


# Reconceptualizing Self-Affirmation With the Trigger and Channel Framework: Lessons From the Health Domain

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## Abstract

Self-affirmation—a theory-based technique to affirm the adaptive adequacy of the self—can promote positive behavior change and adaptive outcomes, although effects are variable. We extend a novel framework (Trigger and Channel), proposing three conditions that facilitate self-affirmation-induced behavior change: (a) presence of psychological threat, (b) presence of resources to foster change, and (c) timeliness of the self-affirmation with respect to threat and resources. Using health behavior as a focus, we present meta-analytic evidence demonstrating that when these conditions are met, self-affirmation acts as a psychological trigger into a positive channel of resources that facilitate behavior change. The presence of a timely threat and the availability of timely resources independently predicted larger self-affirmation effects on behavior change, and the two interacted synergistically to predict still larger effects. The results illustrate the conditionality of self-affirmation effects and offer guidelines for when, where, and for whom self-affirmation will be most effective.

## Keywords

self-affirmation, behavior change, recursive processes, social psychological intervention

Self-affirmation—the act of affirming one’s moral and adaptive adequacy (Steele, 1988)—has been used as a tool to facilitate behavior change in health, education, and relationship contexts (Cohen & Sherman, 2014; Harris & Epton, 2009). Self-affirmation was developed from research in social psychology demonstrating the fluidity of the self-concept in the face of threats to it. The standard self-affirmation intervention presents people with an opportunity to write briefly about an important personal value, such as relationships or religion (McQueen & Klein, 2006). Although brief, this act broadens the perceived bases of self-worth and helps people to cope with a threatening situation, especially one in an altogether different domain from the self-affirmation. Self-affirmation has been used successfully in education, improving academic outcomes for psychologically threatened students, such as those contending with negative stereotypes (Cohen, Garcia, Apfel, & Master, 2006; Cohen, Garcia, Purdie-Vaughns, Apfel, & Brzustoski, 2009; Goyer et al., 2017). In parallel, self-affirmation has appeared in an increasing number of health behavior change studies. Effects on health outcomes have been generally positive but relatively small and variable (Epton, Harris, Kane, van Koningsbruggen, & Sheeran, 2015; Sweeney & Moyer, 2015), suggesting it is not a universal path to behavior change. The conditions in educational settings under which self-affirmation is most likely to be effective and ineffective have been discussed (see Cohen & Sherman, 2014; Goyer et al., 2017). Here we advance an understanding of the conditions under which

self-affirmation is likely to be most effective, focusing on health behavior change.

We extend a framework, Trigger and Channel, which specifies conditions under which self-affirmation most effectively facilitates health behavior change (Cohen, Garcia, & Goyer, 2017; Goyer et al., 2017). We then meta-analytically demonstrate that the framework predicts the magnitude of affirmation-induced health behavior across the body of published and unpublished studies on this topic. Finally, we provide examples of contexts where self-affirmation is most likely to be effective. The Trigger and Channel framework conceptualizes the self-affirmation process as a trigger, which, when it occurs at a timely moment, places people on a channel of behavior change. Specifically, when the affirmation occurs for people facing a psychological threat impeding change, and in a context that provides them with access to resources that support their behavior change efforts, it is more likely to prompt behavior change. Once change occurs, it may persist, because the person has entered a channel of forces that sustain forward momentum. Thus, our framework predicts conditional effects of self-affirmation:

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For maximal benefit, it must be well-situated in a complex system.

### Self-Affirmation and Health Behavior

People tend to be defensive when learning that their behavior puts them at a health risk, because this information threatens their sense of personal adequacy by implying that they have volitionally engaged in harmful or irrational action (Jemmott, Ditto, & Croyle, 1986; Kunda, 1987). Self-affirmation bolsters people's sense of global adequacy, broadening the perceived sources of personal worth on which the self is based and rendering the specific information less threatening (Steele, 1988). Rather than avoid or defensively dismiss threatening information, self-affirmed people are more likely to engage with it and incorporate it into their future plans (see Cohen & Sherman, 2014). Because threat is diminished, people can also process the information in a deeper and more systematic manner (Correll, Spencer, & Zanna, 2004), which can facilitate long-term attitude change (Petty & Cacioppo, 1986).

The notion that self-affirmation interventions can catalyze the effects of health education and behavior change programs is appealing in light of the fact that these interventions are easy to administer and take only a few minutes to complete (Klein, Shepperd, Suls, Rothman, & Croyle, 2015; McQueen & Klein, 2006). Consistent with this notion, self-affirmations have been shown to encourage people to form intentions and plans to engage in healthful behavior (e.g., Armitage, Harris, Hepton, & Napper, 2008; Ferrer, Klein, & Graff, 2017; Ferrer, Shmueli, Bergman, Harris, & Klein, 2012), to increase their healthful behavior (Burson, Crocker, & Mischkowski, 2012; Cooke, Trebaczyk, Harris, & Wright, 2014; Epton & Harris, 2008; Fielden, Sillence, Little, & Harris, 2016; Harris et al., 2014; Harris & Epton, 2009), and to lessen biological and behavioral markers of poor health, such as physiological stress and body mass index (Creswell et al., 2005; Derks, Scheepers, Van Laar, & Ellemers, 2011; Logel & Cohen, 2012; Sherman, Bunyan, Creswell, & Jaremka, 2009).

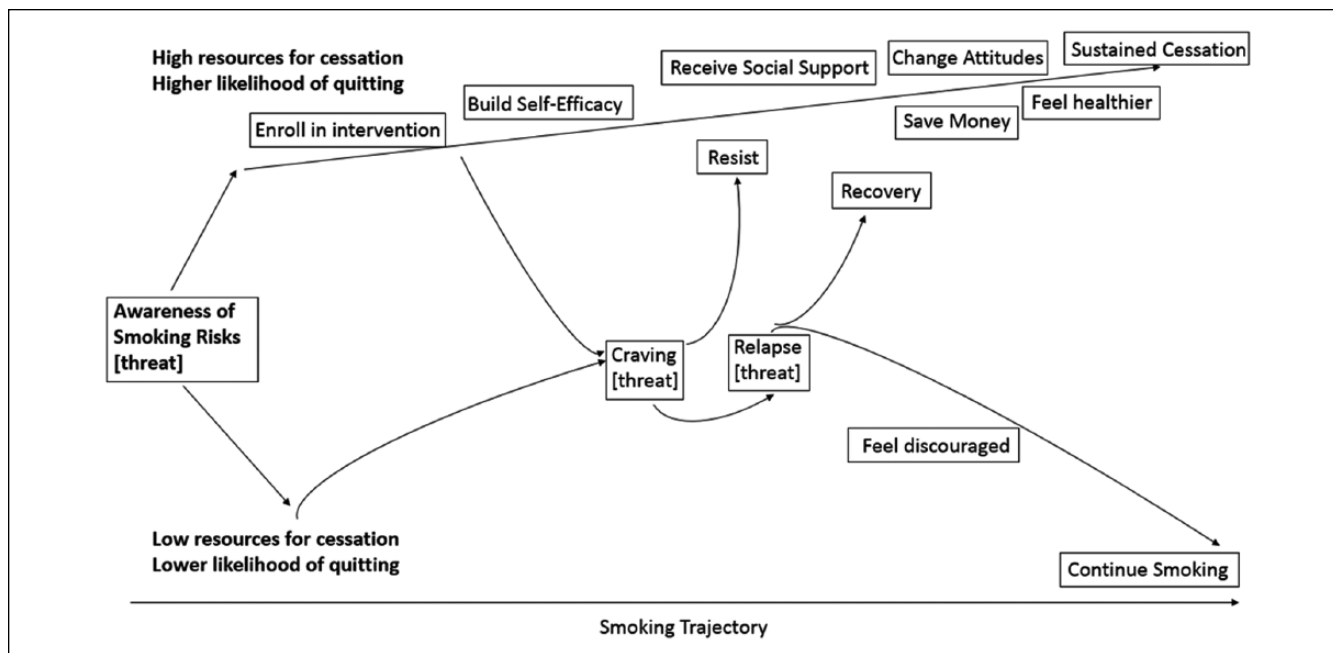
However, self-affirmation is not a universal path to behavior change. It does not always yield positive effects. This is especially true for effects on actual behavior, in contrast to self-reported attitudes and intentions (Fry & Prentice-Dunn, 2005; Good, Harris, Jessop, & Abraham, 2015; Harris, Mayle, Mabbott, & Napper, 2007; Harris & Napper, 2005; Jessop, Simmonds, & Sparks, 2009, 2014; Mancuso et al., 2012; Meier et al., 2015; Pietersma & Dijkstra, 2011; Reed & Aspinwall, 1998). Meta-analyses show that the effect of self-affirmation on health behavior is, though positive and significant overall, small and variable (Epton et al., 2015; Sweeney & Moyer, 2015). This suggests that self-affirmation has effects that depend on the context in which it is introduced, not uniformly positive ones (see Cohen & Sherman, 2014; Lewin, 1939; Pawson & Tilley, 1997).

Moreover, under nonoptimal conditions, self-affirmation may not only be ineffective but counterproductive (Cohen & Sherman, 2014; Vohs, Park, & Schmeichel, 2013).

