

## Greater benefit of self-affirmation for prevention-focused individuals prior to threatening health messages

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Greater Benefit of Self-Affirmation for Prevention-Focused Individuals  
in the Context of Threatening Health Messages

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## Abstract

**Objective:** Individuals are often defensive toward health messages that suggest they are putting their health at risk because such messages threaten their self-competence and integrity. Although self-affirmation can facilitate prevention behaviors in response to health messages, effects are variable. We examined whether disease prevention focus might strengthen self-affirmation's effects in response to disease prevention messages, given that prevention-focused individuals are likeliest to be persuaded by those messages after self-affirmation attenuates defensiveness.

**Design:** In Study 1, participants were self-affirmed before a message about sexually transmitted infections. In Studies 2 and 3, individuals were self-affirmed prior to a message about alcohol and cancer risk. **Main Outcome Measures:** Studies assessed intentions to use condoms, intentions to reduce alcohol, and willingness to drink alcohol in specific scenarios. **Results:** In Study 1, self-affirmation facilitated condom use intentions among those higher in prevention focus. In Studies 2-3, self-affirmation facilitated lower willingness to consume alcohol among those high in prevention focus. A meta-analysis across the three studies indicated that self-affirmation improved intentions and willingness under high, but not low, prevention focus ( $d=0.20, p=.003$ ). **Conclusion:** These findings demonstrate that health prevention-focus can strengthen self-affirmation's effects, thereby improving responsiveness to health communications about behaviors that increase disease risk.

## Greater Benefit of Self-Affirmation for Prevention-Focused Individuals

### Prior to Threatening Health Messages

Individuals often engage in risky health behavior even when information about health risks is readily available. For example, condoms are effective for mitigating the risk of sexually transmitted infections (STI) but are used only by approximately half of sexually active young adults in the U.S. and U.K. (Civic, 2000; de Visser, 2007; Reece et al., 2010; Tucker et al., 2019). Similarly, alcohol is one of the most preventable causes of injury and death worldwide (WHO, 2018), including as a major contributor to preventable cancer (LoConte et al., 2018), but over 40% of adults report consuming alcohol in the past 12 months (WHO, 2018). Moreover, a substantial proportion of individuals who engage in these behaviors are unaware of, or unwilling to accept information about, these risks (e.g., Scheideler & Klein, 2018; Vail-Smith & White, 2010).

One potential reason for this lack of awareness or acceptance is that people faced with personally threatening disease prevention messages often respond defensively (e.g., Good & Abraham, 2007; McQueen, Vernon, & Swank, 2013), likely due to a need to demonstrate self-integrity and consistency (Steele, 1988). This defensiveness may be attenuated when individuals are able to maintain self-integrity through self-affirmation (Cohen & Sherman, 2014). Self-affirmation often involves asking individuals to select an important value and write about why it is important and how they uphold it (McQueen & Klein, 2006). Self-affirmed individuals who respond less defensively to threatening messages may subsequently change their behavior (e.g., Armitage et al., 2011; Ehret & Sherman, 2018; Epton & Harris, 2008; Harris et al., 2014; Harris & Epton, 2010; Sherman, Nelson, & Steele, 2000).

Despite these promising findings, however, two features of the literature are notable.

First, more studies assess effects on upstream cognitions such as *attitudes and acceptance* than those more proximal to behavior such as *intentions* and *willingness to engage in behavior*. The latter are more immediate precursors to behavior in most frameworks (Conner & Norman, 2015; Gibbons et al., 1998). A second, and perhaps more important, feature of the literature is that the effects of self-affirmation are relatively modest and heterogeneous (Epton et al., 2015; Sweeney & Moyer, 2015). Moreover, several studies have failed to find effects on intentions or behavior (Harris & Napper, 2005; Meier et al., 2015; Reed & Aspinwall, 1998).

Accordingly, some studies have examined boundary conditions of self-affirmation. Many of these focus on the degree to which individuals are likely to be threatened by, and thereby defensive towards, a message. For example, self-affirmation is more likely to facilitate behavior change when recipients engage in high levels of the behavior (Harris et al., 2007; Sherman et al., 2009) and are more defensive toward the message (Griffin & Harris, 2011). A recent meta-analysis further suggests that self-affirmation is more effective at facilitating change among individuals experiencing psychological threat that would otherwise impede it (and who have resources to support the change) (Ferrer & Cohen, 2019).

These studies focus on the degree of threat arising from the message. However, for behavior change to occur once threat is attenuated, the message itself must be persuasive. Indeed, the application of self-affirmation is predicated on the uncontroversial assumption that motivation facilitates behavior change (Atkinson, 1957). Individuals likely to be motivated by a message should change their behavior when threat is attenuated by self-affirmation, whereas individuals less likely to be motivated by a message may not change. Thus, it is crucial to consider individual differences in responses to certain types of messages when making predictions about the impact of self-affirmation on response to those messages. Here, we

examine whether the extent to which people are motivated to prevent negative health outcomes predicts whether self-affirmation motivates change following a health prevention message.

