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"Thou Shalt Kill": Practicing self-control supports adherence to personal values when asked to aggress

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ABSTRACT

Poor self-control is a root cause of aggression and criminality. But people can improve their self-control through repetitive practice. Because self-control involves acting in accordance with personal values, practicing self-control can promote attainment of value-consistent goals. The present research tested the hypothesis that practicing self-control could both decrease and increase obedient aggression. In Experiment 1, relative to the active control group, participants who practiced self-control were more hesitant to engage in mock violence (e.g., "cutting" the experimenter's throat with a rubber knife), especially for participants high in dispositional empathy. In Experiment 2, practicing self-control increased obedience to kill insects, but only among participants who felt little moral responsibility for their actions. There was a trend for decreased killing among participants who felt morally responsible for their actions. Our findings suggest that when asked to behave aggressively, self-control promotes adherence to personal values, which may or may not fuel aggression.

1. Introduction

Social psychologists have traditionally understood self-control as the ability to restrain or override a prepotent response in the service of long-term goals and values (e.g., Baumeister, Vohs, & Tice, 2007). Consistent with this definition, higher self-control is linked to lower levels of aggression and criminality (Denson, DeWall, & Finkel, 2012; Gottfredson & Hirschi, 1990; Moffitt et al., 2011). Baumeister and colleagues' strength model specifies that one way to boost self-control capacity is to practice self-control over an extended period of time. This practice is often referred to as self-control training (SCT) or self-regulation training (Berkman, in press). In laboratory experiments, relative to a control group, two weeks of SCT reduced reactive aggression toward strangers in individuals high in trait physical aggression (Denson, Capper, Oaten, Friese, & Schofield, 2011) and aggressive tendencies toward romantic partners (Finkel, DeWall, Slotter, Oaten, & Foshee, 2009). In the present research, we investigated how personal values shape how practicing self-control influences participants' willingness to obey a request to behave aggressively.

SCT entails monitoring ongoing behavior and replacing a habitual behavioral response with a preferred behavior. In addition to reduced aggression, practicing self-control in one domain for a minimum of two weeks (e.g., practicing better posture, using one's non-dominant hand for common tasks) can improve self-controlled behavior in a variety of additional, unrelated domains (e.g., smoking abstinence) (Berkman, in press; Denson et al., 2011; Finkel et al., 2009; Gailliot, Plant, Butz, & Baumeister, 2007; Hagger, Wood, Stiff, & Chatzisarantis, 2010; Hui et al., 2009; Muraven, 2010a, 2010b; Muraven, Baumeister, & Tice, 1999; Sultan, Joireman, & Sprott, 2012). A meta-analysis of 30 experiments found a significant small-to-moderate effect of SCT on improving a wide range of self-controlled behaviors (Hedge's $g = +0.36$) (Beames, Schofield, & Denson, in press).

In contrast to the strength model, two recent models of self-control emphasize the importance of goals. Fujita (2011) suggested that self-control is required in the presence of a conflict between abstract, distal motives and concrete, proximal motives. He suggests that self-control is not uniformly good in every situation. Rather, self-control is a tool for obtaining goals, which can be socially desirable or undesirable. When distal goals are socially undesirable (e.g., hurting another person), practicing self-control should promote the attainment of this socially undesirable goal.

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Similarly, the elaborated process model of self-control provides a theoretical basis for predicting that self-control may sometimes increase harmful behaviors (Inzlicht, Schmeichel, & Macrae, 2014). According to this model, self-control allows people to pursue goals derived from personal values (called "have to" goals) rather than focusing on goals that they intrinsically enjoy (called "want to" goals). To the extent that a person feels they "have to" engage in harmful behaviors (e.g., as part of one's profession or obeying a request to harm others), practicing self-control may increase aggression (e.g., Rawn & Vohs, 2011). Similarly, Finkel (2007) suggested that goal-directed, instrumental aggression could be enhanced by high self-control, for example, by overriding the aversion to harm others.

Although both models emphasize goal attainment as the outcome of self-controlled behavior, goals and values are intricately linked. Most theories suggest that values determine which goals are pursued (e.g., Feather, 1992). Fujita's (2011) model implies that they are largely interchangeable. Specifically, self-control facilitates acting in accordance with one's higher-order goals and values. Similarly, Inzlicht, Legault, and Teper (2014) emphasized that self-controlled behavior is more easily achieved when goals are aligned with personal values than when they are unaligned. Consistent with this notion, affirming core values counteracts the depletion effect (Schmeichel & Vohs, 2009). In the present research, we expected personal values to moderate the influence of SCT on obedient aggression. Specifically we examined the moderating influence of the personal values of empathy (Experiment 1) and moral responsibility (Experiment 2) on the effect of SCT on obedient aggression.

Examining the interactive effects of SCT and personal values on obedient aggression provides an opportunity to examine whether practicing self-control can enhance socially desirable *and* undesirable behavior in some people. To date, self-control has largely been thought to exclusively promote socially-desirable behaviors. For instance, studies showing that self-control reduces reactive aggression strongly support this notion (Denson et al., 2011; Finkel et al., 2009; Moffitt et al., 2011). However, consistent with newer models of self-control (Fujita, 2011; Inzlicht, Schmeichel et al., 2014), it is equally plausible that under some circumstances, SCT could increase obedient aggression.

