditions, left to right, are the object condition, the gun condition, and the handholding condition.

Effects of Condition on Self-Report Data

For our secondary analyses, we were able to extract self-report data from 90 participants nested within 50 dyads (36 from non-owning households, 54 from gun-owning households). Simulation-based power analyses suggest that this sample provides us 80% power (at an alpha level of 0.05) to detect a within subjects/between-subjects interaction (Block Condition x Gun Ownership) of *partial eta*^{2} = 0.063, and 80% power to detect a between-subjects main effect of partial eta2 = 0.093.

We did not find the expected interaction for reported arousal between gun ownership and condition, $F(2, 177.26) = 0.18$, $p = .83$, *partial eta*^{2} = 0.0021 [0.00, 0.023], but we did find a main effect of gun ownership, $F(1, 87.33) = 4.60$, $p = .035$, *partial eta*^{2} = 0.050 [0.00, 0.16]

whereby gun-owners generally felt more arousal after each block, regardless of condition (M = 3.77, se = 0.25) than did non-owners (M = 3.00, se = 0.30).

Similarly, we did not find the expected interaction for self-reported pain between gun ownership and condition, $F(2, 178.43) = 0.64$, $p = .53$, *partial eta*^{2} = .0071 [0.00, 0.042], but we did find a main effect of gun ownership, $F(1, 88.15) = 7.81$, $p = .0064$, *partial eta*^{2} = 0.08 [0.0069, 0.21], whereby gun-owners generally felt more pain after each block, regardless of condition (M = 3.21, se = 0.18) than did non-owners (M = 2.46, se = 0.22).

Finally, we again did not find the expected interaction for self-reported valence between gun ownership and condition, $F(2, 177.26) = 0.22$, $p = .81$, *partial eta*^{2} = 0.0025 [0.00, 0.025], but we did find a main effect of gun ownership, $F(1, 87.26) = 4.22$, $p = .043$, *partial eta*^{2} = 0.046 [0.00, 0.16], whereby gun-owners generally felt happier after each block, regardless of condition (M = 3.74, se = 0.25) than did non-owners (M = 3.01, se = 0.30).

In exploratory models, we find no evidence for moderation of any effects by gender.

Discussion

Do those from gun-owning households find comfort in their guns when psychologically threatened? In a preregistered laboratory study, we find that they do. As predicted, when repeatedly threatened with electric shock, participants from gun-owning households had a slower heartrate when holding a highly-realistic prop pistol than when holding a control metal object or holding the hand of a same-sex friend. Participants from gun-free households, by contrast, found no palliative effect in holding a gun, with a slower heartrate when holding a control metal object than when holding the gun, and with the fastest heartrate when holding the hand of their friend.

As inferring psychological states from a single psychophysiological indicator is problematic, given that multiple psychological states can lead to the same pattern of

psychophysical response (Mendes, 2016; Siegel et al., 2018), we additionally simply asked people how they were feeling. Gun-owners self-reported a pattern of responses (higher levels of arousal, more pain, but a pleasant experience) consistent with their being more vigilant to potential threats in the environment than our non-owners (e.g., Aldrich, Eccleston, & Crombez, 2000; Oken, Salinsky, & Elsas, 2006).

Our paradigm was, in fact, threatening - while, in our control-object condition, we did see the expected distinction in heartrate between periods of high threat (when a participant was at immediate threat of being shocked) and periods of lower threat (when a participant was told that they were not at immediate threat for shock), we saw no such differences across our gun-holding or hand-holding conditions. We speculate that the degree of felt threat in the gun and handholding conditions at baseline were high enough that they washed out any difference between safety and threat trials; and in fact previous work using heartrate as a measure of threat has also found that heartrate is more responsive to the overall threat across a block of trials and discriminates less between safety and threat trials within a block (Fishman, Turkheimer, & DeGood, 1995).

General Discussion

Across two studies, one that glimpsed into everyday life and one that created a tightly-controlled laboratory session, we find that guns help their owners to cope with the psychological threats of the world, but at a potential cost. In both studies, gun owners (or those that come from gun-owning households) find reprieve from the dangers of the world when a gun is made experimentally salient - feeling safer, more in control, and that their lives are more meaningful in Study 1, feeling less worried about the threat of electric shock in Study 2; and in

both studies, there is some evidence that having this gun present increases their vigilance to threat. In combining both lab and field-type studies, we are able to get a much clearer picture of the ways in which protective gun owners use their weapons to feel safe.