### Trigger and Channel Framework

Our framework offers a theoretical account of contextual factors that influence the effectiveness of self-affirmation. This framework offers an account not of self-affirmation per se, but of the application of it: when, where, and for whom it is apt to work best. The framework specifies that self-affirmation will be effective *for* a person experiencing a threat to self that is impeding adaptive behavior. The self-affirmation must also be delivered *where* there are resources to support behavior change, either already present in the environment, such as within the educational or health care system, or as provided by an intervention or program featured in the experimental procedure. Finally, even when threat is present, and resources are available, these may not suffice for self-affirmation to have a positive impact on behavior. In addition, the affirmation must be *timely* with respect to them. Ideally, affirmation should occur near the moment that psychological threat emerges, to alleviate the threat and at a time when resources for change are easy to access (Cohen, Garcia, & Goyer, 2017). If a psychological threat has already occurred and been resolved, affirmation is apt to have limited impact. If resources are difficult to access, the positive intentions created by affirmation are less likely to be channeled into action. When these conditions—*psychological threat*, *resources for change*, and *timeliness*—are met, the self-affirmation will trigger a psychological reaction of openness, the effects of which are channeled into healthful behavior change.

Consider the example of a text-message program to promote smoking cessation (e.g., Taber, Klein, Ferrer, Augustson, & Patrick, 2016). Figure 1 illustrates the smoking cessation process and the various junctures where self-affirmation could influence a person's ability to remain on a successful course. These are signified with the term "threatening." If the key conditions are met—psychological threat, resources for change, and timeliness with respect to threat and resources—self-affirmation should augment the cessation program's efficacy and the individual's ability to stop smoking. In this figure, timeliness would be represented by the placement of affirmation near the threatening junctures that cause people to diverge into a healthful or unhealthy channel. For instance, if given right before a psychologically threatening text that alerts them of new research related to the risks of smoking, the self-affirmation might make people less defensive and more likely to accept the information. This positive reaction might then be channeled into the uptake of nearby resources. People might be more likely to seize available resources, such as an opportunity to join a smoking cessation support group that presents itself. One can imagine future junctures where self-affirmation could be



**Figure 1.** Implicit smoking cessation track optimized by self-affirmation.

Note. At each threatening juncture, signified with the term “threatening” in brackets, affirmation could trigger entry or sustain progress along the high resource channel.

effectively timed. If self-affirming content were delivered before a strong temptation to smoke, it might provide people with the psychological strength to resist (Schmeichel & Vohs, 2009). Similarly, if smokers receive a self-affirmation after they relapse, they may be more likely to return to their health goals rather than abandon them (Polivy, Herman, & Deo, 2010). These shifts in attitudes and behavior can become self-sustaining. Having overcome their craving for cigarettes once, people may have greater efficacy for resisting temptation in the future. Once they join a support group, they may be subjected to peer influence that deters smoking. Various other changes, such as the realization that they feel healthier and are saving money, can further reinforce the change and act as affirmations unto themselves. In short, if an affirmation is well-situated, it may trigger a psychological state that helps people to enter or remain in channels that sustain their health goals—akin to entering currents in a river (Lewin, 1939). Recursive processes underlie these effects, as when self-affirmation promotes success, which affirms the self further, promoting still more success, in a repeating cycle (Cohen et al., 2009). In addition, however, the trigger-and-channel process deals not just with how a psychological process can repeat itself, as in recursion, but with how it interacts with environmental opportunities. Affirmed, a person may be more likely to enter positive environmental channels that promote behavior change.

If the key conditions are not met, however, self-affirming activities will have little if any benefit. In absence of psychological threat, self-affirmation is unlikely to have an effect on

behavior, even if it occurs in proximity to resources. There is no psychological threat for affirmation to address, and hence providing an affirmation would be akin to prescribing a treatment for a disease that a person does not have. Without the resources, self-affirmation may create openness to a health message but little behavior change. This situation is akin to create a positive attitude without a channel for its expression, a key determinant of whether attitudes predict behavior (Ross & Nisbett, 2011). Self-affirmation might similarly prove ineffective if it occurs after a psychological threat has occurred, and people have rationalized it away or after the opportunity to avail oneself of resources has passed.

### Support for the Trigger and Channel Conditions

As described in greater detail below, the three conditions—psychological threat, resources, and timeliness—have received some support in the literature, but to date, the disparate findings have not been examined in one study or integrated into a meta-analysis. Below we offer a brief review of the research supporting each condition.

#### Psychological Threat

The presence of psychological threat refers to the condition that, for self-affirmation to be beneficial, there must be a threat to self-adequacy or self-integrity and, moreover, that psychological threat must impede behavior change. As in

medical science, a psychological intervention like self-affirmation should be targeted to the underlying condition it is designed to ameliorate. Because self-affirmation is designed to ameliorate threats to the self (Steele, 1988), it should be targeted to people who, in a particular context, experience psychological threat that deters adaptive action. For example, a smoker receiving information about health risks of smoking, or a smoker who recently quit but has relapsed, may experience psychological threat. In the first case, the person may feel threatened by the implication of having engaged in unhealthy behavior, and in the second, by the failure to meet an important goal. In both cases, threat can deter adaptive outcomes. In the first case, it may lead the person to defensively reject the information, “motivated skepticism” (Ditto & Lopez, 1992). In the second case, psychological threat may lead at least the individual to defensively abandon the goal to stop smoking, as captured in research on the “what the hell” effect (Polivy et al., 2010).

Self-affirmation has been shown to be effective at facilitating behavior change among those under psychological threat (Binning, Sherman, Cohen, & Heitland, 2010; Sherman et al., 2013). Self-affirmations improve outcomes for groups under psychological threat in school. Students who face negative stereotypes in school, such as African Americans, Latino Americans, and women in science, and students who (regardless of their race or gender) question whether they belong in school benefit. But self-affirmations have little, if any, effect for students who are not under consistent psychological threat (Cohen et al., 2006; Cohen et al., 2009; Layous et al., 2017; Martens, Johns, Greenberg, & Schimel, 2006; Sherman et al., 2013). Even among minority students, self-affirmations are effective primarily in threatening environments, such as ones with larger achievement gaps and smaller representations of one’s ethnic group (Hanselman, Bruch, Gamoran, & Borman, 2014).

Likewise, in health, studies suggest that self-affirmations best facilitate behavior change among people under threat, such as those who engage in risk behavior, compared with those who do not (e.g., Griffin & Harris, 2011; Harris & Napper, 2005; Klein, Harris, Ferrer, & Zajac, 2011; Reed & Aspinwall, 1998; Sherman, Nelson, & Steele, 2000). For example, Griffin and Harris (2011) found that self-affirmation increased concern about eating seafood among women of childbearing age in response to a message about the dangers of seafood consumption during pregnancy, but only among women who frequently consumed seafood. Among those who consumed seafood infrequently or not at all, self-affirmation actually *decreased* concern. Similarly, Harris and Napper (2005) found that self-affirmation increased intentions to reduce alcohol consumption among women who read a message about the link between heavy alcohol consumption and cancer but only among those who drank heavily. In addition, Harris and colleagues (2007) found that self-affirmation before exposure to graphic warning labels related to cigarettes increased smokers’ intentions to quit, but

that increases were greater in magnitude among smokers who, because they smoked more, were at higher risk for the consequences depicted. Research also suggests that in the absence of psychological threat, self-affirmation may even heighten people’s confidence in their thoughts and thus increase resistance to persuasion (Briñol, Petty, Gallardo, & DeMarree, 2007).

Critically, self-affirmations should be effective primarily in situations where psychological threat not only is present but impedes adaptive behavior. In contrast to the foregoing examples, in some cases, psychological threat encourages positive change rather than discourages it. Research suggests, for example, that people who are made to feel hypocritical for failing to uphold their personal values (e.g., by not practicing safe sex in the past) experience a psychological threat to the self. In response, they re-strengthen their behavioral commitment to their values (e.g., by increasing condom use; Aronson, Fried, & Stone, 2011; Cohen & Sherman, 2014; Dickerson, Thibodeau, Aronson, & Miller, 1992, see also Rokeach, 1973). In such cases, self-affirmation would be expected to decrease rather than increase the desired behavior. In our meta-analytic review of self-affirmation health studies, there are none in which psychological threat would be expected to facilitate adaptive outcomes.

Many protocols using self-affirmation to facilitate health behavior change expose people to information that suggests that they are engaging in behavior that puts them at a health risk, thus fulfilling to some degree the condition of psychological threat. Some studies exclusively target people at a health risk due to their behavior. For example, smokers and females who consume enough alcohol to increase their risk of breast cancer are expected to experience some degree of psychological threat when they encounter information suggesting that their alcohol consumption puts them at risk (see Epton et al., 2015; Sweeney & Moyer, 2015). However, other studies recruit general samples that include an unknown number of people who either do not engage in the risk behavior at all or who do not engage in it with the frequency presented as harmful in the health message (e.g., Jessop, Sparks, Buckland, Harris, & Churchill, 2014; Knight & Norman, 2016; Pietersma & Dijkstra, 2011; Scott, Brown, Phair, Westland, & Schüz, 2013). For example, Jessop and colleagues (2014) affirmed sunbathers prior to presenting them with a message about the importance of using sunscreen to prevent skin cancer. It is possible that the message was not threatening to some (unknown proportion) of the sample, such as those who already used sunscreen. Similarly, Knight and Norman (2016) affirmed individuals who drank alcohol and then presented them with a message about the health risks of binge drinking. It is possible that the message was not threatening to some (unknown proportion) of the sample, such as those who drank alcohol in moderation. In these studies, a message was present and was likely to be threatening to *some* participants, but not to *all* participants. Still other

studies experimentally manipulate psychological threat. For example, they expose people to an experience of social exclusion, a threatening experience that increases consumption of high-sugar, high-fat hedonic foods (Burson et al., 2012). A key goal of our meta-analysis is to assess the degree to which psychological threat, occurring as a result of either a preexisting risk factor or a situational trigger, consistently predicted stronger affirmation effects.