1.1. Obedient aggression

Many violent atrocities throughout history were committed by people who were directed to do so. Warfare and genocide claimed tens of millions of lives in the 20th century. Milgram's (1963, 1974) experiments and subsequent replications showed the world the ubiquity of the human propensity to obediently hurt other people. When an authority figure was present in the room and asked the participant to deliver electrical shocks to a physically distant victim, a surprisingly large number of participants were willing to inflict an apparently excruciating level of pain. When the authority figure was not physically present, obedience levels shrank. Similar reductions in obedient aggression were obtained when the victim was moved to the same room as the participant.

To frame these results in Fujita's (2011) terms, the physical presence of an experimenter created a proximate goal of obeying the authority figure's directives. More distal concerns about the victim's welfare were pushed into the background. Obedient aggression therefore represents a context in which the more distal values suggest that aggression is inappropriate. Boosting self-control in this context should therefore decrease aggression for people who are empathic or feel morally responsible for doing harm. However, for people who do not feel responsible for their harmful behavior, SCT should increase aggression. On a similar note, a recent study found that people high in conscientiousness, which is a trait characterized by a high degree of self-control, were willing to administer more intense shocks in a Milgram paradigm (Bègue et al., 2015).

We examined the effect of SCT on obedient aggression using two different paradigms. In Experiment 1 (based on Cushman, Gray, Gaffey, & Mendes, 2012), we asked participants to engage in mock violence. In this paradigm, participants are asked to perform actions which simulated (but did not actually inflict) extreme physical harm upon another person (e.g., drawing a rubber knife across someone's throat). This procedure induced self-reported distress and physiological stress responses in participants (Cushman et al., 2012). In Experiment 2, we asked participants to kill bugs by grinding them in a coffee grinder (Martens, Kosloff, Greenberg, Landau, & Schmader, 2007). We report all variables for both experiments and data are available here: https://osf.io/hpquv/.

2. Experiment 1

In Experiment 1, participants completed an SCT or control procedure before performing an adaptation of Cushman et al.'s (2012) mock aggression task. We predicted that SCT would make participants more hesitant and therefore slower to engage in mock aggressive actions. To provide evidence that this effect was due to participants' moral values, we also examined an individual difference variable which represents moral objections to aggression. Burger (2009) found that individuals high in empathic concern were less likely to engage in obedient aggression; and there is a well-known and sizable literature suggesting that empathy increases concern for the welfare of others (Batson et al., 1988; Davis, 1994; Eisenberg & Miller, 1987). As such, we predicted that SCT would only make participants high in empathic concern more hesitant to perform symbolically aggressive actions, but may actually increase obedient aggressiveness among participants low in empathic concern.[1]

2.1. Participants and design

A total of 59 undergraduate psychology students (38 women; $M_{age} = 20.5$) at the University of Wyoming completed both sessions of the study. One additional participant (assigned to the SCT condition) was excluded for extreme non-compliance with this protocol (see below). As there was no viable effect size estimate to base power analyses on prior to conducting this study, this sample size was chosen because it allots approximately 30 participants to each cell of the design. Thus, this exceeds recommendations to allot at least 20 participants per cell (Simmons, Nelson, & Simonsohn, 2011). Participants were required to have a phone with texting capabilities to participate, and they received course credit for participation. At the first session, participants were assigned to either the SCT ($n = 30$) or control condition ($n = 29$) on a pseudo-random basis (i.e., odd-numbered participants = SCT; even-numbered participants = control condition) and reported on their level of trait empathic concern. This procedure ensures equal numbers of participants were assigned to each condition, while still eliminating pre-existing differences between conditions. At the second session, their times to comply with instructions to engage in symbolically-aggressive and non-aggressive actions were measured.

2.2. Materials and procedure

Participants signed up for a study on "handedness and dexterity". They were instructed that the study would consist of two brief (i.e., half-hour) sessions, as well as a two-week activity between these two sessions. Participants signed up for both sessions at the same time, and they were scheduled exactly two weeks apart.

[1] Participants also completed measures of physical aggression (Buss & Perry, 1992), psychopathy (Levenson, Kiehl, & Fitzpatrick, 1995), perspective-taking (Davis, 1983), and self-control (Tangney, Baumeister, & Boone, 2004). The perspective taking × SCT interaction approached significance ($p = 0.14$) and was in the same direction as the empathy interaction. No other interactions were significant. All data are available on the Open Science Framework.

2.2.1. SCT manipulation

Following prior research, participants in the *SCT condition* were asked to use their non-dominant hand and to exert as much effort as possible when: brushing their teeth, opening doors, striking a match or using a lighter, carrying items, operating a computer mouse, stirring, and drinking with a glass or a mug (e.g., Denson et al., 2011; Finkel et al., 2009). These activities were to be completed every day between 8 am and 6 pm for a two-week period. Because the task requires monitoring ongoing behavior and replacing a dominant response with a preferred response, this procedure requires active exertion of self-control.

The control condition was an active sham task that controlled for self-monitoring. Specifically, participants in the *control condition* were told:

"The first thing we'd like to do in this study is determine how much you use your non-dominant hand in your daily life. So, for the next 2 weeks, we would like you to monitor how much you use your (left/right) hand. There is no need for you to change your existing habits. Just monitor how much you naturally use your (left/right) hand during mundane daily activities like brushing your teeth, opening doors, carrying objects, drinking from a glass, stirring, or holding your phone."