There are individual differences in the extent to which individuals focus on motivation to avoid losses (i.e., prevention focus) (Higgins, 1998; Higgins & Spiegel, 2004; Scholer & Higgins, 2011). For example, when considering a goal to reduce alcohol consumption, some individuals are particularly motivated to reduce their consumption to prevent cancer or other diseases; individuals motivated to avoid the negative consequences of a behavior are said to be high in prevention focus. Prevention focus can be a domain-specific rather than global orientation (Ferrer et al., 2017; Gomez et al., 2013; Summerville & Roese, 2008). When individuals high in prevention focus in a particular domain engage in activities directed at preventing losses in that domain, regulatory fit occurs (Cesario et al., 2008; Higgins, 2005; Spiegel et al., 2004). Moreover, behavior change interventions focused on preventing disease are more effective among individuals high in prevention focus (Cesario et al., 2004; Latimer et al., 2008a; Latimer et al., 2008b; Schokker et al., 2010; Spiegel et al., 2004). As such, self-affirmation should be most effective in motivating a behavior following a potentially threatening message about disease prevention for individuals high in prevention focus (compared to individuals who are low in prevention focus), because these individuals are more likely to be motivated by the message.

### *The Present Study*

Here, we examined whether motivation to prevent health threats increased the effectiveness of self-affirmation in motivating intentions and willingness to change behavior in response to a message about the health risks of a behavior. In three studies ([Datasets are available to individual investigators by official request, as required by regulations for data](#)

collected by a federal employee), we measured individual differences in disease prevention focus using the Health Regulatory Focus Scale (HRFS; Ferrer et al., 2017), which assesses individual differences in motivation to avoid health consequences (prevention focus) and achieve positive health outcomes (promotion focus). We integrated the findings from the three studies into a meta-analysis, a technique that has been recommended for use in replication research as a way to detect the signal of overall effects from a series of experiments (Shrout & Rodgers, 2018).

We also assessed health promotion focus (i.e., motivation to engage in a behavior to achieve positive health outcomes) and examined whether it moderated the effectiveness of self-affirmation on behavioral intentions. Although any behavior can technically be construed as promotion- or prevention-focused (Higgins et al., 2001; Updegraff & Rothman, 2013), the persuasive messages employed here focused on health risks, and we therefore expected that only prevention focus would moderate the effects. However, because prevention and promotion focus are two independent constructs that assess motivation to engage in a behavior (Scholer & Higgins, 2011), ruling out the potential for moderation by promotion focus would allow us to attribute any moderating effects of prevention focus to individual differences in motivation to avoid health consequences, as opposed to general health-related motivation.

We hypothesized that prevention focus would strengthen effects of self-affirmation on responses to messages about STI prevention (Study 1) and alcohol consumption reduction (Studies 2 and 3). Our primary outcomes were intentions and willingness to engage in preventive behavior, as these are important proximal predictors of behavior (Conner & Norman, 2015; Gibbons et al., 1998).

## Study 1

### Method

*Participants.* Two-hundred-and-ninety-seven undergraduates at University of Pittsburgh (61.6% female, age 18-23) voluntarily completed the study for course credit in a laboratory. Sixty-seven percent reported having engaged in sexual activity in the previous six months. We included individuals who were not currently sexually active, given the high prevalence of sexual debut in this population—reasoning that our message was equally relevant to all participants. The sample size necessary to achieve a small-to-medium effect size ( $\sim .35$ ) at  $p=.05$  with power $=.80$  is  $N=260$ .

*Procedure.* Because effects are reduced when participants are aware of self-affirmation's purpose (Sherman et al., 2009), an ostensibly separate studies paradigm was employed. Participants were consented for both studies. Procedures were approved by the University of Pittsburgh Institutional Review Board.

Participants were randomly assigned to receive a self-affirmation intervention or a non-affirmation control activity (e.g., McQueen & Klein, 2006). Experimenters were blind to condition. Those in the self-affirmation condition selected their most important value from a list (artistic skills; athletics; business/earning money; compassion; conscientiousness; creativity; friendliness; generosity; hedonism; honesty; independence; intelligence; kindness; musical ability/appreciation; politics; relations with friends/family; spirituality/religiousness; sense of humor; spontaneity/living life in the moment; trust; worthiness; other), and were instructed to write a statement about why the value was important to them with examples of how they express it in everyday life. Control participants selected their least important value and wrote about why this value might be important to someone else.

Participants were then transitioned into the “second study.” They read an article describing the STI risks of sexual activity, adapted from the Centers for Disease Control and



Prevention website ([www.cdc.gov](http://www.cdc.gov)). The article noted that “women who get one of these STIs can experience abnormal vaginal discharge, and men can experience discharge from the penis. Both men and women may have a burning sensation when urinating, rectal pain, and/or throat infection.” The article ended with a statement that, barring abstinence, latex condoms were a highly effective way protect against STI. We pilot tested the article with a similar sample of sexually active and non-sexually active students to ensure it was perceived as threatening; students were moderately worried about STI ( $M=4.78$  on a 7-point scale).

Following the health information, participants answered questions about intentions to engage in safer sexual behavior, prevention and promotion focus, and standard demographics.

*Measures.* Four items served as a manipulation check: “This value has influenced my life;” “In general, I try to live up to this value;” “This value is an important part of who I am;” and “I care about this value.” (1=*strongly disagree*—5=*strongly agree*,  $\alpha=.93$ ).