### Presence of Resources

The presence of resources to support change refers to the condition that there must exist some infrastructure or other instrumental content to support behavior change for self-affirmation to have benefit. Once psychological threat is ameliorated, and a person is open to change, there must be behavioral channels to translate motivation and intention into sustained action. Self-affirmation itself does not serve as this resource, nor does information suggesting the behavior is harmful. They are catalysts for psychological change, but alone, they do not provide resources to turn the resulting motivational change into concrete behavior. Examples of resources can include: behavioral skills training that facilitates enactment of health goals; social support for pursuing health goals from; institutional sources of guidance, such as hotlines and support groups; and, more simply, the proximity and availability of options that support healthful behavior, such as readily available healthy food (Thaler & Sunstein, 2008).

In educational settings, self-affirmation has been found to produce long-term effects in part by leading students to enter resource-rich channels that support achievement (Cohen & Garcia, 2014). For example, Dee (2015) found an overall null effect of self-affirmation on the achievement of minority students in a large group of urban schools; but further analyses identified a positive effect in the subset of classrooms that provided more opportunity for cognitive growth. Goyer and colleagues (2017) demonstrated that self-affirmation did not simply improve minority middle schoolers' grades. In addition, because these students performed better, they were more likely to gain entry into mainstream and advanced courses and a college preparatory program. Through this recursive process, self-affirmed students performed better, and having performed better, they were validated by the system, given more opportunities, and became more self-affirmed, propelling even higher levels of achievement in a recurring cycle (Cohen & Sherman, 2014). In the absence of institutional opportunities for advancement, self-affirmation would have had a more limited benefit.

Research examining the effect of self-affirmation on health behavior can provide additional resources to support behavior change. Some studies accompany self-affirmation with a behavior change strategy, such as an activity that encourages people to form "if-then" plans to implement

their health goals, which have been shown to facilitate health behavior change above and beyond self-affirmation alone (e.g., Ehret & Sherman, 2018; Epton & Harris, 2008; Norman et al., 2016; cf. Jessop et al., 2014). Interestingly, however, most self-affirmation studies in the health domain provide few if any resources to support change (e.g., Burson et al., 2012; Ferrer et al., 2017; Klein et al., 2011; Knight et al., 2016; Pietersma et al., 2011). A second goal of our meta-analysis is to assess whether studies that feature more resources yield consistently larger self-affirmation benefits.

### Timeliness

Timeliness refers to the condition that, for self-affirmation to be effective, it must be delivered in temporal proximity to a psychological threat and, ideally, the opportunity to access resources that support behavior change. "Temporal proximity" means soon before the threat occurs, or as it takes place—but not after the threat has been resolved—and soon before or when resources for change are available—but not after the opportunity to readily access them has passed. Even if a threat and resources are present, if the self-affirmation is not timely with respect to them, it is unlikely to be effective. As one example of the influence of timeliness, Cook, Purdie-Vaughns, Garcia, and Cohen (2012) found that delivering the same self-affirmation to middle schoolers *early* in the academic year, rather than 2 weeks later, led to better academic grades. This is because the beginning of the academic year is a time when psychological threat begins to emerge and to set in motion recursive processes that undermine achievement.

Timeliness can refer to whether self-affirmation is timely with respect to the experience psychological threat (see also Critcher, Dunning, & Armor, 2010). If the self-affirmation is given too long before the experience of threat, its psychological effects will have decayed by the time the threat is encountered. Alternatively, if the self-affirmation occurs too long after the threat—for instance, after the person has defensively rejected a health message—it will have little benefit and possibly even increase resistance. In fact, persuasion research shows that self-affirming *after*, rather than before, a persuasive communication can increase resistance to the change by increasing people's confidence in their cognitive reactions to a message (Briñol et al., 2007; Critcher et al., 2010). The timeliness of an affirmation and the *presence* of psychological threat are not fully orthogonal constructs. Affirmation cannot possibly be well-timed to a threat if there is no psychological threat present. However, if a threat is present, affirmation may or may not be timely with respect to it.

Timeliness can also refer to the self-affirmation's placement with respect to resources. For maximal benefit, self-affirmations should occur not only in physical proximity to resources but in temporal proximity to them. There are environments, for example, where resources are more available at particular times than others. For instance, at the beginning

of the academic quarter, a student may have the ability to choose to take honors rather than mainstream math. After the window for choosing has closed, it may not re-open until the next academic year. If resources are present, but are no longer easily accessible at the time of self-affirmation, behavior change is less likely to occur. Once again, the timeliness of a self-affirmation and the availability of resources are not fully orthogonal. Self-affirmation could not possibly be timely with respect to resources if none were present. On the contrary, if resources are present, the self-affirmation could be timely or not with respect to them.

Timeliness could pertain to other events important to a self-affirmation's impact, such as a transitions and choice points (Cohen & Sherman, 2014). For example, spring break can be an important point of vulnerability for many college students, when the opportunity to engage in behaviors such as alcohol consumption and risky health behavior rises abruptly (e.g., Apostolopoulos, Sönmez, & Yu, 2002; Smeaton, Josiam, & Dietrich, 1998). But the timeliness of self-affirmation with respect to resources and threat is the most paramount and most represented in the health research.

As noted, the timeliness of a self-affirmation with respect to threat and resources in a given study is *partly* confounded with their presence. Thus, while we attempt to disentangle some of the independent effects of timeliness, our ability to do so is limited given the collinearity between timeliness on one hand and threat and resources on the other.

### Meta-Regression of Trigger and Channel Criteria: The Example of Health Behavior Change

In summary, for benefits to manifest, self-affirmations should be given to people *for whom* psychological threat impedes adaptive outcomes, *where* resources to support behavior change are available, and *when* psychological threat is experienced and resources can be readily accessed. We predict that self-affirmation will be most effective when each condition is met. In addition, it is possible that synergistic or interactive effects may emerge such that the fulfillment of all conditions will yield still more benefit than the sum of their main effects. The possibility of interactive effects dovetails with other models suggesting that behavior is most likely to occur not only when each necessary criterion is met but when all criteria are maximally fulfilled—a “perfect storm” of social and psychological conditions (Finkel et al., 2012; Finkel, 2014). We conducted meta-regressions to assess the degree to which the three conditions posited by the Trigger and Channel framework explain the heterogeneity of self-affirmation effects on health behavior.

#### Method

**Search strategy.** We included all studies identified by previous meta-analyses of self-affirmation and health that

included at least one health behavior outcome (e.g., fruit and vegetable consumption; Epton et al., 2015; Sweeney & Moyer, 2015). We identified papers and dissertations published after these meta-analyses had been conducted by using the key words provided in each identified article (as of March 12, 2018). We also searched for unpublished literature by emailing relevant listservs (*Society for Personality and Social Psychology*, *Society for Experimental Psychology*), a private Google group for self-affirmation researchers, and individual investigators known to conduct research in self-affirmation and health. The latter were identified by the two authors or culled from reference sections from earlier meta-analyses.

**Data extraction.** We extracted each behavioral effect of self-affirmation reported in each study. A single study might have multiple effects if it included multiple groups or conditions. Effect sizes might thus be based on smokers versus non-smokers, on those exposed to a health message and those not, or on those provided with resources for behavior change and those not. For each effect extracted, we coded the extent to which the procedure and participant characteristics fulfilled each of the three criteria. Table 1 provides examples of procedural characteristics associated with each coding category for each criterion, as well as the number of effect sizes found within each category (i.e., the  $k$ ). Table 2 lists each effect size, within each study, and their corresponding scores in each category. Data were extracted and coded by the lead author (R.F.) and two postbaccalaureate fellows. The fellows were trained by the lead author. They were introduced to the definition of each code and provided with relevant hypothetical illustrations. The fellows were kept unaware of study hypotheses, the purpose of the meta-analysis, and the effect size associated with each procedure they evaluated. The lead author extracted the information needed to code each procedure along the relevant three criteria and, to reduce the potential for bias, completed her coding before extracting statistical information and calculating effect sizes. Interrater reliability was high ( $kappas = 0.74-0.89$ ). Discrepancies among the coders were resolved through discussion.

*Psychological threat* was coded  $-1$  if no psychological threat was present in proximity to the self-affirmation manipulation;  $0$  if a potential psychological threat was present but it was not necessarily threatening to the participant sample (e.g., a message about the risks of excessive alcohol consumption given to modest drinkers; a message about the risks of smoking given to a general sample); and  $+1$  if a clear psychological threat was present (e.g., a message about the risks of excessive alcohol consumption given to heavy drinkers; a threatening experience with social exclusion, which can increase hedonic eating).