The experimenter then gave all participants a small card with instructions on how to complete the monitoring protocol. The card contained the question "How much have you used your non-dominant hand on mundane tasks today?" (1 = not at all to 10 = consistently). Participants were asked to respond to this compliance question via text message every other day between 5 and 6 pm during the two-week interval between sessions for a total of 7 reports. The card given to participants also contained specific instructions regarding how to send in their response (i.e., what phone number to send it to; what code to send in for each response). To receive credit for the study, participants were told that they had to answer this question for at least 5 separate days. Additionally, participants in the SCT condition were told that although it was important to comply with instructions to use their non-dominant hand as often as possible, it was more important to provide accurate feedback about their hand usage. They were encouraged to respond as honestly as possible, and it was emphasized that they would receive credit for the study regardless of their responses to the monitoring protocol. In order to support the cover story, participants next completed the Edinburgh Handedness Questionnaire (Oldfield, 1971).

2.2.2. Trait empathy

To test the hypothesis that SCT will only increase the hesitancy to perform symbolically aggressive actions for individuals who value the welfare of others, we next administered Davis's (1983) widely-used and well-validated empathic concern scale. This scale contains 7 items ($\alpha = 0.68$) measuring the tendency to feel emotional concern for individuals in distress (e.g., "If I see someone being taken advantage of, I feel kind of protective towards them"). Participants indicated their agreement with each item using a 1 (does not describe me well) to 7 (describes me well) response scale. The scale predicts prosocial behavior and concern for others' welfare better than related constructs (e.g., personal distress, cognitive perspective taking, agreeableness) (Davis, 1983; Graziano, Habashi, Sheese, & Tobin, 2007; Penner, Dovidio, Piliavin, & Schroeder, 2005).

2.2.3. Obedience to a request to behave aggressively

Participants arrived at the second session exactly two weeks later, and were greeted by the same experimenter. All participants were told:

"Thank you for completing the two-week hand use protocol. In this session, we'd like you to perform 10 tasks which measure your dexterity. I'll explain each task to you first. When I say, 'Go', perform the action as directed. We'll record video of you while you perform each action, so that we can later assess your dexterity. Please perform all actions in front of the camera."

The experimenter then started the recording on the computer with a webcam. The experimenter started the program at a neighboring computer, which randomly selected 1 of 10 actions and displayed it on screen. After each action was displayed on screen, the experimenter retrieved any equipment necessary for the displayed action. The experimenter then read the instructions for the displayed actions off the screen. After the experimenter read the action, s/he waited a moment and said, "Go", thereby instructing the participant to perform the action.

Five actions were closely modeled after Cushman et al.'s (2012) mock-aggressive actions. They specifically consisted of: 1) pounding the experimenter's shin with a hammer (the experimenters wore a protective PVC cover over their shin to protect them from injury); 2) using a rock to smash the experimenter's hand (the experimenter inserted a rubber hand to their sleeve); 3) discharging a (toy) gun into the experimenter's head; 4) drawing a (rubber) knife across the experimenter's throat; and 5) smacking a realistic-looking baby doll's head onto a table. The comparable non-aggressive actions developed by Cushman et al. were also adapted for use in the study. These actions were designed to be similar to the aggressive actions in terms of surface characteristics, complexity, and physical exertion, but non-aggressive in nature. They specifically consisted of: 1) pounding a piece of wood with a hammer; 2) using a rock to smash a soft rubber ball (similar to a Koosh ball); 3) using a spray bottle to spray water toward the camera; 4) drawing a rubber knife across a loaf of bread; and 5) smacking a hand-broom on a table.

Once participants completed all 10 actions, the experimenter stopped the recording and asked the participant to complete a series of open-ended questions on the computer. These were designed to test participants' awareness of the hypothesis. No participant indicated any suspicion of the true hypothesis. Finally, the participant was verbally debriefed by the experimenter and allowed to leave.

2.2.4. Dependent variable

To code participants' hesitancy and willingness to perform the actions, two undergraduate research assistants watched the videos using VideoPad video editing software. As they did so, they recorded the time at which the experimenter said the word, "Go" and the time at which the participant performed the action. We developed specific, discrete events (i.e., markers) which clearly indicated the exact point in time at which each action was performed. For example, the marker for drawing the rubber knife across the experimenter's throat was the point in time at which the knife first touched the experimenter's throat. The number of milliseconds necessary to perform each action was calculated through subtraction.

To prepare RTs for analysis and assess the reliability of the coders, the following steps were taken: we first eliminated any trial in which either coder noted a problem with the proper performance of the action (e.g., the participant did not wait for the word "go" to perform the action) or the coder's ability to correctly code the action (e.g., the trial was not performed within view of the camera) (3.75% of trials). Next, the RTs were log-transformed to correct for a positively-skewed distribution. Then RTs greater than ± 2.5 *SD*s from the mean RT for each respective action were winsorized (i.e., replaced with values that were ± 2.5 *SD*s from the mean RT) (Robinson, 2007). Three participants (2 in the SCT condition; 1 in the control condition) refused to perform one of the five mock-aggressive actions. Because these refusals clearly indicated strong resistance, we replaced these refusals with the maximum possible log-transformed RT that another participant exhibited for the same action. An average RT for each participant was then created for the aggressive and non-aggressive actions. These steps were performed separately for each coder. The resulting values were quite reliable across coders (*r*s = 0.90 and 0.92 for the aggressive and non-aggressive actions, respectively). We therefore averaged across the two coders.