When owners are seeing the world through the metaphorical sights of their guns, they construe it as a more dangerous, chaotic place; but we find converging evidence that the psychological resources that their guns provide help them to feel up to the task of taking it on. In Study 1, even though we find that having one's gun accessible increases vigilance, we find no evidence for differences in feelings of safety or control. In Study 2, even though we find self-report responses in those from gun-owning households that are consistent with increased vigilance when they are holding a gun, we similarly find that holding the gun diminishes their physiological threat response. Guns may be, to stretch a metaphor, a double-edged sword, both making the world appear more dangerous but empowering owners to take those dangers in stride.

We note, however, that we do find a difference in anxiety across the two studies: between the increased anxiety felt in Study 1 when owners had their guns accessible and the reduced threat response felt in Study 2 when those from owning households had a gun in hand. We suspect that this difference comes from a consideration of unpredictable versus predictable threat. Uncertainty about a threat is especially anxiety-provoking (Grillon et al., 2004; Grupe & Nitschke, 2013; see also Wilson & Gilbert 2008), and the two different experimental paradigms highlight certainty and uncertainty in very different ways. In the real-world environment of Study 1, the explicit threat of victimization that participants are preparing for is unpredictable and could come at any moment (e.g. Barnhart et al. 2018; Dowd-Arrow et al. 2019; Grossmann & Christensen, 2004; Harcounrt, 2016). By contrast, in Study 2, the threats are very much known and contained. While the precise timing may be stochastic, participants can fully-prepare for the

threat; certain that, at some point in the next few minutes, they will be electrically-shocked, and since they are in the controlled space of a psychology laboratory, they are otherwise completely protected. While the uncertainty of the timing of the shock may have increased vigilance - indeed, in a recent study of threat-response in the lab, researchers found that male handgun owners reacted more strongly (measured via startle-eyeblink) to unpredictable threat probes than to predictable ones (Manzler et al., 2024) - that vigilance, in the safe space of a psychology lab, may not rise to the level of full-blown anxiety.

The benefits of gun ownership seem to be more than just cheap talk. Simply by holding a conceptually-freighted object, these participants appear to have received the benefits of safety. An open question, therefore, lies in better understanding how owners conceptualize the psychological benefits they get from carrying a gun. Do gun owners explicitly think that their weapon can protect them from electric shock or from a sense of anomie that comes from societal upheaval, or are they simply using the societally-generated affordances of an accessible tool? Prior work has shown that people do not need to be explicitly aware of the coping properties of objects for those objects to have a coping function – when primed with a sense that their relationships were unreliable, for example, one study showed that people tended to seek reunion with treasured objects, even when that object was explicitly viewed as being irrelevant for relational harmony (Keefer et al., 2012). At the same time, gun owners may be explicitly elaborating the ways in which guns keep them personally safe: they may have a well-rehearsed sense of how they might be forced to use a weapon in case of emergency (e.g. Barnhart et al., 2018), and have a sense that "trouble come automatically when you don't have a gun." (Harcourt, 2006, p. 32); this rehearsal may carry over into a more generalized sense of a gun as an all-purpose tool for securing one's person. While it is clear that not all Americans find holding

a gun to be a relaxing experience – in our study, those participants from non-gun-owning households had elevated arousal when gripping our pistol – it will be important to understand just how conscious this safety-provisioning process needs to be.

Constraints on Generality

Believing that a gun keeps one existentially safe is a prerequisite for being able to use it as a coping device, and not all gun owners have this belief. The hunting and sport-shooting subcultures of American gun ownership, who tend to see their guns as a tool or a means of recreation (Kohn, 2004), are somewhat distinct from those who own their weapons as a means of protection (e.g., Azrael et al., 2017; Lizotte et al., 1981); and the belief that guns protect their owners may be unusually prevalent in American gun culture, specifically (e.g., Cooke, 2004; Kohn, 2004). We would therefore only expect to see threat-buffering type responses among groups such as American protective gun owners, and we would be somewhat surprised to see such responses among American target-shooters, hunters, or non-American gun owners. As American hunting culture is on the decline, however (Smith & Son, 2015), and is being replaced with an ever-more-militant protective gun culture (e.g., Conley, 2019; Lacombe 2019), we expect that these effects will grow stronger in the population of American gun owners as the link between protection and guns becomes ever more central in the minds of their owners.