Individual differences in prevention focus were assessed with the HRFS (Ferrer et al., 2017), a measure of individual differences in motivation to prevent losses and achieve gains specifically in the health domain. This scale has been shown to be more predictive of intentions to engage in most health behaviors, compared to a general regulatory focus scale and a regulatory focus scale focused on academic achievement, underscoring the importance of examining regulatory focus in the same domain as the behavior it is being used to predict (Ferrer et al., 2017). Examples of prevention items (six items;  $\alpha=.80$ ) are: “Thinking about my health usually makes me worry” and “I often imagine myself being ill in the future.” Examples of promotion items (six items;  $\alpha=.82$ ) are “I think of good health as a key to a happy life,” and “I would do anything to maintain a good, healthy body.” Previous scale validation research has demonstrated the scale is empirically distinct from other measures of general and (non-health)

domain-specific regulatory focus; the same research found that prevention-focus was only modestly correlated with anxiety ( $r=.25$ ) and that prevention-focus significantly predicted key outcomes when controlling for anxiety (Ferrer et al., 2017). As in past research, the correlation between the prevention- and promotion-focus subscales was low ( $r=.14, p=.015$ ).

Intentions to use condoms were assessed with two items ( $r=.727, p<.001$ ): “To what extent do you think you personally should make sure that you or your partner use a condom during sexual activity?” and “To what extent do you think you will actually make sure you and your partner use a condom during sexual activity?” (1=*no extent at all*—7=*to a great extent*). These items were developed based on research suggesting that incorporating expectations about future behavior into intentions items may be more predictive of future behavior than intentions items alone (e.g., Armitage, Norman, Alganem, & Conner, 2015) and were adapted from items used to assess alcohol consumption in previous research validating the HRFS (Ferrer et al., 2017).<sup>1</sup>

*Analysis.* Analyses were undertaken using SPSS version 25.0. Prevention and promotion focus were grand-mean-centered before creating interaction terms. Self-affirmation condition, prevention focus, and promotion focus were regressed together in a separate model for each outcome (using linear or logistic regression as appropriate). Then, we assessed whether the

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<sup>1</sup> Approximately one week later, participants were emailed to ask whether they had engaged in sex in the past week. If so, they indicated whether they used a condom never, some of the time, or all of the time. The study was not powered to obtain significant effects on behavior, but inclusion of this measure permitted an effect size assessment. Study 1 also assessed perceived barriers and behavior change plans (open-ended, coded by two reviewers). Perceived barriers ranged from 0-5 ( $M=1.36, SD=1.23$ ), with high interrater reliability ( $\kappa=.96-.98$ ) and plans ranged from 1-5 ( $M=1.32, SD=1.25; \kappa=.95-.99$ ). Self-affirmation and prevention focus interacted to predict barriers ( $B=-.420, 95\%CI=-.783, -.1056, p=.024, d=.27$ ) such that self-affirmation reduced barriers when prevention focus was higher. No other effects were significant ( $ps > .05$ ). For the purposes of testing separate (unpublished) hypotheses unrelated to this manuscript, participants also completed measures of message acceptance, risk perception, and condom knowledge; the full questionnaire is available from the first author.

influence of self-affirmation condition was moderated by prevention focus (controlling for the main effect of promotion focus), and whether the influence of self-affirmation condition was moderated by promotion focus (controlling for the main effect of prevention focus).<sup>2</sup> The interaction between self-affirmation and prevention focus was probed using simple slopes analyses at  $\pm 1$  *SD* of the moderator (Aiken & West, 1991), and Johnson-Neyman regions of significance analyses using the SPSS PROCESS Macro (Hayes, 2017). Sex and age (largely homogenous) did not qualify effects; thus, analyses were unadjusted. No data were excluded. We conducted analyses with and without the subgroup that reported no current sexual activity (i.e., sexual activity in the past six months) and obtained a similar pattern of results.<sup>3</sup>

## Results and Discussion

Table 1 contains descriptive statistics. Self-affirmation was effective in encouraging individuals to reflect on important values: individuals in the self-affirmation condition rated the value they selected as significantly more important than did those in the control condition,  $F(1,294)=733.21, p<.001, d=3.15$ . Promotion and prevention scores did not vary by self-affirmation condition ( $F_s<1.0, ns$ ), assuring non-dependence. Mean regulatory focus scores were prevention=2.73 ( $SD=0.76$ ) and promotion=3.91 ( $SD=0.58$ ). Participants had relatively high intentions to use condoms ( $M=5.91, SD=1.32$ ).

Table 2 contains all results, and interactions are plotted in the supplementary materials.

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<sup>2</sup> The pattern and significance of results remained unchanged when the control variable was not included.

<sup>3</sup> Sexual activity (past six months) did not interact with self-affirmation,  $B=0.52, 95\%CI=-0.11,1.14, p=.103$ , or prevention focus,  $B=0.04, 95\% CI=-0.37,0.44, p=.858$ , nor was the three-way interaction significant,  $B=0.18, 95\%CI=-0.64,0.99, p=.673$ . Sexual activity (between the affirmation follow-up) did not interact with self-affirmation,  $B=0.32, 95\%CI=-0.68,1.31, p=.532$ , or prevention focus,  $B=-0.30, 95\%CI=-1.65,1.04, p=.658$ , nor was the three-way interaction significant,  $B=0.11, 95\%CI=-1.55,1.76, p=.901$ .