3. Results

3.1. Preliminary analyses

Overall, participants were quite compliant with the monitoring protocol. The mean number of completed compliance checks was quite high ($M = 5.85$ out of 7 requested checks, an 83.6% compliance rate) and did not differ across conditions, $p = 0.43$. Initial inspection of the SCT condition indicated that one participant was highly non-compliant with the instructions to use her non-dominant hand, as she reported a level of non-dominant hand usage of no higher than a 2 (on a 1 to 10 scale) on any day of the protocol. This participant was therefore deleted from all analyses. However, the central results of this study remain largely identical when this participant was included. After the deletion of this participant, participants in the SCT condition reported a significantly-higher level of non-dominant hand usage ($M = 4.44$, $SD = 1.24$) than participants in the control condition ($M = 3.64$, $SD = 1.70$), $t(57) = -2.05$, $p = 0.045$, $d = 0.54$.

3.2. Time to perform actions

To test the central hypothesis, a 2 (SCT Condition: SCT vs. Control) × 2 2 (Action type: Mock-Aggressive vs. Non-Aggressive) mixed ANOVA was conducted on the time to perform actions. The main effects of SCT condition and action type were both non-significant, $ps > 0.13$. However, the predicted interaction between these two factors was marginally significant, $F(1,57) = 3.19$, $p = 0.08$, $\eta^2_{partial} = 0.052$. This effect size estimate narrowly missed Cohen's (1988) criterion for a medium effect (i.e., 0.059). Participants in the SCT condition were more hesitant to perform mock-aggressive ($M = 2.92$ log-transformed ms; $SD = 0.18$) relative to non-aggressive actions ($M = 2.85$ log-transformed ms; $SD = 0.14$), $t(29) = 2.35$, $p = 0.03$, $d = 0.42$. However, this was not the case for participants in the control condition (mock-aggressive actions: $M = 2.84$ log-transformed ms; $SD = 0.19$; non-aggressive actions: $M = 2.85$; $SD = 0.16$), $t(28) = -0.17$, $p = 0.86$, $d = -0.03$. Furthermore, participants in the SCT condition were somewhat slower to perform the mock-aggressive actions than participants in the control condition, $t(57) = -1.59$, $p = 0.12$, $d = -0.41$, although this comparison did not reach significance. There was no difference between the groups for time to initiate the non-aggressive actions, $t(57) = -0.02$, $p = 0.99$, $d = 0.004$.

3.3. Moderation by trait empathy

To examine whether the effect of SCT was moderated by trait empathic concern, a general linear model (GLM) analysis was next conducted on the speed to perform actions. The GLM combines the traditional ANOVA and regression analyses, thus allowing us to examine a categorical within-subject variable (i.e., Action Type: Mock-Aggressive vs. Neutral), a categorical between-subject variable (i.e., SCT Condition: SCT vs. Control), and a continuous between-subject variable (i.e., trait empathic concern) in the same analysis. Thus, trait empathic concern could be treated as a true continuous variable representing participants' actual responses to the empathic concern scale, rather than artificially dichotomizing this variable (e.g., through a median-split). Dichotomization reduces statistical power considerably (Cohen, 1983), and is an imprecise reflection of the measured construct. To allow proper interpretation of the main effects in this analysis, empathic concern was standardized prior to analysis (Cohen, Cohen, West, & Aiken, 2013). In addition to the SCT × action type interaction reported above, the three-way interaction between trait empathy, type of action, and experimental condition was significant, $F(1,49) = 8.84$, $p = 0.005$, $\eta^2_{partial} = 0.15$, a large effect size (Cohen, 1988).[2]

[2] Degrees of freedom differ because computer failure caused the loss of empathy data from 6 participants.

To understand the nature of this interaction, the times to initiate each type of action in each experimental condition were estimated for participants ± 1 *SD* from the mean in empathic concern (Cohen et al., 2013). The results are displayed in Fig. 1. Consistent with hypotheses, simple slope analyses indicated that participants who were high in empathic concern and in the SCT condition were significantly slower to initiate the mock aggressive actions than the neutral actions, $F(1,26) = 12.05$, $p = 0.002$. This difference was not observed for participants in the control condition who were high in empathic concern, $F(1,23) = 2.50$, $p = 0.13$. There were no significant differences in RTs for participants who were low in empathic concern, $ps > 0.31$.

4. Discussion

Participants who practiced self-control for two weeks were slower to obey the mock aggressive actions. This effect was most pronounced among participants high in empathic concern. These results indicate that SCT may have made highly empathic participants focus more on distal moral values (i.e., concern for others' welfare), and less on the immediate experimental context in which they were being asked to perform a symbolically aggressive action. However, nearly all participants completed all five mock aggressive actions; outright refusals were extremely rare (occurring <1% of the time). Thus, Experiment 2 used a previously-developed paradigm that elicits variability in more overt aggressive actions. Specifically, we asked participants to perform an action which would ostensibly cause death to living organisms.