This set of constraints on generality, moreover, points clearly to a set of future directions for this work. In powering for our designs, we were generally unable to make strong claims about moderation by demographic or ideological variables. Tests of moderation require especially-large samples, especially when testing for full or partial attenuation (Sommet et al., 2023), and in these studies we were more interested in establishing a phenomenon of interest than in moving to understand how it differs across people. But, we expect that there will be

differences. There are lots of ways to be a gun owner in America - with an estimated 40% of American households owning at least one gun (Parker et al., 2017), gun ownership is, of course, going to be deeply culturally heterogeneous. Understanding that heterogeneity - more properly exploring the differences between citizen-protectors (Carlson, 2015), ascriptive republicans (Filindra, 2023), #2A owners (Drenten et al., 2023), liberal emancipatory democrats (Hubbert & Eaton, 2024), sport-shooters (Kohn, 2004), gun feminists (Kelley, 2021), Black civil-rights defenders (Williams, 1962), hunters (Lizotte & Bordua, 1980; Lizotte et al., 1981), veterans (Cleveland et al., 2017), tactical fanboys (Dannar, 2023), collectors (Olmstead, 1988), tinkerers (McWhirter & Elinson, 2023), and all the other diverse, overlapping, ways of owning a gun in America is a vital next step in mapping out how guns function in the everyday psychological lives of their owners.

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Table 1
Between-Person EMA Analyses

DV	Omnibus Statistic	Non-Owner *M* (se)	Owner Non-Salient *M* (se)	Owner Salient *M* (se)	Non-Owner v. Non Salient	Non-Owner v Salient	Non-Salient v Salient	Non-Owner vs Owner Contrast
Safety/ Control	$F(2, 251.65) = 14.72$, $p < .001$***	4.80 (0.12)	5.32 (0.15)	5.73 (0.13)	$d = 0.69$ [0.20, 1.18], $p = .0055$**	$d = 1.22$ [0.78, 1.67], $p < .001$***	$d = 0.53$ [0.028, 1.04], $p = .039$*	$d = 1.91$ [1.13, 2.69], $p < .001$ ***
Meaning	$F(2, 255.86) = 14.17$, $p < .001$***	4.84 (0.14)	5.07 (0.19)	5.95 (0.16)	$d = 0.32$ [-0.31, 0.95], $p = .32$	$d = 1.52$ [0.94, 2.10], $p < .001$***	$d = 1.20$ [0.55, 1.86], $p < .001$***	$d = 1.84$ [0.82, 2.85], $p < .001$***
Hyper-vigilance	$F(2, 243.22) = 0.53$, $p = 0.59$	2.14 (0.13)	2.07 (0.16)	2.28 (0.14)	$d = -0.089$ [-0.62, 0.44], $p = .94$	$d = 0.18$ [-0.30, 0.67], $p = 0.74$	$d = 0.27$ [-0.28, 0.82], $p = 0.59$	$d = 0.10$ [-0.75, 0.94], $p = .83$
Anxiety	$F(2, 239.9) = 3.17$, $p = 0.044$*	2.16 (0.11)	1.91 (0.13)	1.77 (0.12)	$d = -0.34$ [-0.81, 0.13], $p = .15$	$d = -0.54$ [-0.97, -0.11], $p = .013$*	$d = -0.20$ [-0.69, 0.29], $p = .42$	$d = -0.88$ [-1.64, -0.13], $p = .022$*
Calm	$F(2, 248.23) = 7.74$, $p < .001$***	4.88 (0.12)	5.38 (0.16)	5.57 (.13)	$d = 0.41$ [0.10, 0.74], $p = .012$*	$d = 0.57$ [0.27, 0.86], $p < .001$***	$d = 0.15$ [-0.18, 0.49], $p = .37$	$d = 0.98$ [0.46, 1.50], $p < .001$***
Appraisal as Chaotic	$F(2, 210.38) = 0.40$, $p = .67$	1.60 (0.081)	1.54 (0.10)	1.50 (0.088)	$d = -0.10$ [-0.53, 0.33],	$d = -0.18$ [-0.57, 0.22],	$d = -0.077$ [-0.52, 0.40],	$d = -0.28$ [-0.97, 0.42],