Self-affirmation did not affect intentions. Health prevention focus was positively associated with intentions, but promotion focus was unassociated with intentions. Most importantly, and as predicted, self-affirmation and prevention focus interacted to predict intentions. Although self-affirmation did not influence intentions among those high in prevention focus, the regression weight for self-affirmation was larger when prevention focus was higher. Moreover, regions of significance analyses indicated that the critical value for prevention focus (centered) at which self-affirmation significantly increased intentions to use condoms was 1.07 ( $B=0.51$ ). There was no prevention focus value at which self-affirmation had a negative effect on intentions (lowest observed value=-1.73,  $B=0-0.50$ ,  $95\%CI=-1.32,0.15$ ,  $p=.119$ ). Follow-up analyses with the subsample of 67% who indicated they had been sexually active in the previous six months yielded an identical pattern with comparable effect size for the interaction of self-affirmation and prevention focus ( $d=.24$  for ancillary analyses compared to  $d=.23$  for full sample).<sup>4</sup>

### Summary

College students exposed to threatening STI messages reported higher condom use intentions after self-affirmation if they were also high in prevention focus; no interaction emerged for promotion focus. We found tentative evidence of behavioral differences at a one-week follow-up: there was a marginal interaction (with a high effect size) such that self-affirmed individuals higher in health prevention focus were relatively more likely to use condoms.

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<sup>4</sup> At follow-up, 29 sexually-active-at-baseline participants reported engaging in sexual activity during the course of the study. The interaction of self-affirmation and prevention focus yielded a large effect size ( $OR=32.3$ ,  $95\%CI=0.53,1958.03$ ,  $p=.098$ ;  $d=1.91$ , see Table 2), though not statistically significant, presumably due to low power. Self-affirmation among those higher in prevention focus yielded greater condom use. However, there were no statistically significant transition points within the observed range of prevention focus. Of note, including the three participants who had their sexual debut during the follow-up period increased the  $p$ -level ( $OR=11.01$ ,  $95\%CI=0.51, 235.50$ ,  $p=.125$ ), although the effect size remained large ( $d=.1.32$ ).

## Study 2

In Study 2, we attempted to replicate the pattern observed above for a different prevention behavior – limiting alcohol consumption – in a high-risk population (women who drink more than 7 drinks per week). Given that *intentions* to engage in health behaviors may be less likely to lead to actual behavior than predictors like *willingness* to engage in unprotected intercourse in specific situations (e.g., Gibbons et al., 1998), we also measured willingness to consume alcohol. We predicted that willingness to consume alcohol would be relatively lower among self-affirmed individuals high in prevention focus.

## Method

*Participants.* 400 female participants were recruited on Amazon Mechanical Turk (mTurk), an online crowdsourcing platform. mTurk yields high quality data that is relatively representative compared to convenience or student samples, and participants may pay more attention to studies than do undergraduates (Bartneck et al., 2015; Buhrmester et al., 2011; Hauser & Schwartz, 2016; Gardner et al., 2012; Holden et al., 2013; Shapiro et al., 2013). Moreover, although there have been no comparisons of the effectiveness of self-affirmation in internet vs. laboratory studies, online experimental paradigms are often as effective as laboratory paradigms (e.g., Berinsky et al., 2012; Ferrer et al., 2015; Krantz & Dalal, 2000), and self-affirmation paradigms have been administered successfully and shown to be effective in reducing defensiveness in internet research (e.g., Ferrer et al., 2017; Fox, Harris, & Jessop, 2017; Fielden et al., 2016; Harris et al., 2014; Jiang, 2017; Moeini-Jazani et al., 2019). Given that effects in Study 1 were smaller than predicted, more conservative power calculations were employed here. A sample size necessary to achieve a small effect size ( $\sim .20$ ) at  $p=.05$  with  $\text{power}=.90$  is  $N=390$ .

Mean participant age was 34.4 ( $SD=10.16$ ). Participants were White (82.7%), Black (6.9%), Hispanic (3.8%), Asian (3.3%), American Indian (1.3%), or multiple/ other races (2.0%). Education was college degree (46.1%), some college (45.3%), high school (8.15), and less than high school (0.5%).

A screener assessed gender and average level of alcohol consumption using two questions that asked the average number of days per week individuals drank alcohol in the previous year, and the number of drinks they typically consumed per day. The screener was labeled as a “qualifier,” with no information about what the answers would yield regarding qualification. Women who consumed either an average of seven drinks per week, or more than seven drinks in one setting (based on relevance to the message) were eligible.

*Procedure.* Study 2 also used an ostensibly separate studies paradigm. After providing informed consent, participants were randomly assigned to the self-affirmation or control condition. In the “second study,” participants read an article about alcohol and cancer risk, adapted from accurate information on the National Cancer Institute website (<https://www.cancer.gov/about-cancer/causes-prevention/risk/alcohol/alcohol-fact-sheet>). The article included statements such as “Drinking a single alcoholic drink a day (e.g., a glass of wine, bottle of beer, or a mixed drink) increases a woman's chance of developing breast cancer, according to a 2008 quantitative review of many studies examining the association of alcohol and breast cancer” and “Further, a recent 2011 study in the Journal of the American Medical Association found that consumption of 3-6 alcoholic drinks per week carried a 15% increased risk of breast cancer.” The article ended by recommending: “According to the U.S. Department of Health and Human Services, women should not exceed 1 serving per day (12 oz. of beer, 5 oz. of wine, or 1.5 oz. of hard liquor) and should drink no more than 7 servings

per week.” After reading the article, participants completed all dependent measures.

*Measures.* Intentions to decrease alcohol consumption were assessed using two items ( $r=0.84, p<.001$ ): “I intend to decrease my alcohol consumption in the next two weeks” (1=*not at all* to 7=*as much as possible*), and “To what extent do you think that you, personally, will actually reduce the amount of alcohol you consume in the next two weeks?” (1=*definitely will not do* to 7=*definitely will do*).

