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How Does Anticipated Regret Influence Health and Safety Decisions? A Literature Review

Erika J. Koch
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Making important decisions about health and safety often involves contemplating the regret that may arise if a decision turns out badly. Does anticipated regret decrease risky behaviors and promote precautionary behaviors? The present article reviews the role of anticipated regret in health and safety decisions by outlining findings from the most commonly researched topics. In line with an extended theory of planned behavior, the review concludes that anticipated regret generally predicts behavioral intentions, and intentions in turn influence health and safety behavior. The review discusses methodological recommendations and implications for interventions, and identifies unanswered questions and directions for future research.

In a vivid Public Service Announcement entitled “What If?” a young woman drives an SUV through a quiet neighborhood while two children voice a series of questions tinged with regret: “What if her phone didn’t ring? What if she didn’t answer it?” (http://www.isitworthit.ca). As the questions play, the young driver apparently hits a child with her car while distractedly answering her cell phone. The action then reverses, and the scene replays with the driver ignoring her phone, then smiling at the child crossing the street. High school students designed this video in a Canada-wide competition; will it successfully curb distracted driving? If it creates a sense of anticipated regret, then research strongly suggests that it will. The present review examines the effects of anticipating regret when making health and safety decisions.

SCOPE OF THE PRESENT REVIEW

The present review focuses specifically on the potential role of anticipated regret (AR) in decisions involving health and safety. In the present context, the phrase “health and safety” incorporates adaptive behaviors that promote physical health (e.g., exercising regularly, undergoing cancer screening) and maladaptive behaviors that potentially damage physical health (e.g., having unprotected sex, consuming illicit drugs), as well as behaviors that involve unsafe driving (e.g., exceeding the speed limit).

The present review focuses on health and safety behavior, rather than including other behaviors that AR may influence. Broader reviews already exist in the AR literature on, for example, the role of AR in adolescents’ decision making (Amsel, Bowden, Cottrell, & Sullivan, 2005) and the role of feedback in AR (Zeelenberg, 1999a). Theoretical reviews have integrated experienced and anticipated regret in a detailed account of the determinants of regret and the strategies for regulating it (e.g., Pieters & Zeelenberg, 2007). Although an important meta-analysis recently revealed a unique link between AR and behavioral intentions (Sandberg & Conner, 2008), the present review differs from and expands upon the meta-analysis in several notable ways. First, because the primary purpose of the meta-analysis was to evaluate the utility of adding AR to the theory of planned behavior (TPB), it included only studies that used the TPB as a guide. Thus, the meta-analysis examined 20 studies that met specific criteria, whereas the present review examines a larger number of studies that meet broader criteria. As noted next, the TPB is the most commonly used framework linking AR to health and
safety behaviors; however, studies that do not rely on this theory may still be informative in evaluating the role of AR in health and safety.

Second, the variability in how AR has been measured and manipulated within the health/safety domain makes meta-analysis a less than appropriate tool for the present synthesis. Although meta-analyses are highly informative for summarizing the results from studies using similar methods and procedures, meta-analyses are less useful for addressing research questions that have been examined with varied manipulations and measures (Baumeister, 2003; Cooper, 2010). Experimental research on AR within the health/safety domain has varied importantly in terms of both the manipulations themselves and in the comparison groups. For example, an early manipulation of AR compared the effects of rating “feelings after” (to induce AR) and “feelings about” having casual sex without a condom (Richard, van der Pligt, & de Vries, 1996b). More recent experimental research has manipulated both the presence (e.g., Brown, Hurst, & Arden, 2011) and placement (before or after items assessing intention; e.g., Sandberg & Conner, 2011) of AR items. Thus, the range of experimental manipulations of AR makes quantitative comparisons of AR manipulations difficult.

Third, correlational research on AR within the health/safety domain typically examines the statistical effect of AR by using multiple regression analyses to simultaneously control other variables, which vary across studies. Recent recommendations suggest that statistically combining slopes from multiple regressions is inappropriate when predictors and outcomes differ across studies (Cooper, 2010). Thus, given the variability in the manipulation, measurement, and analyses of AR within the health/safety domain, a narrative approach was deemed more appropriate than meta-analysis for the present review.

By honing in on AR in the health and safety domain, I aim to evaluate the role of AR in health-related decisions with an eye toward practical implications for intervention. Does targeting AR effectively promote precautionary behaviors and decrease risky behaviors, or might other techniques—such as fear appeals—more successfully influence behavior? The present review concludes that AR is generally a promising target for interventions designed to promote health and safety. The format of the review is a series of empirical questions along with what the existing evidence suggests as answers to those questions.