					$p = .89$	$p = .65$	$p = 0.94$	$p = .43$
Appraisal as Positive	$F(2, 254.01) = 8.97$, $p < .001$***	4.40 (0.11)	4.86 (0.14)	5.09 (0.12)	$d = 0.48$ [0.11, 0.85], $p = .011$*	$d = 0.71$ [0.37, 1.04], $p < .001$***	$d = 0.23$ [-0.15, 0.61], $p = .24$	$d = 1.19$ [0.59, 1.78], $p < .001$***
Appraisal as Routine	$F(2, 245.34) = 6.82$, $p = .0013$**	4.77 (0.11)	5.09 (0.14)	5.36 (0.12)	$d = 0.22$ [-0.021, 0.47], $p = .074$	$d = 0.42$ [0.19, 0.64], $p < .001$***	$d = 0.19$ [-0.059, .45], $p = .13$	$d = 0.64$ [0.25, 1.03], $p = .0014$**

Note: For all pairwise comparisons with a significant omnibus test, we do not adjust tests for multiple comparisons. For those pairwise comparisons without a significant omnibus test, we use a Tukey-adjustment for the resulting tests. 95% confidence intervals are presented in brackets. *$p < .05$, **$p < .01$, ***$p < .001$

Table 2
Within-Person EMA Analyses (all events)

DV	Omnibus Statistic	Unarmed *M* (se)	Armed *M* (se)	Armed v Unarmed
Safety/Control	$F(1, 42.43) = 1.65$, $p = .21$	5.67 (0.11)	5.75 (0.11)	$d = 0.13$ [-0.071, 0.32]
Meaning	$F(1, 51.36) = 0.032$, $p = .86$	5.96 (0.13)	5.95 (0.12)	$d = -0.015$ [-0.18, 0.15]
Hypervigilance	$F(1, 58.66) = 5.86$, $p = .019$*	2.16 (0.14)	2.38 (0.15)	$d = 0.30$ [0.051, 0.54]
Anxiety	$F(1, 57.43) = 9.54$, $p = .0030$**	1.65 (0.089)	1.84 (0.11)	$d = 0.28$ [0.10, 0.47]
Calm	$F(1, 59.01) = 0.88$, $p = .77$	5.60 (0.14)	5.48 (0.14)	$d = -0.11$ [-0.34, 0.12]
Appraisal as Chaotic	$F(1, 37.54) = 8.37$, $p = .0063$**	1.32 (0.057)	1.57 (0.11)	$d = 0.47$ [0.15, 0.80]
Appraisal as Positive	$F(1, 57.43) = 1.03$, $p = .31$	5.00 (0.12)	5.10 (0.12)	$d = 0.11$ [-0.11, 0.33]
Appraisal as Routine	$F(1, 76.16) = 0.036$, $p = .55$	5.29 (0.14)	5.36 (0.13)	$d = 0.057$ [-0.14, 0.25]

Note: 95% confidence intervals are presented in brackets. *$p < .05$, **$p < .01$

Table 3
Within-person EMA Analyses (TV-watching only)

DV	Omnibus Statistic	Unarmed *M* (se)	Armed *M* (se)	Armed v Unarmed
Safety	$F(1, 25.23) = 0.50$, $p = .49$	5.88 (0.13)	5.79 (0.14)	$d = -0.13$ [-0.53, 0.27]
Meaning	$F(1, 57.94) = 3.05$, $p = .086$^	5.82 (0.19)	6.02 (0.14)	$d = 0.37$ [-0.10, 0.83]
Hypervigilance	$F(1, 28.34) = 3.05$, $p = .092$^	1.96 (0.19)	2.26 (0.17)	$d = 0.48$ [-0.096, 1.06]
Anxiety	$F(1, 22.99) = 4.53$, $p = .044$*	1.51 (0.094)	1.79 (0.14)	$d = 0.44$ [0.00099, 0.89]
Calm	$F(1, 31.12) = 0.76$, $p = .39$	5.84 (0.20)	5.65 (0.17)	$d = -0.19$ [-0.65, 0.27]
Appraisal as Chaotic	$F(1, 39.84) = 7.25$, $p = .010$*	1.09 (0.031)	1.40 (0.12)	$d = 0.85$ [0.18, 1.51]
Appraisal as Positive	$F(1, 19.89) = 0.91$, $p = .35$	5.48 (0.14)	5.36 (0.13)	$d = -0.19$ [-0.60, 0.23]
Appraisal as Routine	$F(1, 32.33) = 0.98$, $p = .33$	5.35 (0.20)	5.56 (0.17)	$d = 0.20$ [-0.23, 0.63]

Note: 95% confidence intervals are presented in brackets. ^$p < .10$, *$p < .05$