Behavioral Willingness was assessed with two drinking scenarios (Gerrard et al., 2002; Gibbons et al., 1998). The first scenario was: “Suppose that you are relaxing at home this weekend, and there is some alcohol (beer, wine, or liquor) in your cabinet or refrigerator. How willing would you be to do each of the following?” and the second was: “Suppose that you are out with some friends. After several drinks, you begin to feel that you may have had enough. Then a friend you haven’t talked to for a while starts talking to you and offers to get you another drink. How willing would you be to do each of the following?” Each scenario was followed by two items: “Drink just one or two drinks” and “Drink more than one or two drinks” (both answer options 1=*Not at all willing*–7=*Very willing*).

Participants were also asked to respond to items assessing emotions and risk perceptions; the full survey is available by request from the first author. At the conclusion of the survey, participants completed the 12-item Health Regulatory Focus Survey used in Study 1 (Ferrer et al., 2017). Both prevention ( $\alpha=0.89$ ) and promotion ( $\alpha=0.85$ ) focus subscales had high reliability.

*Analyses.* Analyses were performed using the same procedures as in Study 1.

## Results and Discussion

Descriptive statistics are in Table 1. Prevention and promotion focus were modestly correlated ( $r=0.32, p<.001$ ). Neither prevention ( $B=0.03, p=.740$ ) nor promotion focus ( $B=0.04,$

$p=.579$ ) was influenced by self-affirmation, again assuring non-dependence. Table 2 contains all models for each outcome below.

Self-affirmation did not influence *intentions* to reduce alcohol consumption. Prevention and promotion focus were associated with intentions. However, neither the interaction of self-affirmation with prevention nor promotion focus predicted intentions.

Self-affirmation did not influence *willingness to drink 1-2 drinks*. Neither prevention nor promotion focus was associated with willingness. As predicted, however, the interaction between self-affirmation and prevention focus predicted willingness, such that self-affirmation was more likely to reduce willingness when prevention focus was high than when it was low. The critical value for prevention focus (centered) at which self-affirmation produced greater willingness was 1.00 ( $B=-0.41$ ), and at which it produced *less* willingness was -1.14 ( $B=0.44$ ). The interaction of self-affirmation and promotion focus did not predict willingness.

Self-affirmation did not influence *willingness to drink >2 drinks*. Prevention focus was associated with lower willingness, but promotion focus was not. Neither the interaction of self-affirmation with prevention focus, nor promotion focus, predicted willingness.

### Summary

There was no main effect of self-affirmation on intentions, nor was an effect moderated by prevention focus. However, the self-affirmation x prevention focus interaction observed in Study 1 was replicated, this time for willingness to consume 1-2 drinks (not for willingness to consume more, although the effect was in the expected direction despite not reaching significance). Across the two studies, then, we have obtained two cases in which self-affirmation was more effective in the context of a threatening health message among individuals high in prevention motivation.



### Study 3

Data for Study 3 were collected as part of a larger (currently unpublished) study to identify the essential components necessary for an induction to facilitate self-affirmation. Because this study included a traditional essay-based self-affirmation condition and a traditional control condition, it provided an opportunity to replicate the findings in Study 2, with the goal of determining whether the interaction between self-affirmation and prevention-focus could be further replicated and accumulating more evidence of this interaction for a meta-analysis that we report later.

#### Method

*Participants.* Data collection occurred as part of a larger (currently unpublished) study, which included several additional conditions intended to isolate the “active ingredients” necessary to facilitate self-affirmation, including a self-activation condition and a health affirmation, and was designed to examine differences in the extent to which different kinds of affirmations influence receptiveness to health conditions. Here, we examined only participants in the traditional essay self-affirmation and no affirmation conditions, consistent with conditions in Studies 1 and 2. No participants in either of these conditions were excluded. Participants were 189 women ( $M_{age}=32.59$ ,  $SD=11.04$ ) recruited through Amazon mTurk with the same screener and inclusion criteria as Study 2. Participants were White (73.4%), Black (9.6%), Hispanic (9.0%), Asian (5.9%), and multiple races (2.1%). Educational status was college (54.3%), some college (35.5%), high school (9.1%), and less than high school (1.1%).

We acknowledge that  $N=189$  participants may be underpowered based on power calculations in Study 2 (although based on the willingness effect size in Study 2,  $N=189$  should yield 80% power to detect a medium ( $\sim 0.25$ ) effect at  $p=.05$ ). However, because power

calculations were based on a power necessary for the larger (unpublished) study, and because the purpose of this study was to amass additional effect sizes for the meta-analysis, we believe this to be a relatively minor concern.

*Procedure.* Procedures were identical to those of Study 2, with one exception: participants were randomly assigned to one of eleven self-affirmation conditions. However, for the current study, we limited analyses to the two traditional conditions.

*Measures.* Measures were identical to those in Study 2, with one exception: the intentions scale included an additional item, consistent with the intentions scale in Study 1: “To what extent do you think that you, personally, should reduce the amount of alcohol you consume?” (1=*not at all* to 7=*as much as possible*). Reliabilities for prevention focus ( $\alpha=.81$ ), promotion focus ( $\alpha=.90$ ), and intentions ( $\alpha=.77$ ) were acceptable.

*Analyses.* Analyses were identical to those in Study 2.