*Resources* were coded as  $-1$  if no resources for health behavior change were provided in proximity to the self-affirmation manipulation;  $0$  if some resources were provided (i.e., if one resource or evidence-based behavior change

**Table 1.** Examples of Study Design Comparisons Within Each Coding Category for Each Criterion.

Code	-1	0	1
Threat	<i>k</i> = 5 (5.6%) Participants self-affirmed prior to social inclusion or unintentional exclusion (as in a 2 × 2 study that also included affirmation and no-affirmation within a social exclusion condition; e.g., Burson, Crocker, & Mischkowski, 2012; Howell & Shepperd, 2016)	<i>k</i> = 39 (45.8%) Hypertensive patients self-affirmed prior to a message about medication nonadherence, where nonadherence was not an inclusion criterion (e.g., Ogedegbe et al., 2012) Female sunbathers who may or may not be already wearing sunscreen self-affirmed prior to a message about risks of not wearing sunscreen (e.g., Jessop, Simmonds, & Sparks, 2009)	<i>k</i> = 45 (50.6%) Heavy smokers self-affirmed (or not) prior to a message about smoking and cancer risk (Harris, Mayle, Mabbott, & Napper, 2007) Participants self-affirmed (or not) before an experience of intentional social exclusion (Burson et al., 2012)
Resources	<i>k</i> = 61 (68.5%) Self-affirmation to reduce smoking without accompanying cessation support (e.g., Harris et al., 2007) Self-affirmation to increase colorectal cancer screening, without an opportunity to be screened (e.g., Klein et al., 2010)	<i>k</i> = 5 (5.6%) Self-affirmation with brief content to build self-efficacy for dietary change (e.g., Epton et al., 2008) Self-affirmation with an opportunity to generate plans to make dietary improvements or reduce alcohol consumption (e.g., Armitage, Rowe, Arden, & Harris, 2014; Harris et al., 2014)	<i>k</i> = 24 (27.0%) Self-affirmation with extensive, evidence-based intervention content to facilitate smoking cessation (e.g., Taber, Klein, Ferrer, Augustson, & Patrick, 2016) Self-affirmation with a readily available, costless opportunity to engage in the outcome (e.g., obtaining sunscreen among sunbathers; Jessop et al., 2009)
Timeliness	<i>k</i> = 5 (5.6%) Participants self-affirmed after a message about organ donation (e.g., Sheeran, Klein, & Rothman, 2017)	<i>k</i> = 38 (42.7%) Self-affirmation before a message about alcohol risks but not before resources for change (e.g., Kamboj et al., 2016)	<i>k</i> = 46 (51.7%) Minority individuals affirmed (or not) prior to a discussion with a physician, where the behavioral outcome was related to clinical communication (e.g., Havranek et al., 2012) Affirmation prior to a message about HIV risk, followed by an opportunity to engage an outcome (e.g., take a condom sample, Sherman, Nelson, & Steele, 2000)

intervention component was provided); and +1 if extensive resources were provided (i.e., if multiple resources or evidence-based behavior change intervention components were provided). For example, an effect was scored a -1 if it was derived from a group of sedentary individuals who received a self-affirmation and a health message about the risks of inadequate fruit and vegetable consumption but no practical strategies on how to increase their consumption. An effect was scored a 0 if it derived from the same procedure but, in addition, the message also included content intended to build behavioral skills or self-efficacy to engage in the target behavior (e.g., suggestions for how to incorporate fruit and vegetable consumption into one's diet; Epton et al., 2008). Finally, an effect was scored a +1 if the resources were extensive. For example, an effect received a +1 if the same group of participants received a self-affirmation and health message, read about strategies for incorporating fruit and vegetable consumption into their diet, and were provided with goal-regulation strategies to further support change. As one example of the latter strategies, people might be

prompted to generate "if-then" plans to incorporate physical activity into their day, a simple but validated goal-regulation strategy (Gollwitzer & Sheeran, 2006; Gollwitzer, 1999).

Notably, there was a subset of studies where resources were embedded as part of the experimental procedure. They made the opportunity to engage in the targeted behavior readily available. That is, a proximal behavioral channel was presented that gave participants the chance to translate their new attitudes into concrete action. For example, a procedure might offer sunbathers a sample of sunscreen after they read a brochure about the risks of sun exposure (Jessop et al., 2009). This effect size is coded as +1 because it provides participants with one of the most influential kinds of resource for promoting behavior change: *ease*. As research in social psychology and behavioral economics attests, behavior is more likely to occur when there is a clear, specific, and accessible channel for engaging in it—that is, when the situation makes the behavior easy (Thaler & Sunstein, 2008). In this case, the resource is built into the architecture of the protocol design, and few, if any, other resources are needed to

**Table 2.** Coding for Each Study Included in the Meta-Analysis.

Study	Subgroup	Outcome	Follow-up	Threat	Resources	Timeliness	Timely threat	Timely resources
Armitage et al. (2011)	II for SA	Alcohol	1	0	-1	0	0	-1
Armitage et al. (2011)	No II	Alcohol	1	0	-1	0	0	-1
Armitage et al. (2014)	II for SA	Alcohol	1	1	-1	0	1	-1
Berkman (2017)	NA	F&V consumption	1	1	1	1	1	1
Bradbury et al. (2016)	No II	Salt intake	1	1	-1	0	1	-1
Bradbury et al. (2016)	II for SA	Salt intake	1	1	-1	0	1	-1
Burson et al. (2012)	Intentional exclusion enhancement	Cookies consumed	1	0	-1	0	0	-1
Burson et al. (2012)	Intentional exclusion transcendent	Cookies consumed	1	0	-1	0	0	-1
Burson et al. (2012)	Unintentional exclusion enhancement	Cookies consumed	1	-1	-1	-1	-1	-1
Burson et al. (2012)	Unintentional exclusion transcendent	Cookies consumed	1	-1	-1	-1	-1	-1
Cerully (2011)	NA	Condom use	1	0	-1	0	0	-1
Cooke et al. (2014)	NA	Exercise	1	0	-1	0	0	-1
During & Jessop (2015)	NA	Exercise	1	1	-1	0	1	-1
Ehret & Sherman (2018)	II	Alcohol abstaining	1	1	1	1	1	1
Ehret & Sherman (2018)	II	Alcohol abstaining	2	1	1	1	1	1
Ehret & Sherman (2018)	II	Alcohol consumption	1	1	1	1	1	1
Ehret & Sherman (2018)	II	Alcohol consumption	2	1	1	1	1	1
Ehret & Sherman (2018)	No II	Alcohol abstaining	1	1	0	1	1	0
Ehret & Sherman (2018)	No II	Alcohol abstaining	2	1	0	1	1	0
Ehret & Sherman (2018)	No II	Alcohol consumption	1	1	0	1	1	0
Ehret & Sherman (2018)	No II	Alcohol consumption	2	1	0	1	1	0
Epton (2008)	NA	F&V consumption	1	0	0	1	0	0
Epton (2009)	Study 1	Eating out	1	0	0	1	0	0
Epton (2009)	Study 1	F&V consumption	1	0	-1	0	0	-1
Epton (2009)	Study 1	Salt intake	1	0	0	1	0	0
Epton (2009)	Study 2	Alcohol 1	1	0	0	1	0	0
Epton (2009)	Study 2	Alcohol 2	1	0	0	1	0	0
Falk et al. (2015)	NA	Sedentariness	1	1	1	1	1	1
Fielden et al. (2016)	NA	F&V consumption	1	0	0	1	0	0
Good et al. (2015)	NA	Exercise	1	1	0	1	1	0
Harris & Nappe (2005)	High risk	Alcohol consumption	1	1	-1	0	1	-1
Harris & Nappe (2005)	High risk	Alcohol consumption	2	1	-1	0	1	-1
Harris & Nappe (2005)	Low risk	Alcohol consumption	1	0	-1	0	0	-1
Harris & Nappe (2005)	Low risk	Alcohol consumption	2	0	-1	0	0	-1
Harris et al. (2007)	NA	Smoking	1	1	-1	0	1	-1
Harris et al. (2014)	II	F&V consumption	1	1	1	1	1	1
Harris et al. (2014)	II	F&V consumption	2	1	1	1	1	1
Harris et al. (2014)	No II	F&V consumption	1	1	0	1	1	0
Harris et al. (2014)	No II	F&V consumption	2	1	0	1	1	0
Harris et al. (2007)	NA	Alcohol (past 24 hr)	1	0	-1	0	0	-1
Harris et al. (2007)	NA	Alcohol (past 7 days)	1	0	-1	0	0	-1
Havranek et al. (2012)	NA	Patient disclosure	1	1	1	1	1	1
Howell & Shepperd (2012)	Study 1	Disease risk	1	0	1	1	0	1
Howell & Shepperd (2012)	Study 2 high obligation	Disease risk	1	1	1	1	1	1
Howell & Shepperd (2012)	Study 2 low obligation	Disease risk	1	0	1	1	0	1
Howell & Shepperd (2012)	Study 3 high risk	Disease risk	1	1	1	1	1	1

(continued)