5. Experiment 2

In Experiment 2, we used a different laboratory paradigm to investigate obedient aggression. Specifically, we employed the insect-killing paradigm originally developed by Martens et al. (2007) (see also Martens & Kosloff, 2012; Webber, Schimel, Martens, Hayes, & Faucher, 2013). In this paradigm, the experimenter asks participants to ostensibly perform the act of killing insects. In reality, the insects are not killed, but this information is not revealed to participants until debriefing. As in Experiment 1, we also examined whether individual differences reflecting moral objections to aggression may moderate these effects. We predicted that SCT may decrease obedient aggression specifically for individuals who feel morally responsible for killing. Thus, SCT should allow those who feel responsible for killing to adhere to their distal goals of being a peaceful person. For participants who did not feel responsible and may have felt like they were appropriately obeying the experimenter, we examined whether SCT could increase killing. We

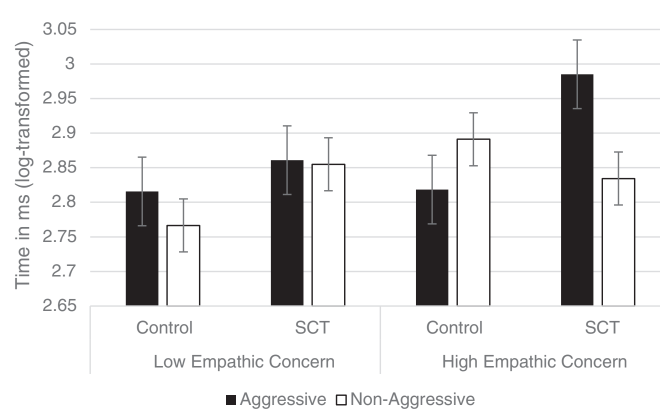

Fig. 1. Time to initiate mock-aggressive and non-aggressive actions at the request of the experimenter in Experiment 1. Participants who were high in empathic concern were slowest to comply with the experimenter's request to engage in the mock aggressive actions than the non-aggressive actions, but only after completing two weeks of SCT (right half). There was no effect of the experimental manipulation on time to initiate the non-aggressive actions for participants.

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also expected a main effect such that SCT would increase obedience with the request to kill. We made this prediction because we assumed that most participants would be disinclined toward killing and SCT would help participants override this general aversion.

6. Method

6.1. Participants and design

Data were initially collected as two separate experiments at the University of New South Wales (UNSW) in Sydney, Australia. Both experiments were run over two sessions held two weeks apart. As in Experiment 1, there was no effect size available for a power analysis. We therefore arbitrarily chose a minimum of 40 participants per group; however, we collected as much data as we could during the semester to account for attrition and data exclusions. To encourage killing, in the first experiment, participants read information describing the insects as an invasive species damaging Australia's sugar cane crop. The information included a fictitious scientific name, information about invasive species in general, and current research on how to exterminate this specific species. Because we were concerned that these instructions could possibly be construed as prosocial killing, we did not provide information about the insects in the second experiment. There was no main effect of experiment or interactions with any of the variables; therefore, we combined the data sets to maximize statistical power.

Participants were 228 UNSW Australia undergraduates and community members who participated in exchange for course credit or AUD$30. Data were excluded from 50 participants for failure to attend the second session ($n = 24$), poor English ($n = 2$), deducing the true aims of the study ($n = 2$), experimenter error ($n = 1$), refusing to complete the extermination task ($n = 15$),[3] and not following instructions ($n = 6$). The final sample was 168 participants (95 women; $M_{age} = 22.15$ years, SD = 4.32; 18–41 years). Men and women were equally distributed among the conditions, $\chi^2(1, N = 168) = 0.01$, $p = 0.94$. Participants were randomly assigned to the SCT ($n = 88$) or control conditions ($n = 80$). The second independent variable was individual differences in sense of moral responsibility for the bug killing.

6.2. Procedure and materials

6.2.1. Session one: Initial assessments

To conceal the true purpose of the study, the current research was framed as multiple experiments spread over two sessions. Participants were informed that these separate experiments consisted of (1) a short study involving different techniques that could be beneficial to individuals with brain damage such as assisting in recovery after a stroke (Denson et al., 2011), and (2) a study investigating the relationship between exterminators and the insects they exterminate. Participants completed a handedness questionnaire. All participants clearly identified as either left or right handed, except one ambidextrous participant; however, because this participant had been randomly assigned to the control condition, s/he was not removed from the study.

During the first session, participants also completed several individual differences measures alone on a computer. These measures were included to explore personality moderators of the SCT manipulation on bug killing. The measures were the Aggression Questionnaire (Buss & Perry, 1992), the Dirty Dozen scale of psychopathy, narcissism, and Machiavellianism (Jonason & Webster, 2010), the insect-flower implicit association test, and the revised Disgust Sensitivity Scale (DS-R; Haidt, McCauley, & Rozin, 1994; modified by Olatunji et al., 2007). Because, the first wave of data showed a significant interaction between trait psychopathy and the SCT manipulation, we attempted to replicate this finding in the second wave of data with a more widely used measure of psychopathy (Levenson et al., 1995) as well as the Dirty Dozen measure. However, the interaction could not be replicated with either psychopathy measure. There were no other significant interactions. On an exploratory basis, we asked participants four questions to see if the SCT and control groups would have different perceptions of bug killing (i.e., how disgusting, enjoyable, morally wrong, and distressing killing bugs would be). There were no group differences on any item at the baseline or second sessions, $ts < 1$, $ps < 0.33$. Also, in order to explore improved inhibitory control as a mechanism through which SCT facilitates self-controlled behavior, at the end of the second experiment (post-bug killing) participants completed the stop-signal task used by Verbruggen, Logan, and Stevens (2008). There were no effects of the SCT manipulation on any of the stop-signal variables, $ps > 0.16$.