## Results and Discussion

Descriptive statistics are in Table 1. The correlation between prevention and promotion focus was  $r=.14$ ,  $p=.051$ . Prevention focus was unaffected by self-affirmation ( $B=0.05$ ,  $p=.725$ ). Promotion focus was affected by self-affirmation ( $B=0.25$ ,  $p=.001$ ); however, this was not concerning given our hypotheses regarded prevention focus. Table 2 contains all models.

Self-affirmation did not significantly increase *intentions* to reduce consumption (although the effect approached significance). Both prevention and promotion focus were associated with intentions. Neither the interaction of self-affirmation with prevention focus, nor with promotion focus, predicted intentions.

Self-affirmation did not influence *willingness to drink 1-2 drinks*. Neither prevention nor promotion focus was associated with willingness. Neither the interaction of self-affirmation with

prevention focus, nor with promotion focus, predicted willingness.

Self-affirmation did not influence *willingness to drink more >2 drinks*. Neither prevention nor promotion focus was associated with willingness. The interaction between self-affirmation and prevention focus, however, predicted willingness, such that self-affirmation reduced willingness at high, but not low, prevention focus. Self-affirmation produced less willingness when prevention focus (centered) was above the critical value: 0.652 ( $B=-0.56$ ), and less when it was below the critical value: -1.34 ( $B=0.79$ ). The interaction of self-affirmation and promotion focus did not predict willingness.

#### Summary

In Study 3, we found the predicted interaction between self-affirmation and prevention focus, though in this case for willingness to consume >2 drinks. The main effect of self-affirmation on intentions approached significance, but there was no interaction with prevention.

#### Meta-analysis

To reconcile the somewhat inconsistent findings, we conducted a meta-analysis. Meta-analysis has been recommended for use in replication research as a way to detect the signal of overall effects from a series of experiments (Shrout & Rodgers, 2018).

#### Method

*Analyses.* We used Comprehensive Meta-Analysis v3 to calculate mean difference effect sizes (Cohen's  $d$ ; Cohen, 1988), weighted by inverse variance to adjust for sample size (Hedges, 1981). Because our analyses involved regressions and interactions, we calculated effect sizes using  $p$ -values and sample size (Borenstein & Cooper, 2009; Lipsey & Wilson, 2001) from the regressions reported previously (which all included both prevention and promotion focus as

covariates; the pattern and significance remained unchanged when calculated with unadjusted values) Positive effect sizes indicated higher intentions to engage in condom use or reduce alcohol consumption or lower willingness to consume alcohol.

Because effect sizes within studies were interdependent, as they relied upon the same sample, the program was set to average the effect sizes within each study: 1) one intentions effect size from Study 1; 2) the average of three effect sizes for Study 2 (intentions and two willingness outcomes); and 3) the average of three effect sizes for Study 3 (intentions and two willingness outcomes).  $Q$ ,  $I^2$ , and  $\tau^2$  were used to evaluate effect size heterogeneity. Random effects models are reported.

## Results

*Overall Effect Sizes.* There was a significant main association of prevention and promotion focus with intentions/willingness. There was no main effect of self-affirmation. Self-affirmation interacted with prevention focus, such that self-affirmation increased intentions/willingness among those high, but not low, in prevention focus (Table 3; Figure 1).

## General Discussion

In a meta-analysis of three experiments, self-affirmation did not have a direct influence on intentions/willingness, which is somewhat consistent with meta-analytic findings suggesting that self-affirmation has a modest and variable overall effect (Epton et al., 2015; Ferrer & Cohen, 2019; Sweeney & Moyer, 2015). Indeed, although the main effect for the current studies ( $d=0.06$ ) appears smaller than those in recent meta-analyses, it falls into the confidence intervals for effects on intentions in those meta-analyses (Epton et al., 2015:  $d=0.14[0.05-0.23]$ ; Sweeney et al., 2015:  $d=0.26[0.04, 0.48]$ ), indicating that it is not statistically different. More importantly, these findings offer some initial evidence that self-affirmation may be more effective in

motivating behavior change in response to a message about health risks among individuals high in prevention focus. This finding is consistent with the notion that for self-affirmation to be effective in facilitating change, attention must be paid not only to whether individuals are psychologically threatened (Ferrer & Cohen, 2019; Griffin & Harris, 2011; Sherman et al., 2009), but also whether they are likely to be motivated by a persuasive message once defensiveness is attenuated.

Taken together, these results suggest (tentatively, of course) that self-affirmation interventions preceding health messages may facilitate intentions to engage in risk reduction behaviors among those high in prevention focus. Although our effect sizes were modest, with some inconsistency across dependent measures, our meta-analysis suggests the emergence of a potentially important signal to address in future research. Moreover, even small findings can have important implications at the population-level (Miller & Prentice, 1992). Thus, if replicable, findings suggest self-affirmation may be a useful means to reduce defensiveness against threatening messages (which is widespread and undermines public health; Liberman & Chaiken, 1992; van't Riet & Ruiters, 2013) among people whose motivational focus aligns with such messages, particularly with the emergence of strategies to disseminate self-affirmation more widely (Havranek et al., 2012). If replicable, our data suggest that self-affirmation may be a useful intervention tool for behavior change when people's motivational focus aligns with messages about the behavior. This is a possibility that should be addressed in future research with larger samples over a longer time period and with the measurement of subsequent behavior.<sup>5</sup>

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<sup>5</sup> Study 1 also found tentative evidence of behavioral differences at a one-week follow-up (also presented in a footnote): self-affirmed individuals higher in health prevention focus were more likely to use condoms (although the interaction was not statistically significant at  $p < .05$ , the study was underpowered for this outcome and the effect