**Table 2. (continued)**

Study	Subgroup	Outcome	Follow-up	Threat	Resources	Timeliness	Timely threat	Timely resources
Howell & Shepperd (2012)	Study 3 low risk	Disease risk	1	0	1	1	0	1
Howell & Shepperd (2016)	Study 2	Disease risk	1	0	1	1	0	1
Howell & Shepperd (2016)	Study 3 exclusion	Disease risk	1	1	1	1	1	1
Howell & Shepperd (2016)	Study 3 inclusion	Disease risk	1	0	1	1	0	1
Jessop et al. (2009)	Kindness	Sunscreen	1	0	1	1	0	1
Jessop et al. (2009)	Positive traits	Sunscreen	1	0	1	1	0	1
Jessop et al. (2009)	Values	Sunscreen	1	0	1	1	0	1
Jessop et al. (2014)	Study I II	Exercise	1	0	0	1	0	0
Jessop et al. (2014)	Study I No II	Exercise	1	0	-1	0	0	-1
Jessop et al. (2014)	Study 2 II	Exercise	1	0	0	1	0	0
Jessop et al. (2014)	Study 2 No II	Exercise	1	0	-1	0	0	-1
Kamboj et al. (2016)	NA	Alcohol	1	1	-1	0	1	-1
Kang (2017)	NA	Exercise	1	1	1	1	1	1
Kang (2017)	NA	Sedentariness	1	1	1	1	1	1
Klein et al. (2010)	Optimistic	Disease risk	1	1	-1	0	1	-1
Klein et al. (2010)	Pessimistic	Disease risk	1	1	-1	0	1	-1
Klein et al. (2010)	Realistic	Disease risk	1	1	-1	0	1	-1
Klein (2009)	NA	Condom use	1	0	-1	1	0	-1
Knight & Norman (2016)	Attributes	Alcohol 1	1	0	-1	0	0	-1
Knight & Norman (2016)	Attributes	Alcohol 2	1	0	-1	0	0	-1
Knight & Norman (2016)	Kindness	Alcohol 1	1	0	-1	0	0	-1
Knight & Norman (2016)	Kindness	Alcohol 2	1	0	-1	0	0	-1
Knight & Norman (2016)	Values	Alcohol 1	1	0	-1	0	0	-1
Knight & Norman (2016)	Values	Alcohol 2	1	0	-1	0	0	-1
Lepine (2017)	NA	Unprotected sex	2	1	-1	0	1	-1
Mahler (2017)	Message and one photo	Sun safety	1	0	-1	0	0	-1
Mahler (2017)	Message and repeated photos	Sun safety	1	1	-1	0	1	-1
Mahler (2017)	No photo	Sun safety	1	-1	-1	-1	-1	-1
Mancuso et al. (2013)	NA	Exercise	1	0	1	1	0	1
McQueen (2002)	Positive affect	Alcohol	1	1	-1	0	1	-1
McQueen (2002)	SA Only	Alcohol	1	1	-1	0	1	-1
Meier et al. (2015)	NA	Alcohol	1	1	-1	0	1	-1
Memish et al. (2016)	NA	Smoking	1	1	-1	0	1	-1
Neumann (2005)	NA	Alcohol binges	1	1	-1	0	1	-1
Neumann (2005)	NA	Average consumption	1	1	-1	0	1	-1
Neumann (2005)	NA	Number of days drinking	1	1	-1	0	1	-1
Neumann (2005)	NA	Peak consumption	1	1	-1	0	1	-1
Norman & Norman (2016)	II	Alcohol consumption	1	0	0	1	0	0
Norman & Norman (2016)	II	Binge drinking	1	0	0	1	0	0
Norman & Norman (2016)	No II	Alcohol consumption	1	0	-1	0	0	-1
Norman & Norman (2016)	No II	Binge drinking	1	0	-1	0	0	-1
Ogedegbe et al. (2012)	NA	Adherence	1	0	1	1	0	1
Palmgren (2006)	NA	Substance use	1	1	0	1	1	0
Peterson et al. (2012)	NA	Physical activity	1	0	1	1	0	1
Pietersma & Dijkstra (2011)	NA	Cooked vegetable consumption	1	0	-1	0	0	-1
Pietersma & Dijkstra (2011)	NA	Cooked vegetable consumption	2	0	-1	0	0	-1
Pietersma & Dijkstra (2011)	NA	Fruit consumption	1	0	-1	0	0	-1

(continued)

Table 2. (continued)

Study	Subgroup	Outcome	Follow-up	Threat	Resources	Timeliness	Timely threat	Timely resources
Pietersma & Dijkstra (2011)	NA	Fruit consumption	2	0	-1	0	0	-1
Pietersma & Dijkstra (2011)	NA	Raw vegetable consumption	1	0	-1	0	0	-1
Pietersma & Dijkstra (2011)	NA	Raw vegetable consumption	2	0	-1	0	0	-1
Reed & Aspinwall (1998)	High caffeine	Caffeine consumption	1	1	-1	0	1	-1
Reed & Aspinwall (1998)	Low caffeine	Caffeine consumption	1	0	-1	0	0	-1
Reid (unpublished)	High cookies	Eating	1	-1	-1	-1	-1	-1
Reid (unpublished)	Low cookies	Eating	1	-1	-1	-1	-1	-1
Reid (unpublished)	High alcohol	Alcohol	1	0	-1	0	0	-1
Reid (unpublished)	Low alcohol	Alcohol	1	0	-1	0	0	-1
Renninger & Dodge (2017)	NA	Exercise	1	1	-1	0	1	-1
Schüz et al. (2013)	NA	Tanning	1	0	-1	0	0	-1
Scott et al. (2013)	NA	Alcohol	1	0	-1	0	0	-1
Sheeran (2017)	NA	Organ donation	1	0	1	0	-1	1
Sherman et al. (2000)	I	Sexual risk	1	0	1	1	0	1
Sherman et al. (2010)	Approach	Flossing	1	0	0	1	0	0
Sherman et al. (2010)	Avoidance	Flossing	1	0	0	1	0	0
Taber et al. (2016)	NA	Smoking	1	1	1	1	1	1
van Koningsbruggen & Das (2009)	High risk	Disease risk	1	1	1	1	1	1
van Koningsbruggen & Das (2009)	Low risk	Disease risk	1	-1	1	0	-1	1
Van Koningsbruggen (2014)	NA	Diet	1	0	0	1	0	0

Note. F&V = fruit and vegetable; I = Implementation Intentions

prompt behavior change. The provision of sunscreen might also constitute only as a limited resource, if the key outcome was the production of subsequent sunscreen use behavior. For example, if all participants were given a sample of sunscreen, and then the key outcome was the extent to whether they *used* it over the next 7 days, the provision of sunscreen in the study would be coded as 0 on the resource dimension (as was the case in one study providing seven samples of floss, where the key outcome was daily use of floss over 7 days; Ehret & Sherman, 2018).

*Timeliness* of the self-affirmation was coded as -1 if the self-affirmation was not timely with respect to threat, resources, or a risky transition (e.g., spring break for college students); 0 if the self-affirmation was timely with respect to *either* threat, resources, or a transition; and +1 if the self-affirmation was timely with respect to two of these three dimensions. (There was no study where affirmation was timely along all three dimensions, and only one study where the affirmation was timely with respect to a transition and threat but not resources: [Klein, 2009]). For example, an effect received a score of -1 if it presented no threat and no resources and therefore the self-affirmation could be timely

to neither. An effect received also received a score of -1 if threat present but the self-affirmation was poorly timely with respect to it (e.g., participants were self-affirmed *after* rather than before reading a message) and resources were not present. Similarly, an effect also received a score of -1 if resources were present but the self-affirmation was poorly timed with respect to them (e.g., *after* rather than before an opportunity to use a health promotive resource—for example, the chance to sign up for a healthful meal plan—and threat was not present. or. In practice, there was only one effect where people were placed under psychological threat but the affirmation was not timely with respect to it (Sheeran, 2017). Moreover, in all studies that provided resources, the affirmation was timely with respect to it. Thus, almost all effects receiving a score of -1 were based on protocols where threat and resources were altogether absent. An effect received a score of 0 if it was based on participants who were self-affirmed immediately before reading a threatening health message *or* the opportunity to access resources for behavior change. An effect received a score of +1 if it was based on participants who were self-affirmed immediately before a threat *and* the opportunity to access resources.

Likewise, an effect received a score of +1 if it was based on participants who were self-affirmed before a threat *and* a transition point (e.g., the self-affirmation came before a message presented to college students concerning unsafe sex and excessive drinking soon before spring break: Klein, 2009).

**Collapsed coding.** A second set of coding was undertaken to resolve collinearity problems that arose because of the confounding of timeliness with threat and resources in our dataset. Effects that received a high score on resources also tended to receive a high score on timeliness ( $r = .84$ ). Moreover, when we re-code the timeliness variable to represent timeliness specifically with respect to resources (rather than resources *and* threat), the correlation between it and the presence of resources reaches near unity ( $r = .91$ ). This is because in almost all cases where limited or extensive resources were present, the self-affirmation was timed well to them.

Effects that received a high score on threat also tended to receive a high score on timeliness ( $r = .30$ ). Moreover, when we re-code the timeliness variable to represent timeliness specifically with respect to threat (rather than threat *and* resources), the correlation strengthens ( $r = .54$ ). This is because in all but one case where some psychological threat was present, self-affirmation was timed well to it. Thus, it is difficult to disentangle the *intensity* of resources and threat from their *timeliness*, though we try to do so through “moving constant analyses” reported in the “Results” section. As another strategy to deal with this collinearity problem, we also re-coded all the effects along two dimensions rather than three. We collapsed the timeliness dimension into the threat and the resources dimension.

The first variable was the presence of a *timely threat*, that is, timely with respect to the self-affirmation. The value of -1 signified either the absence of psychological threat altogether or the presence of a threat for which the self-affirmation was poorly timed (e.g., the self-affirmation occurred after the threat rather than before it; only one effect derived from this type of procedure; Sheeran, 2017). The value of 0 signified the presence of a *potential* psychological threat for which the self-affirmation was well-timed. As was the case with the original coding of threat, these were effects where the threat was of uncertain relevance to the participants (e.g., a message about the health risks of excessive alcohol consumption given to a general population, an unknown proportion of whom might not drink or drink only modestly). The value of +1 signified the presence of a psychological threat for which the self-affirmation was well-timed (e.g., a message about the risks of excessive alcohol consumption given to heavy drinkers immediately after they had been self-affirmed).