6.2.2. SCT manipulation

The SCT manipulation was identical to Experiment 1.

6.2.2.1. Manipulation checks. All participants were asked to complete an online compliance check at least every second day and reply to two text messages during the training period, as well as providing an overall rating of their task adherence upon completion of the study. To encourage compliance and online check accuracy, participants were given an additional AUD$10 for completing 5 or more compliance checks intermittently over the two-week period, regardless of their scores on the tasks.

The SCT compliance check instructed participants to rate the frequency with which they completed the tasks with their non-dominant hand that day on a scale from 1 (*not at all*) to 10 (*consistently*). There was an additional “not applicable” response for when the task was not completed at all that day (e.g., many participants never struck a match or used a lighter with either hand). The control check asked participants to rate the percentages of the day that they *used* and *monitored* their hands. All participants were made aware that the online checks were time stamped to discourage last minute submissions. As a reminder to complete tasks, participants were sent one SMS message per week, specific to each condition, to which they were to respond with a score reflecting their progress so far that day. SCT participants were to respond with a score from 1 (*not performing the NDH tasks*) to 10 (*consistently performing the NDH tasks*). Those in the control condition were to respond with the percentage with which they monitored their hand use.

6.2.3. Session 2

The second session of both studies included the bug-killing task, mood measures, and a measure of moral responsibility (Webber et al., 2013).

6.2.3.1. Killing task. Following Martens and Kosloff (2012), all participants took part in two rounds of an insect extermination task as the primary dependent measure. Participants were told that the study was examining “various types of human-animal interactions” and that on this day the role of exterminators who deal with insects was to be examined. The insects were cricket nymphs (*Teleogryllus commodus*) between 5 and 15 mm in length. The disparity in sizes within each batch remained consistent throughout the study and was matched between the first and second extermination period for each participant.

The experimenter brought an “extermination machine,” 20 cricket nymphs in individual vials, and a timer into the testing room. Following prior research, the extermination machine was a coffee grinder with a PVC tube and funnel attached giving the impression of direct chute to the grinder (Martens et al., 2007). Unbeknownst to participants, the chute was blocked and the nymphs simply collected in the side of the machine for later removal. The experimenter explained that the machine replaced poisonous insect sprays as chemicals were banned

[3] We could not analyze the data from these participants because they refused to participate once they were told what the study required and were then allowed to leave. Thus, they did not complete any other measures. We also failed to record the number of bugs killed for one participant.

from the small experiment rooms for health reasons (Martens, Kosloff, & Jackson, 2010; Webber et al., 2013).

While demonstrating the task, the experimenter instructed participants to place the insects into the grinder one at a time, continuously, and at their own pace until an alarm sounded after 20 s (Webber et al., 2013). Once the alarm sounded, participants were to cease putting the nymphs into the machine, and grind the insects for 3 s (Webber et al., 2013). Small pieces of paper sat inside the grinding apparatus to imitate the sound of the insects being ground (Webber et al., 2013). This extermination procedure was completed twice with the number of insects killed as the dependent variable, which could range from 0 to 40 (Martens & Kosloff, 2012).

6.2.3.2. Feelings of moral responsibility. Following Webber et al. (2013) the current research employed a modified version of the Trauma-related Guilt Inventory (Kubany et al., 1996). The 20-item inventory consists of four subscales, each assessing a discrete element of event-specific traumatic guilt. The subscales are hindsight bias, distress, wrongdoing, and lack of justification. The hindsight bias subscale, which we refer to as the *moral responsibility subscale* ($\alpha = 0.63$), was of particular interest as it assessed feelings of moral responsibility. According to Webber et al. (2013), the subscale "…examines perceptions of personal responsibility in causing the traumatic event, and cognitions about the changeability of the event." (p. 473) (e.g., "I feel responsible for causing what happened" and "I hold myself responsible for what happened") (1 = *not at all true* to 5 = *extremely true*). Webber et al. (2013) found moderate-to-large effects of experimental manipulations on the moral responsibility subscale within the bug-killing paradigm in two experiments, suggesting that the measure is sensitive to moral responsibility within the bug-killing paradigm.

6.2.3.3. Positive and negative affect. A 28-item mood adjective checklist (1 = *not at all* to 7 = *extremely so*) assessed participants' mood prior to and after the extermination task. We examined general negative affect (21 items, e.g., '*upset*', $\alpha_{pre} = 0.96$, $\alpha_{post} = 0.97$) and positive affect (7 items, e.g., '*playful*', $\alpha_{pre} = 0.89$, $\alpha_{post} = 0.83$) because prior work suggests that killing bugs can influence mood (Martens et al., 2007, Study 2).

6.2.3.4. Compliance. After being debriefed, the experimenter probed for suspicion and then asked for an honest rating of overall compliance during the training period from 1 (*never completed the tasks*) to 10 (*completed the tasks every day, consistently from 8 am–6 pm*). The experimenter informed participants that an honest rating was necessary to determine the effectiveness of the intervention and that it was okay if they did not complete the tasks.