More generally, these findings also underscore the importance of ensuring that a health message following self-affirmation is designed to be persuasive to the target population; this is particularly important, given that many (if not most) self-affirmation studies do not report pilot testing the health message itself. Self-affirmation researchers should ensure that the health messages they use are persuasive. Moreover, it highlights the importance of examining moderators of message persuasiveness that are readily malleable. Indeed, despite being an individual difference, regulatory focus can be induced experimentally (Higgins, 2006; Scholer & Higgins, 2011). For example, prevention focus has been successfully induced through guided imagery tasks focusing on potential losses (e.g., Hassenzahl et al., 2008), or by asking participants to reflect on prevention-focused mottos (e.g., “an ounce of prevention is worth a pound of cure;” Faddegon et al., 2008). As such, self-affirmation may thus be buttressed with parallel interventions that produce a prevention focus.

The behaviors targeted in our threatening health messages – reducing alcohol consumption to prevent cancer and using condoms to prevent STIs – may be particularly amenable to moderation by prevention focus. Although some have noted that behaviors are not inherently prevention- or promotion-focused (Higgins et al., 2001; Updegraff & Rothman, 2013), in practice, many health communications categorize behaviors into health promotion and disease prevention categories (e.g., [https://www.cdc.gov/nchs/healthy\\_people/hp2020.htm](https://www.cdc.gov/nchs/healthy_people/hp2020.htm)). Given these categorizations, it is possible that prevention focus may be more likely to moderate the effects of self-affirmation on defensiveness against messages targeting “prevention” behaviors, but less likely to do so in the context of “promotion” behaviors (e.g., exercise, multivitamin use).

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size was high. However, given the small number of participants in this analyses, any further interpretation would be speculative.

In these studies, we experimentally manipulated self-affirmation. Self-affirmation can also be construed as an individual difference; some people are more likely to reflect on strengths and values without prompting (Creswell et al., 2007; Harris et al., 2019). Tendencies to spontaneously self-affirm may have effects comparable to self-affirmation inductions, as they have been shown to buffer against affective influences on health information avoidance, to be directly associated with less health information avoidance, and to be associated with a variety of positive affective and well-being outcomes (Ferrer et al., 2015; Harris et al., 2019; Taber et al., 2015). Future work might examine whether self-affirmation tendencies and regulatory focus interact in ways comparable to those observed here.

These studies had several limitations. We used convenience samples of college students and female mTurk workers, which could limit generalizability. Outcomes were self-reported, introducing self-report bias concerns. Moreover, outcomes were intentions and behavioral willingness, rather than behavior itself (with the exception of a small sample who reported on condom use in Study 1), which is a limitation given the intention-behavior gap (Sheeran & Webb, 2016). We assessed prevention focus after the self-affirmation induction, and although it was unaffected by this induction, future research might consider pre-manipulation assessments if feasible. As in most self-affirmation experiments, we did not include a no-message control condition. Finally, although our studies involved large sample sizes, statistical power to detect interaction effects was of course lower than power to detect main effects. We attempted to offset this particular limitation by including the meta-analysis to boost power and integrate findings.

Despite these limitations, these studies are the first to evaluate prevention focus as a moderator of self-affirmation effects, suggesting this is a promising construct to explore in the continued assessment of self-affirmation as a tool for health behavior change. Identifying

prevention focus as a potential moderator of this tool advances the science of targeting and tailoring interventions involving self-affirmation to individuals for whom they will be most effective.



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Table 1. Descriptive statistics for study variables.

	<i>Study 1</i>		<i>Study 2</i>		<i>Study 3</i>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Prevention focus	2.73	0.76	3.26	0.71	3.01	0.97
Promotion focus	3.91	0.58	4.06	1.00	4.24	0.54
Intentions	5.91	1.32	3.69	2.02	4.06	1.54
Behavioral Willingness (1-2 dr.)	-	-	4.42	1.47	4.71	1.42
Behavioral Willingness (>2 dr.)	-	-	3.64	1.62	3.66	1.64

Table 2. Findings from Studies 1, 2, and 3.