The second variable was the presence of *timely resources*, that is, timely with respect to the self-affirmation. The value of -1 signified the absence of resources altogether (in practice, however, there were no studies where resources were

poorly timed). The value of 0 signified the presence of limited resources for which the self-affirmation was well-timed. The value of +1 signified that the presence of extensive or influential resources for which the self-affirmation was again well-timed.

**Follow-up interval.** As a control variable, effects were also coded for the number of days that intervened between the self-affirmation manipulation and the behavioral outcome. This was done to assess the degree to which self-affirmation effects decayed or persisted with time, that is, whether the self-affirmation effect size was moderated by the amount of time that had elapsed between the manipulation and the outcome measure. Intuitively, one would expect the self-affirmation effect to decay as a function of this interval. However, according to our theoretical model, whether self-affirmation leads to behavior change may depend less on how much time passes after its administration and more on whether it was *given* at an *opportune* moment. We also assessed whether the duration between the manipulation and outcome measure moderated the effects of timeliness, threat, or resources.

**Effect sizes.** All effect sizes were calculated in Comprehensive Meta-Analysis (CMA) version 3. Effect sizes, measured as Cohen's  $d$  (Cohen, 1988), were calculated by computing the mean difference between the self-affirmation condition and the control condition, divided by the pooled  $SD$  (Lipsey & Wilson, 2001). When means and  $SD$ s were unavailable, other statistical information was used to estimate them (e.g., sample size,  $t$  statistics, and  $p$  values, as well as reported effect sizes). All effect sizes were weighted by the inverse of their variance to adjust for sample size bias (Hedges, 1981). A positive effect size reflected a positive effect of self-affirmation (such as increased fruit and vegetable consumption or reduced smoking), whereas a negative effect size reflected a negative effect of self-affirmation (such as decreased fruit and vegetable consumption or increased smoking).

A separate effect size was calculated for each case where a self-affirmation condition was compared with a control condition. If a study included multiple self-affirmation conditions, multiple effect sizes were calculated. If a study included multiple samples (e.g., self-affirmation for heavy smokers vs. light smokers), an effect size was calculated for each sample. The specific control condition used for comparison was selected based on which was most appropriate. For example, in a factorial design independently manipulating self-affirmation and exposure to a health message, one effect size was calculated by comparing the self-affirmation plus message condition with the message alone condition. Another effect was calculated by comparing the self-affirmation/no message condition with the no self-affirmation/no message condition.

If multiple self-affirmation conditions were compared with one control condition, the control condition  $n$  was adjusted for each comparison to ensure effect sizes were independent, as recommended by Borenstein (2009). For

example, a study with two self-affirmation conditions of 100 participants each and a control condition of 100 participants would result in two effect sizes, each calculated based on 100 self-affirmation participants and 50 control participants. When a single protocol included more than one behavioral outcome (e.g., fruit consumption and vegetable consumption as separate outcomes), CMA was set, in effect, to use the average of these effect sizes (see below), again as recommended by Borenstein (2009). Thus, each effect size represents independent data derived from nonoverlapping participants. Data are available to individual investigators by official request, as required by regulations for data collected by a federal employee.

**Analyses.** All analyses were conducted in CMA V3. Final analyses included 51 publications, dissertations, and unpublished studies, yielding 113 effect sizes (see supplementary online materials for more details). Some of these 113 effect sizes were interdependent, because they were derived from the same sample (e.g., two separate behavioral outcomes were assessed in the same sample, or the same measure was assessed at two time points in the same sample). Although each effect size was entered as a unique line of data, the program was set to appropriately weight interdependent effect sizes in analyses. For example, when two effect sizes were derived from the same sample, the program was set to weight each at 0.5 in analyses. Altogether,  $k = 85$  independent effect sizes were used in analyses.

The  $Q$  statistic,  $I^2$ , and  $\tau^2$  were used to evaluate the overall heterogeneity of effect sizes. As we found, consistent with our framework, that self-affirmation effects were heterogeneous, we conducted a series of random-effects meta-regression analyses to identify predictors of that heterogeneity (Hedges & Vevea, 1998). A significant meta-regression coefficient indicates that a predictor was associated with the magnitude of the self-affirmation effect size across the sample. Although not a focus of our meta-analysis, the overall effect size of self-affirmation on behavior is reported, along with follow-up tests to assess the potential for publication bias in the reporting of self-affirmation effects (funnel plot; fail-safe  $n$ , Rosenthal, 1979; trim-and-fill calculations, Duval & Tweedie, 2000).

Our analysis took three tacks. First, we report single-criterion models analyzing the extent to which each of the three predictors—threat, resources, and timeliness—independently predicted the affirmation effect size on behavior. Because of the collinearity between timeliness and the other two predictors, they could not be included simultaneously and were thus included singly. Second, we report single-criterion models analyzing the two predictors that collapse timeliness into a *timely threat* dimension and a *timely resources* dimension. We assessed the main effect of each predictor by performing a main-effects meta-regression analyses, regressing the self-affirmation effect size on both of the predictors simultaneously. Next, we conducted a meta-regression that added the

interaction of timely threat and timely resources. We decomposed this interaction by calculating simple slopes for each of the two predictors at high values of the other predictor (+1 coding level) and low levels (−1 coding level).

Third, we used the moving constant technique to evaluate each combination of the original codes (threat, timeliness, and resources). This technique entails calculating the overall effect size for self-affirmation on behavior within each of the cells, that is, each combination of threat, resources, and timeliness (Johnson & Huedo-Medina, 2011). Because timeliness is, as noted previously, partially confounded with resources and threat, we present these analyses as tentative. This approach added five effect sizes ( $k = 93$ ), because five of the original effects were based on multiple outcomes, and the effect on each outcome was associated with a different set of codings. In the moving constant analysis, these effects were stratified into the appropriate cells.

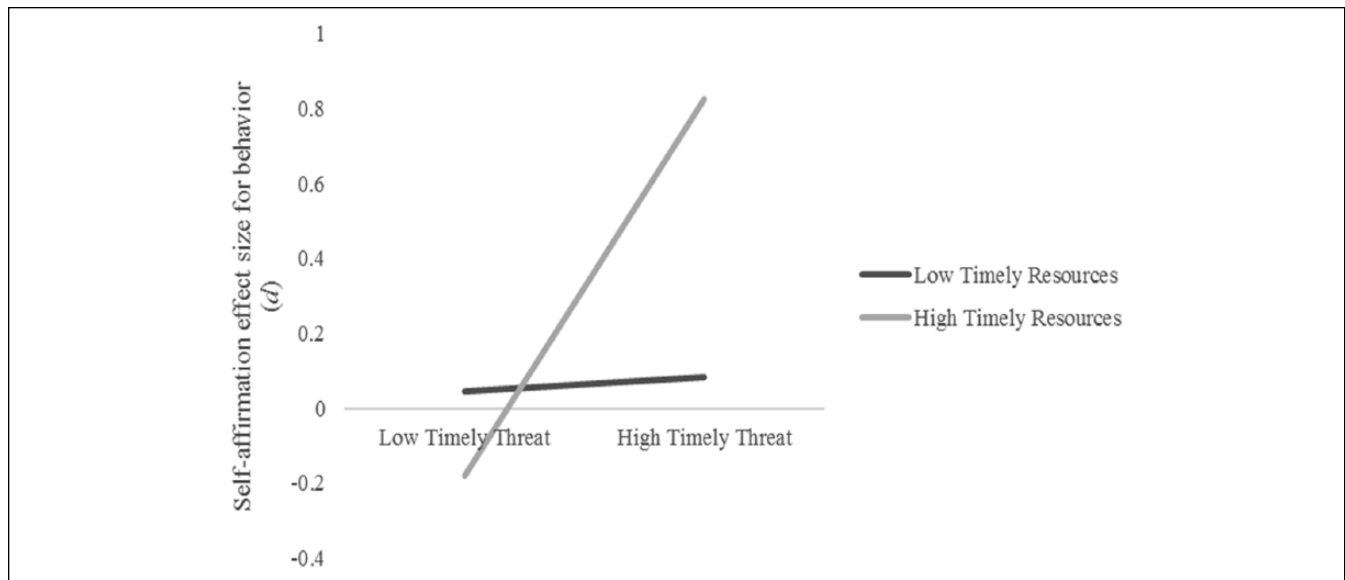
## Results

Models initially included time between self-affirmation and outcome when predicting affirmation effect sizes (in days,  $M = 28.89$ ,  $SD = 70.77$ ). Interestingly, however, this variable was unassociated with effect size,  $B < -0.01$ ,  $p = .434$ . For this reason, time between self-affirmation and outcome was excluded from the final model. Moreover, time between self-affirmation and outcome did not interact with any of the three original codings or with either of the two collapsed codings—that is, no two-way, three-way, or four-way interactions—interaction between timely threat and follow-up days:  $B < -0.01$ , 95% confidence interval (CI) =  $[-0.01, 0.01]$ ,  $p = .058$ , all other  $ps > .373$ .

**Overall effect size.** The effect of self-affirmation on health behavior was small but significant,  $d = 0.25$ ,  $p < .001$ . This is comparable to effect sizes in previous meta-analyses including both published and unpublished studies (Epton et al., 2015:  $d = 0.32$ ; Sweeney & Moyer, 2015:  $d = 0.27$ ). Critically, effects were highly heterogeneous,  $Q(84) = 417.76$ ,  $p < .001$ ,  $I^2 = 79.89$ ,  $\tau^2 = 0.179$ .