HOW HAVE RESEARCHERS DEFINED AR?

Defining Regret

In an early framework, Janis and Mann (1977) defined anticipated regret broadly as “a convenient generic term to refer to the main psychological effects of the various worries that beset a decision-maker before any losses actually materialize” (p. 222). For example, a parent may consider the potential negative effects of not promoting exercise for his or her child while also contemplating the potential physical and psychological discomfort that a child beginning an exercise program may experience. Thus, a parent may anticipate regret when deciding whether to enroll a child in an exercise program.

Of course, whereas one may imagine feeling regret in the future, one may also experience regret in the present stemming from personal decisions. For example, on learning that an exercise program has reached its maximum enrollment, parents may regret not enrolling their child earlier. According to a recent definition, “Regret is experienced when people realize or imagine that their present situation would have been better had they decided differently in the past” (Zeelenberg & Pieters, 2006, p. 214). Although examinations of lay perceptions of regret suggest that people evaluate regret positively and view regret as a functional emotion (Saffrey, Summerville, & Roeser, 2008), such favorable evaluations may appear only in retrospect. Perhaps actually feeling regret is aversive, whereas learning from regret is not. Experienced regret may ultimately fuel anticipated regret, potentially allowing people to learn from their regret experiences.

Some researchers have argued for a further distinction when defining regret: anticipated versus anticipatory emotions (e.g., Carrera, Caballero, & Munoz, 2012; Loewenstein, Weber, Hsee, & Welch, 2001). Specifically, anticipatory emotions are currently experienced due to the prospect of a future event (e.g., hope or fear). Anticipated emotions, on the other hand, are expected to be experienced in the future if certain events do or do not occur (e.g., anticipated joy or regret) (Baumgartner, Pieters, & Bagozzi, 2008, p. 685).

Others have favored in the research literature use of the term “anticipatory” regret (e.g., Wollson & Briggs, 2002) or have used the terms “anticipated” and “anticipatory” interchangeably (e.g., Kivetz & Keinan, 2006). For the sake of clarity and consistency with the majority of research in this area, I use the term “anticipated regret” to denote a prospective, aversive, and cognitive emotion (i.e., an emotion that requires thinking) that influences decision making.

Adding AR to the TPB

Much of the research reviewed here builds on the TPB (e.g., Ajzen, 1991); thus, the present article draws from an extended TPB to provide a theoretical framework.
Briefly, according to the TPB, behavioral intentions (e.g., intending not to use a cell phone while driving) are the most proximal predictor of behavior (e.g., not using a cell phone while driving). Intentions, in turn, have three primary predictors: attitudes (e.g., how one feels about not using a cell phone while driving), perceived behavioral control (PBC; e.g., one’s perceptions of control over not using a cell phone while driving), and subjective norm (e.g., one’s perception of whether significant others would want one to refrain from cell phone use while driving). Despite the success of the TPB in predicting substantial variability in intentions and behavior, typical TPB studies leave much variability unexplained. In response to criticisms that the TPB neglects important affective components of decision making (e.g., van der Pligt, Zeelenberg, van Dijk, de Vries, & Richard, 1997), some researchers have advocated for inserting AR as an additional predictor of intentions in the TPB (e.g., Conner & Armitage, 1998). As the studies summarized in the following pages demonstrate, evidence strongly supports the addition of AR to the TPB as a unique predictor of behavioral intentions, empirically distinct from attitudes (e.g., Richard, de Vries, & van der Pligt, 1998; Richard, van der Pligt, & de Vries, 1996a).

Other Relevant Theoretical Perspectives

Although most of the research reviewed here draws on an extended TPB, other theoretical approaches may guide research on the role of AR in health and safety decisions. For example, several studies summarized in the present review used the Attitudes—Social Influence—Self-Efficacy model, which incorporates variables that are conceptually similar to those of the original TPB (e.g., Lechner, de Vries, & Offermans, 1997). Several relevant studies also drew from the Health Belief Model, which posits that perceived vulnerability and severity, as well as an evaluation of risks and benefits, influence how people respond to health threats (e.g., Brewer et al., 2011; Reiter, McRee, Kadas, & Brewer, 2011; Steptoe, Perkins-Porras, Rink, Hilton, & Cappuccio, 2004).