	Study 1 Intentions				Study 1 Behavior								
	<i>B</i>	<i>95% CI</i>	<i>p</i>	<i>d</i>	<i>OR</i>	<i>95% CI</i>	<i>p</i>						
Self-affirmation	0.09	-0.21, 0.39	.551	0.07	1.15	0.37, 26.76	.293						
Prevention	<b>0.29</b>	<b>0.09, 0.49</b>	<b>.004</b>	0.34	0.43	0.05, 4.13	.432						
Promotion	0.07	0.19, 0.32	.609	0.06	0.49	0.08, 2.93	.434						
SA X Prevention	<b>0.39</b>	<b>&lt;0.01, 0.78</b>	<b>.049</b>	0.23	32.20	0.53, 1958.03	.098						
SA X Promotion	0.14	-0.37, 0.66	.587	0.06	0.06	>0.01, 2.79	.148						
SA at High Prevention	0.39	-0.03, 0.81	.068	0.21	0.22	0.02, 2.82	.246						
SA at Low Prevention	-0.21	-0.62, 0.21	.335	-0.11	44.71	0.39, 5071.71	.115						
SA at Mean Prevention	0.09	-0.20, 0.39	.539	0.07	3.15	0.37, 26.76	.293						
	Study 2 Intentions				Study 2 Willingness (1-2)				Study 2 Willingness (2+)				
	<i>B</i>	<i>95% CI</i>	<i>p</i>	<i>d</i>	<i>B</i>	<i>95% CI</i>	<i>p</i>	<i>d</i>	<i>B</i>	<i>95% CI</i>	<i>p</i>	<i>d</i>	
Self-affirmation	0.08	-0.27, 0.43	.644	0.05	-0.01	-0.30, 0.28	.951	-0.01	-0.06	-0.38, 0.26	.701	-0.04	
Prevention	<b>0.59</b>	<b>0.41, 0.78</b>	<b>&lt;.001</b>	<b>0.64</b>	-0.15	-0.30, 0.01	.060	-0.19	0.10	-0.07, 0.27	.259	0.11	
Promotion	<b>0.70</b>	<b>0.44, 0.96</b>	<b>&lt;.001</b>	<b>0.54</b>	-0.12	-0.34, 0.10	.281	-0.11	<b>-0.36</b>	<b>-0.60, -0.12</b>	<b>.003</b>	<b>-0.30</b>	
SA X Prevention	0.07	-0.28, 0.43	.679	0.04	<b>-0.40</b>	<b>-0.69, -0.11</b>	<b>.008</b>	<b>-0.27</b>	-0.26	-0.58, 0.06	.115	-0.16	
SA X Promotion	-0.10	-0.59, 0.40	.699	-0.04	-0.13	-0.54, 0.28	.528	-0.06	-0.08	-0.53, 0.37	.729	-0.04	
SA at High Prevention	0.16	-0.34, 0.65	.536	0.06	-0.41	-0.82, 0.01	.053	-0.20	-0.32	-0.77, 0.13	.165	-0.14	
SA at Low Prevention	0.01	-0.49, 0.51	.974	0.03	0.39	-0.03, 0.80	.065	0.19	0.20	-0.26, 0.65	.397	0.09	
SA at Mean Prevention	-0.16	-1.36, 1.04	.794	-0.03	1.28	0.29, 2.28	.012	0.26	0.78	-0.32, 1.88	.162	0.14	
	Study 3 Intentions				Study 3 Willingness (1-2)				Study 3 Willingness (2+)				
	<i>B</i>	<i>95% CI</i>	<i>p</i>	<i>d</i>	<i>B</i>	<i>95% CI</i>	<i>p</i>	<i>d</i>	<i>B</i>	<i>95% CI</i>	<i>p</i>	<i>d</i>	
Self-affirmation	0.47	0.06, 0.88	.055	0.34	-0.07	-0.50, 0.34	.732	-0.02	-0.01	-0.50, 0.47	.957	-0.01	
Prevention	<b>0.52</b>	<b>0.31, 0.73</b>	<b>&lt;.001</b>	<b>0.72</b>	0.02	-0.20, 0.23	.871	0.02	0.17	-0.08, 0.42	.174	0.20	
Promotion	<b>0.55</b>	<b>0.16, 0.93</b>	<b>.005</b>	<b>0.41</b>	-0.10	-0.50, 0.29	.614	-0.07	-0.41	-0.86, 0.04	.071	-0.26	
SA X Prevention	0.04	-0.37, 0.46	.837	0.03	-0.35	-0.78, 0.08	.107	-0.24	<b>-0.72</b>	<b>-1.20, -0.24</b>	<b>.003</b>	<b>-0.43</b>	
SA X Promotion	-0.36	-1.15, 0.42	.359	-0.13	-0.28	-1.09, 0.53	.493	-0.10	-0.81	-1.72, 0.10	.082	-0.26	
SA at High Prevention	0.51	-0.06, 1.08	.081	0.26	-0.41	-0.99, 0.18	.172	-0.20	<b>-0.70</b>	<b>-1.35, -0.04</b>	<b>.037</b>	<b>-0.31</b>	
SA at Low Prevention	0.42	-0.16, 1.01	.153	0.21	0.27	-0.32, 0.87	.369	0.13	<b>0.70</b>	<b>0.03, 1.37</b>	<b>.040</b>	<b>0.30</b>	
SA at Mean Prevention	0.32	-1.12, 1.77	.661	0.06	1.09	-0.39, 2.57	.148	0.21	<b>2.39</b>	<b>0.73, 4.04</b>	<b>.005</b>	<b>0.42</b>	



Table 3. Meta-analysis results.

	<i>k</i>	<i>Q</i>	<i>I</i> <sup>2</sup>	<i>Tau</i> <sup>2</sup>	<i>d</i>	95% <i>CI</i>	<i>p</i>
Self-affirmation	3	0.22	0.00	0.00	0.06	-0.07, 0.19	.364
Prevention Focus	3	1.96	0.00	0.00	<b>0.20</b>	<b>0.07, 0.34</b>	<b>.003</b>
Promotion Focus	3	1.76	0.00	0.00	<b>0.19</b>	<b>0.05, 0.32</b>	<b>.014</b>
SA X Prevention	3	0.30	0.00	0.00	<b>0.20</b>	<b>0.07, 0.33</b>	<b>.003</b>
SA at Low Prevention	3	0.04	0.00	0.00	-0.09	-0.23, 0.04	.164
SA at High Prevention	3	0.58	0.00	0.00	<b>0.18</b>	<b>0.05, 0.32</b>	<b>.007</b>

Figure 1. Effect sizes of self-affirmation in meta-analysis of the three studies.