**Single criterion models.** Larger self-affirmation effect sizes were predicted, in separate meta-regressions, by the presence of threat ( $B = 0.18$ , 95% CI =  $[0.01, 0.37]$ ,  $p = .048$ ), the presence of resources ( $B = 0.22$ , 95% CI =  $[0.12, 0.33]$ ,  $p = .002$ ), and the timeliness of the self-affirmation ( $B = 0.39$ , 95% CI =  $[0.22, 0.55]$ ,  $p < .001$ ).

The two predictors from our second set of codings, which averted problems tied to collinearity between timeliness and the other two dimensions, could be entered simultaneously into the meta-regression. Both timely threat ( $B = 0.20$ , 95% CI =  $[0.04, 0.37]$ ,  $p = .017$ ) and timely resources ( $B = 0.21$ , 95% CI =  $[0.10, 0.33]$ ,  $p = .003$ ) were each independently and uniquely associated with a larger self-affirmation effect size. Timely threat and timely resources also interacted



**Figure 2.** Simple slopes of meta-regression of behavioral effect sizes on Timely Threat  $\times$  Timely Resources interaction.

synergistically ( $B = 0.24$ , 95% CI = [0.07, 0.41],  $p = .006$ ; see Figure 2). When timely threat was high, timely resources predicted larger self-affirmation effects on behavior ( $B = 0.27$ , 95% CI = [0.10, 0.42],  $p = .002$ ). However, when timely threat was low, timely resources did not predict self-affirmation effect size ( $B = -0.05$ , 95% CI = [-0.29, 0.20],  $p = .718$ ). Similarly, when timely resources were high, timely threat predicted larger self-affirmation effect sizes ( $B = 0.50$ , 95% CI = [0.24, 0.77],  $p < .001$ ). However, when timely resources were low, timely threat did not significantly predict larger self-affirmation effect sizes ( $B = 0.15$ , 95% CI = [-0.01, 0.31],  $p = .069$ ).

**Moving constant analyses.** These analyses zeroed in on some of the effects derived from the full 3 (threat)  $\times$  3 (resources)  $\times$  3 (timeliness) matrix of protocols and, on an exploratory basis, compared them. The results suggest that meeting additional criteria synergistically predicted larger self-affirmation effects on behavior change (Table 3). A comparison of CIs allows us to determine when one effect size is significantly different from another (e.g., Berrar & Lozano, 2013). Specifically, when all three criteria were maximally fulfilled, there was a significant and positive self-affirmation effect size, which fell above the threshold for a large statistical effect (0.8) and the bottom range of its CI fell above a medium effect (0.5). Moreover, procedures maximally fulfilling all three criteria had larger effect sizes than all other cells with available data in the matrix, as evidenced by non-overlapping CIs (Table 3), significantly so for all comparisons except one: moderate threat, moderate resources, and high timeliness (the CI also overlapped with the cell for moderate threat, low resources, and high timeliness;

however, this cell comprised only one effect, making its results difficult to generalize). That is, studies maximally fulfilling all three criteria had significantly larger effect sizes than procedures fulfilling no criteria, and procedures that had other nonmaximal combinations of criteria: moderate threat, no resources, moderate timeliness; moderate threat, moderate resources, moderate timeliness; moderate threat, high resources, high timeliness; high threat, low resources, moderate timeliness; and high threat, moderate resources, high timeliness.

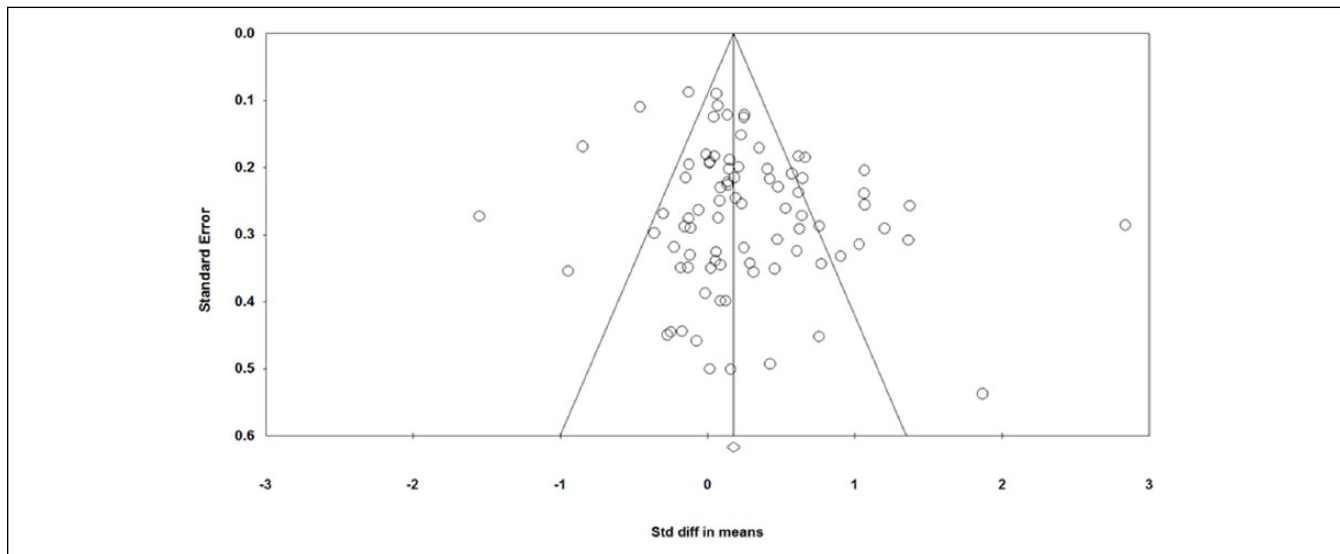
Interestingly, procedures that fulfilled no criteria yielded a negative self-affirmation effect size, although the effect was not statistically significant. However, these procedures yielded significantly lower effect sizes than procedures fulfilling all criteria (as noted above) and procedures only partially fulfilling the key conditions: moderate threat, high resources, high timeliness; and moderate threat, moderate resources, high timeliness. There was one other cell in the matrix that yielded a negative self-affirmation effect: moderate threat, high resources, and moderate timeliness. However, this cell comprised only one effect.

**Publication bias.** We found little evidence for publication bias. This may partly reflect the fact that the behavioral outcomes in published studies are sometimes not significant and only secondary to the self-report outcomes. The fail-safe  $n$  suggests that 1,719 null studies would be needed to render the effect size not significant ( $p > .05$ ). Moreover, the funnel plot (Figure 3) was distributed relatively symmetrically, suggesting no publication bias, and trim-and-fill calculations indicate that no (zero) studies need to be removed to correct for asymmetry (i.e., to yield a distribution consistent with no publication bias).

**Table 3.** Point Estimates From Moving Constant Analyses for Each Combination of Threat, Resources, and Timeliness.

	Timeliness = -1				Timeliness = 0				Timeliness = 1			
	k	d	95% CI	p	k	d	95% CI	p	k	d	95% CI	p
Threat = -1												
Resources = -1	5	-0.23	[-0.49, 0.03]	.082	—	—	—	—	—	—	—	—
Resources = 0	—	—	—	—	—	—	—	—	—	—	—	—
Resources = 1	—	—	—	—	—	—	—	—	—	—	—	—
Threat = 0												
Resources = -1	—	—	—	—	22	0.11	[-0.12, 0.34]	.352	1	0.06	[-0.58, 0.70]	.859
Resources = 0	—	—	—	—	—	—	—	—	11	0.62	[0.29, 0.96]	<.001
Resources = 1	—	—	—	—	1	-0.46	[-0.67, -0.24]	<.001	15	0.25	[0.14, 0.37]	<.001
Threat = 1												
Resources = -1	—	—	—	—	18	0.02	[-0.07, 0.11]	.670	—	—	—	—
Resources = 0	—	—	—	—	—	—	—	—	3	0.08	[-0.17, 0.34]	.517
Resources = 1	—	—	—	—	—	—	—	—	9	0.99	[0.50, 1.48]	<.001

Note. Dashes within cells indicate that no procedures fulfilled a particular combination of threat, timeliness, and resources. CI = confidence interval.



**Figure 3.** Funnel plot of standard error by standard difference in means for behavioral effect sizes.

**Discussion**

The Trigger and Channel framework suggests that self-affirmations have variable rather than uniform effects on behavior and should thus be effective under key conditions: for people *who* are under a psychological threat that impedes their openness to behavior change, in *contexts* where resources for behavior change are present, and at *times* of when threat is acute, resources available, or a transition point looms. Echoing the history of much social psychological research (Zanna & Fazio, 1982), the first generation of self-affirmation studies addressed the question: *Does self-affirmation influence behavior?* Now, the second generation addresses the question: *Under what conditions does self-affirmation influence behavior?* This shift is particularly important, because

although self-affirmation has significant effects across the literature, the presence of null and negative findings (see Epton et al., 2015; Sweeney & Moyer, 2015) suggests potential moderators. Indeed, even established effects, such as mere exposure, are highly moderated, even by subtleties such as seconds of stimulus exposure time (Montoya, Horton, Vevea, Citkowitz, & Lauber, 2017). Our meta-analysis is useful, in part, because it helps to explain heterogeneity in the effect of self-affirmation on behavior.