7. Results

7.1. Data availability and preliminary analyses

Participants were compliant with the monitoring protocol. The mean number of compliance checks completed was high ($M = 5.58$ out of a possible 7.00, $SD = 1.90$), resulting in an 80% compliance rate, although participants in the control group completed slightly more checks ($M = 5.90$, $SD = 1.71$) than participants in the SCT group, ($M = 5.30$, $SD = 2.03$), $F(1166) = 4.20$, $p = 0.042$, $\eta^2 = 0.025$. Ratings of 'honest' engagement with the tasks was moderate ($M = 5.61$, $SD = 1.85$), and did not differ as a function of condition, $F(1166) = 2.01$, $p = 0.159$, $\eta^2 = 0.012$. Excluding the lighter/match question, participants showed a high level of engagement with the tasks ($M = 5.87$, $SD = 1.81$), which was highly correlated with the honest rating of task engagement, $r(86) = 0.70$, $p < 0.001$. These data suggest effective engagement with the tasks.

A 2 (SCT, control) × 2 (pre-extermination, post-extermination) mixed ANOVA on negative affect revealed only a main effect of time,

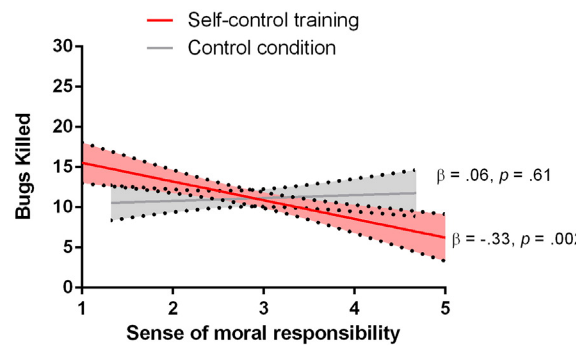

Fig. 2. Number of bugs killed by participants in Experiment 2 as a function of SCT condition and sense of moral responsibility with 95% confidence bands.

$F(1166) = 28.38$, $p < 0.001$, $\eta_p^2 = 0.15$, which showed a decrease in negative affect from pre- to post-extermination. A 2 × 2 mixed ANOVA on positive affect revealed a similar main effect of time, $F(1166) = 67.74$, $p < 0.001$, $\eta_p^2 = 0.29$, which showed an increase in positive affect from pre- to post-extermination. These findings replicate previous work showing that killing multiple bugs can improve mood (Martens et al., 2007, Study 2).

7.2. Feelings of moral responsibility and bugs killed

We first tested for main effects of the SCT manipulation on killing-related guilt and the number of bugs killed. Next, we tested our hypothesis that the effect of the SCT manipulation would be moderated by individual differences in moral responsibility for the killing. There was no main effect of SCT on the number of bugs killed, $p = 0.82$, but there was a negative relationship between moral responsibility and bugs killed, $\beta = -0.16$, $t(164) = -2.02$, $p = 0.045$. However, this main effect was qualified by the predicted SCT × moral responsibility interaction, $\beta = -0.20$, $t(163) = -2.61$, $p = 0.010$ (see Fig. 2).

Post hoc probing revealed that for participants one standard deviation below the mean on moral responsibility scores, participants in the SCT group killed significantly more bugs than participants in the control group, $b = 2.05$, $t(164) = 2.02$, $p = 0.045$. For participants one standard deviation above the mean, participants in the SCT group killed marginally fewer bugs than participants in the control group, $b = -1.72$, $t(164) = -1.68$, $p = 0.094$. Regions of significance analyses revealed that for participants reporting low levels of moral responsibility, they killed more bugs in the SCT condition than control condition at -0.97 *SDs* from the mean. For participants who reported high levels of moral responsibility, they killed fewer bugs in the SCT than control condition at $+1.40$ *SDs* from the mean.

Similarly, examining each condition revealed that within the control condition, moral responsibility scores did not predict number of bugs killed, $\beta = 0.06$, $t(78) = 0.51$, $p = 0.61$, $R^2 = 0.003$, but the moral responsibility scores were inversely correlated with the number of bugs killed in the SCT condition, $\beta = -0.33$, $t(85) = -3.24$, $p = 0.002$, $R^2 = 0.11$. These two slopes were significantly different from each other, $F(1162) = 8.11$, $p = 0.005$.[4]

8. Discussion

Experiment 2 showed that two weeks of SCT both increased and decreased obedience with a request to kill living organisms. Although we

[4] When the two waves of data collection in Experiment 2 were analyzed separately, the interaction terms were only marginally significant in both ($ps < 0.08$). However, if the null hypothesis is true, the probability of replication by chance (even with a more liberal threshold set at $\alpha = 0.10$) is the power of the alpha value (i.e., $p < .10^2 = 0.01$) (Murayama, Pekrun, & Fiedler, 2013). This lends confidence to the reliability of our findings.

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did not see the expected main effect of SCT, participants in the SCT condition, who felt little moral responsibility for killing, engaged in more bug-killing than the control group. There was also some evidence that participants in the SCT condition who ascribed high personal responsibility to their actions killed fewer bugs than controls.

Relative to the control group, we observed the predicted effect of moral responsibility on bug killing in the SCT group. However, there was no correlation between moral responsibility and bugs killed in the control group. We can only speculate about the reasons, but our preferred explanation is that control participants did not possess the ability to act in accordance with their personal values of moral responsibility. Participants in the control group were therefore unable to resist (or excessively indulge) the experimenter's morbid request. Actively disobeying a request from a university researcher to act in accordance with personal values is probably a difficult task for most young people. Without the help of SCT, it seems likely that participants in the control condition were unable to resist the experimenter's request.