Another potentially useful framework when examining the role of AR in health and safety is regulatory focus theory (Higgins, 1997), which distinguishes between promotion and prevention focus. Promotion focus broadly involves attention to potential gains and an emphasis on growth, whereas prevention focus involves vigilance for potential losses and an emphasis on security. Although anticipating regret might seem relevant only to a prevention focus, an examination of the health and safety behaviors that follow next illustrates that AR plays a role in behaviors that involve both prevention (e.g., vaccination, medical testing) and promotion (e.g., healthy eating, exercising), as well as some prevention- or promotion-focused behaviors not relevant to one’s own health or safety (e.g., blood donation, posthumous organ donation). Furthermore, recent evidence suggests that promotion- and prevention-focused orientations may elicit equally intense levels of AR (Leder, Florack, & Keller, 2013).

In sum, several theoretical frameworks may be useful for understanding the role of AR in health and safety decisions. However, because the TPB has been the most widely applied theoretical framework in this realm, it is the framework that guides the present review.

WHAT HEALTH AND SAFETY DECISIONS AND BEHAVIORS DOES AR PREDICT OR INFLUENCE?

Research on the potential role of AR in health has spanned a wide range of behaviors; however, the present review focuses only on domains in which multiple studies using multiple methods appear in the published literature. This format allows the present review to concentrate on domains that have been investigated with varied methodologies, as such methodological diversity enhances confidence in a narrative review’s conclusions (Baumeister, 2003). Furthermore, this organization by domain follows a recent recommendation to investigate whether the usefulness of a proposed extended TPB variable differs by behavioral domain (Newton, Newton, Ewing, Burney, & Hay, 2013).

This section reviews the extensive research investigating AR’s direct or indirect influence on risky behaviors (e.g., unprotected sex and substance use) and precautionary behaviors (e.g., diet and exercise, medical screening, and blood and organ donation). The section concludes by reviewing research on AR and road safety. In each domain, the emphasis is on the best available evidence from the most methodologically strong studies, which fall into two categories: (a) controlled experiments that manipulate AR in some way, and (b) correlational studies that measure various relevant control variables (e.g., the original TPB predictors of intention) along with AR. Correlational studies that measured general anticipated negative affect without incorporating regret or that included AR items as part of a measure of attitudes were excluded from the present review, given prior empirical illustrations and contemporary theorizing that distinguish AR from both attitudes and other forms of negative anticipated affect (Richard et al., 1998; Richard et al., 1996a; Zeelenberg & Pieters, 2007).

The selection process for the following review began with an electronic literature search (using PsycINFO) with the search term “anticipated regret,” which yielded hits for both “anticipated” and “anticipatory” regret.
Scanning References sections yielded an additional 10 relevant articles. To cast a wide net for relevant articles, I then used PubMed to conduct searches using the terms "anticipated regret" and "anticipatory regret." Using ProQuest, I conducted searches using the terms "anticipated regret" and "anticipatory regret." A query to the Society for Personality and Social Psychology listserv yielded one additional recent publication and no relevant unpublished research. A final PsycINFO search and subsequent References scanning yielded six additional articles. All resulting empirical articles (N = 79) that examined participants’ AR as a predictor of health or safety became subjects of the review that follows.

Risky Health Behaviors

Unsafe Sexual Practices

The topic that has received the most empirical attention in the literature on AR in health decisions is (un)safe sex, and the empirical evidence consistently demonstrates that AR significantly predicts and even influences sexual behaviors and intentions. These studies have used scenarios (Conner & Flesch, 2001; Conner, Graham, & Moore, 1999; M.-P. Gagnon & Godin, 2000; Richard et al., 1998; Richard, van der Pligt, & de Vries, 1995; Richard et al., 1996b; Smerecnik & Ruiter, 2010) or self-reports of actual intentions and/or behavior (Arden & Armitage, 2008; Bakker, Buunk, & Manstead, 1997; Buunk, Bakker, Siero, Eijinden, & Yzer, 1998; Kok, Hopsers, Harterink, & de Zwart, 2007; Newton et al., 2013; Richard & Van der Pligt, 1991; van Empelen & Kok, 2008; van Empelen, Kok, Jansen, & Hoebe, 2001). Such studies have included varied samples, ranging from traditional undergraduate samples to community samples, sometimes drawing from high-risk populations (Kok et al., 2007).