The meta-regression suggested, first, that there was a significant and small self-affirmation effect on health behavior across all studies, consistent with previously published meta-analyses (Epton et al., 2015; Sweeney & Moyer, 2015). But more important, there was substantial heterogeneity in the

size of the effect, and this heterogeneity was predicted by our theoretically motivated codings of the experimental procedures used in each study. The findings suggest that self-affirmation does not have a small effect across all contexts, a conclusion that might be reached based on the modest overall effect size. Rather, self-affirmation has a relatively large effect under certain theoretically specified conditions.

Consistent with our framework, our analyses found that the presence of threat, the availability of resources, and the timeliness of the self-affirmation all separately predicted larger self-affirmation effect sizes on behavior. Because of collinearity with the timeliness dimension, we could not test the unique contribution of each construct, so we created a second set of codings that incorporated timeliness into the threat and resources dimension. Both timely threat and timely resources were uniquely and positively associated with larger self-affirmation effect sizes. Moreover, these two conditions seemed to act synergistically. Their confluence predicted larger effect sizes than would be predicted by the sum of their individual effects, as evidenced by the two-way interaction—a “perfect storm” of conditions (Finkel et al., 2012; Finkel, 2014). Moving constant analyses of the full  $3 \times 3 \times 3$  matrix of procedures (along the three-level dimensions of threat, resources, and timeliness) supplemented this latter analysis. Although tentative, it suggested that when all conditions of the Trigger and Channel framework were optimally met, a significant and large positive effect of self-affirmation emerged on health behavior. This effect was stronger than the ones derived from all other cells in the matrix (i.e., other combinations of threat, resources, and timeliness), and significantly so for all but two. One of these effects comprised only one effect size. The other was the moderate threat, moderate resources, and high timeliness cell. This exception may be due to chance. Alternatively, perhaps some of the studies coded as presenting only a moderate psychological threat actually presented a severe one. Many of these studies did not target people at risk for a health condition but they may have happened to recruit a large number of at-risk individuals. Another possibility is that the timely presence of a moderate threat and moderate resources is sufficient for self-affirmation to facilitate behavior change. Regardless, the finding that the perfect storm cell yielded a generally stronger self-affirmation effect than the other cells—in conjunction with the interactive effect of timeliness threat and timeliness resources—offers supportive evidence for the synergistic effects of the three conditions.

Interestingly, the amount of time between the self-affirmation and the outcome—which ranged from immediately after the affirmation to a year following it—did not predict the effect size of self-affirmation on behavior. Moreover, time elapsed did not moderate the effect of any of the coded criteria. Intuitively, one might expect affirmation effects to decay with time. But, our data suggest, the amount of time

between the self-affirmation and the outcome, measured in days here, is not the key variable in predicting the persistence of change. What is critical is the confluence of the Trigger and Channel criteria at the moment of change. On the whole, it seems, when the conditions specified by the Trigger and Channel framework were met, there were not only significant benefits of self-affirmation on health behavior, but benefits that had remarkable endurance.

Although speculative, the data also suggest that self-affirmation might backfire, a topic of considerable interest (Cohen & Sherman, 2014; Vohs et al., 2013). Only one combination (moderate threat, high resources, and moderate timeliness) yielded a negative and significant effect size. However, this was based on one study, and so we cannot generalize much beyond it. Studies that fulfilled none of the criteria also yielded a negative affirmation effect size, albeit one that was not statistically significant. This suggests the possibility that, under nonoptimal circumstances, self-affirmation might prove not only ineffective but counterproductive. Perhaps, if the self-affirmation comes after people have formed their own defensive adaptation to a threat—for instance, rationalizing away the evidence of health risk—it increases their resistance to change (see Briñol et al., 2007).

### Limitations

Three limitations of our meta-analysis are noteworthy. First, though we were able to predict the studies where self-affirmation benefits were largest, we did not experimentally manipulate the three key criteria of threat, resources, and timeliness. Ideally, future research will manipulate the three criteria independently to test their causal and perhaps interactive role.

Second, the range of variance along the coded criteria is, obviously, restricted by the available studies. Timeliness was collinear with resources and threat, making it difficult to disentangle the effects of *timeliness* of threat and resources from their *intensity*. Another ambiguity is the meaning of “timely.” What is too soon, and what is too late? More research is needed into this question. We suspect the answers will depend on characteristics of the person and the context that shape the physical and cognitive accessibility of threat and resources. Still, we believe that the conceptual wisdom offered by our meta-analysis will help practitioners better pinpoint the place and time when affirmation is likely to yield the most benefit.

### Future Directions

Future research on self-affirmation, in health, education, and other applied arenas, should further explore the conditions under which self-affirmation is likely to launch a recursive

**Table 4.** Examples of Promising Contexts for Self-Affirmation in Various Noneducational Domains.

Health	Relationships	Workplace
During college orientation, prior to the choice of which Greek organization to join, as some are known for alcohol-laden social events and others are service-oriented	Prior to a couple's therapy session, for anxiously attached individuals, and when the opportunity to disclose and receive information would facilitate intimacy during the mediated session	Prior to a job interview, where a female or minority is interviewing for a position for which they are qualified, and where they may experience stereotype threat that impedes performance
Prior to the selection of a university meal plan that involves healthy vs. unhealthy options	Among lonely people, before the opportunity to socialize with others	Prior to a performance review accompanied by constructive criticism
During an appointment with health care provider when treatment is prescribed, accompanying other treatment adherence interventions such as pillboxes and alarm reminders	Among people with a proclivity for defensive aggression, and prior to the opportunity to receive an aggression reduction intervention that facilitates self-efficacy and non-violent problem-solving	Prior to potentially threatening team performance situations, where creative idea exchange can be hindered by psychological threat
Prior to appointments when terminal diagnoses are disclosed, and where resources to support end-of-life decision making, such as hospice care, are available	Before an opportunity for conflict resolution or the opportunity to apologize for a transgression	Soon before a negotiation, where people may defensively reject mutually beneficial compromises

process of positive behavior change, or “cycle of adaptive potential” (Cohen & Sherman, 2014). Questions include the following:

1. In what contexts does psychological threat impede adaptive outcomes and in what contexts does it facilitate them?
2. In a given context, at what times are people most amenable to the benefits of self-affirmation? These likely include times when threat is acute; resources are available; or a major transition, performance, or choice is imminent.
3. Where are the points of “psychological friction” in the change process in a given context, that is, the places where resources go underused by the people in need of them? These are points where psychological triggers may help to kickstart the change process.

In general, a fruitful direction for future research is to identify transitions where psychological bottlenecks prevent people from using resources or entering opportunity channels that promote positive change (Cohen, Garcia, & Goyer, 2016). Removing these bottlenecks through timely intervention might unlock latent potential. These bottlenecks may occur at choice points, such as the opportunity to enroll in a support group. They might also occur at “teachable moments,” such as pregnancy, where a person may be more amenable to health communications (Kershaw, Magriples, Westdahl, Rising, & Ickovics, 2009; McBride, Emmons, & Lipkus, 2003; Phelan, 2010), and could take advantage of programs and other resources widely available but underused. The point at which people are diagnosed with a disease (e.g., Bellizzi et al., 2005; Demark-Wahnefried, Aziz, Rowland, & Pinto, 2005; Johnston et al., 2004), or informed

of the diagnosis of a close friend or family member (e.g., Ducharme et al., 2011; Stehl et al., 2009), may also be moments where a self-affirmation may be particularly useful. Table 4 illustrates some opportune junctures for intervention in health, relationships, and work contexts. These represent high-leverage moments where a psychological intervention could have an outsized impact (Cohen et al., 2017).

It would also be worthwhile to explore other groups who might benefit from self-affirmation intervention in the health care system. Most research has focused on people who engage in risky health behaviors, patients, or people at risk for a health condition. However, psychological threat may also impede the performance of gatekeepers, such as health care providers working across lines of difference of dealing with the stressful medical profession. For example, in one study, female surgical residents earned higher evaluations from their supervisor if they had been self-affirmed (Salles, Mueller, & Cohen, 2016; Woolf, McManus, Gill, & Dacre, 2009). Increasing the number of qualified female and minority health care providers, especially in contexts where they have been historically underrepresented, would better serve a greater diversity of patients, as minorities may benefit more from same-race rather than different-race health care providers (e.g., Saha et al., 1999). More generally, timely self-affirmations in these contexts may be helpful to bring out the best among a diversity of medical care providers. Providing opportunities for self-affirmation to health care providers from majority backgrounds (e.g., White, male) may prove beneficial, as research finds that self-affirmations can ameliorate prejudice and stereotyping (e.g., Fein & Spencer, 1997; Lehmler, Law, & Tormala, 2010; Zárate & Garza, 2002). In addition, providers who treat patients with advanced disease may experience a threat to their medical identity



when they cannot provide a cure, leading to prescription of aggressive therapies unlikely to be effective (Gawande, 2014). Self-affirming providers may help them to feel more comfortable prescribing palliative care, although this may not be effective absent resources to support this change (see Ferrer & Orehek, in press). Wherever the application, people who apply self-affirmation, or virtually any psychological intervention, should attend to the key variables of threat, resources, and timeliness.

**Conclusion.** This article extends a novel framework, Trigger and Channel, to better understand when self-affirmation is likely to result in positive behavior change. A meta-analysis demonstrates that the heterogeneity in the effect sizes of self-affirmation reflects an underlying order. It is not simply the content of the intervention, which is often in the foreground of our attention, that matters. It is the context in which it is introduced, the background against which any intervention effort takes place. This insight can help researchers and practitioners take better *aim*, finding the points in a complex system where even a small act of support can yield a large and lasting benefit.

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