9. General discussion

Because self-control imbues many personal and society-wide benefits (Moffitt et al., 2011), it is often considered an unmitigated good. More often than not, self-control allows people to resist undesirable temptations and to adhere to socially desired, normative standards. Indeed, self-control can reduce aggression, criminality, and other typically proscribed behaviors (Denson et al., 2012; Gottfredson & Hirschi, 1990; Moffit et al., 2011). Consistent with prior theory and research, we observed that practicing self-control for two weeks made empathic people more hesitant to engage in mock violence when asked to do so (Experiment 1). Similarly, there was some evidence that SCT helped individuals who felt morally responsible for their actions resist the request to kill bugs (Experiment 2). Thus, we conceptually replicated past work showing that SCT can allow individuals to adhere to more distal values which discourage aggression (Denson et al., 2011; Finkel et al., 2009). We also extended the effects of SCT to mock aggressive actions and killing living organisms.

Perhaps the most novel contribution of this research is the finding that SCT can facilitate obedience when asked to kill. However, SCT only facilitated killing among participants who felt low levels of moral responsibility for their actions. There was a trend toward the opposite effect among participants who reported high levels of moral responsibility. Thus, some participants may have felt they were “just following orders,” whereas others may have felt morally obliged to resist. These feelings likely influenced killing behavior, but only after participants practiced self-control for two weeks. These findings suggest that SCT may enhance the extent to which personal values and goals can guide behavior.

In sum, the overarching theme across these two experiments is that practicing self-control allows people to align their behavior with distal, “ought-to” goals. Individuals differ in whether these distal goals are deemed socially desirable or undesirable. Regardless of the social desirability (whether the goals are “good” or “bad”), SCT promoted behavior designed to attain these distal goals. Thus, our findings are very much consistent with recent theorizing on the role of self-control in goal attainment (Fujita, 2011; Hofmann, Friese, & Strack, 2009; Hofmann, Gschwendner, Friese, Wiers, & Schmitt, 2008; Inzlicht, Legault and et al., 2014).

Our data indicate that SCT could be used to help individuals behave aggressively (or resist a request to aggress) when it is considered useful for them to do so. For instance, combat personnel and police officers must overcome inhibitions against harming others in order to pursue the distal goal of defending one's nation or keeping the peace, respectively (Bourke, 1999; Rawn & Vohs, 2011). Similarly, very few people are strict pacifists and disapprove of every single instance of aggression. Many forms of aggression such as self-defense or defending one's nation are viewed as permissible and even desirable by most cultures. Since these are typically viewed as desirable goals, SCT could be useful in helping individuals who are not typically inclined toward aggression to harm others when the cause is perceived as just.

Although self-control can be used by heroes and villains alike, social norms suggest that most people would endorse using self-control to reduce aggression. So long as people's distal goals and values discourage aggression, bolstering self-control will reduce aggression. So long as empathy and moral responsibility are prevalent, self-control and reductions in aggression will in fact go hand in hand. Indeed, it is highly likely that prior studies (e.g., Denson et al., 2011; Finkel et al., 2009; Moffitt et al., 2011) have linked self-control to reduced aggression precisely because the average person disapproves of most acts of aggression most of the time. Billions of people around the world live in arguably the most peaceful time in human existence (Pinker, 2011). Hence, most societies teach its citizens to restrain their aggressive urges most of the time. The current studies suggest that we cannot assume that this current state of affairs will inevitably exist. Bolstering self-control will only reduce aggression so long as a person's values and goals discourage it.

9.1. Limitations

The current studies were not designed to directly test the psychological mechanisms underlying such effects. For instance, we did not assess the amount of pressure participants felt to comply with the requests. We therefore encourage future research which directly examines the psychological processes underlying this and other self-control-related phenomena (e.g., by measuring distal “have-to” goals and proximate “want to” goals following SCT or depletion). Another limitation is that our moderator measures showed relatively low internal consistency ($\alpha = 0.68$ for the empathy measure, and $\alpha = 0.63$ for the moral responsibility measure). These values fall slightly below the value of 0.70, which is generally regarded as acceptably high (Nunnally & Bernstein, 1994). Similarly, although the experiments used vivid simulations of mock violence and killing, the laboratory environment limits the external generalizability of the findings. Future studies may investigate the effects of SCT on real life (non-)aggression as a function of distal and proximal goals. For example, by obtaining daily diaries of goals, self-reported aggressive thoughts and behavior, and its restraint.

A final limitation is that our studies were conducted in two Western, educated, industrial, rich, and democratic countries (Henrich, Heine, & Norenzayan, 2010). Our conceptual framework predicts that self-control training will increase or decrease obedient aggression according to social or personal standards for appropriate behavior. Our experiments focused on personal values, but it is possible that self-control training may increase or decrease aggression among people of different cultures. For example, compared with those living in individualist cultures, SCT may increase obedient aggression among people living in collectivist cultures who receive the order from a member of their group. This possibility awaits future research.

10. Conclusion

Our results show for the first time that practicing self-control for two weeks led participants to adhere to a distal moral values which discouraged or encouraged aggression (i.e., empathy & lack of moral responsibility). These findings suggest that individual differences in moral concern moderated the effect of SCT on aggressiveness. Specifically, practicing self-control empowered individuals to act in accordance with their personal values.

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