Experiments that manipulate AR strongly support the notion that AR affects sexual behavior, either indirectly (via intentions or expectations) or directly. Participants in an initial experiment described either their feelings about having sex in a hypothetical casual encounter or their feelings after having sex in the same hypothetical encounter (Richard et al., 1996b). The latter served as the AR condition. Results revealed that, as predicted, participants in the AR (i.e., feelings after”) condition reported significantly more negative emotions than did participants in the other (i.e., feelings about”) condition. In one of the most impressive demonstrations of the power of this technique, participants in another study were randomly assigned to either a “feelings about” or a “feelings after” condition and completed measures in response to a casual sex scenario. Five months later, participants reported how often they had used condoms with any new or casual sexual partners. Results controlling for previous condom use demonstrated that participants who had predicted their feelings after the encounter (i.e., the AR condition) were significantly more likely to have reported using condoms in the previous 5 months than were participants in the feelings about condition. This effect was particularly pronounced among male participants (Richard et al., 1996b). These results suggest that highlighting the emotions that one may experience after casual sex may prompt participants to contemplate a “morning-after” regret, resulting in improved levels of condom use.

Generally, correlational studies employing either hypothetical or actual responses demonstrate that AR for not using condoms significantly predicts variability in intentions to use condoms. The predictive power of AR typically emerges even when statistically controlling traditional TPB variables and past behavior. Such findings are crucial to rule out the possibility that AR is merely a proxy for habitual behaviors. For example, if one habitually uses condoms with new sexual partners, then AR may predict condom use not because AR increases the intention to use condoms but because AR correlates with past behavior, which in turn correlates with future behavior. One informative study recruited patrons of a university bar to read a scenario that concluded with a description of a casual sex encounter (Conner et al., 1999). AR predicted intentions to use condoms beyond traditional TPB predictors (i.e., attitudes, subjective norms, perceived behavioral control). Of importance, AR emerged as a unique predictor of intentions, even though past behavior did not. Consistent with other studies (e.g., Abraham & Sheeran, 2003), this finding suggests that AR is not merely a proxy for habitual behaviors. Thus, as have other correlational studies, Conner et al.’s (1999) study demonstrates that AR clearly predicts intentions to engage in safer sex practices.

AR not only predicts condom use intentions but also indirectly predicts behavior beyond the three traditional TPB components. In line with numerous traditional TPB studies, longitudinal research augmenting the TPB with AR also has significantly predicted behavior. One such longitudinal study of university students’ condom use assessed traditional TPB variables (with the exception of measuring behavioral expectations in place of behavioral intentions) along with AR for not using condoms (Richard et al., 1998). Four weeks later, participants reported how often they had used condoms with a new or casual sex partner in the prior 4 weeks. AR emerged as a unique predictor of behavioral expectations (i.e., participants’ expectations that they would use a condom or other contraceptives in a casual sex encounter). In fact, at Time 1, AR emerged as the
strongest predictor of expectations, and along with attitudes and PBC predicted 58% of the variability in behavioral expectations. Four weeks later, only behavioral expectations emerged as a significant predictor of self-reported condom use, indicating that expectations fully mediated the effects of the other TPB variables and AR on behavior (Richard et al., 1998). These results suggest that the influence of AR on behavior may be indirect.

Several intervention studies have tested the efficacy of various sexual education programs, and although these studies have not clearly demonstrated the superiority of one such program over others, they again have demonstrated the power of AR to predict condom use, either directly or indirectly (Abraham, Henderson, & Der, 2004; Brown et al., 2011; Caron, Godin, Otis, & Lambert, 2004). For example, one study compared the effectiveness of a research-based sex education program with a conventional program (Abraham et al., 2004). Results revealed that, although the outcomes of the two programs differed little, regardless of the program condition, AR for not using condoms significantly predicted both condom use intentions and behavior, even after statistically controlling traditional TPB variables.

Summary. Empirical evidence strongly demonstrates that AR predicts condom use, directly or indirectly via intentions. Such evidence arises in a combination of experiments that manipulate AR only and correlational studies. Interventions involving AR to promote condom use require further empirical examination, as none of the available studies manipulated AR.

Substance Use

Surprisingly little empirical research has examined the potential role of AR in predicting or influencing consumption of alcohol and other drugs, but results thus far offer evidence (albeit mixed) that AR directly or indirectly predicts use of alcohol, tobacco, and other drugs. Only one known study experimentally manipulated AR to test its potential effects on substance use. In this longitudinal experiment, making salient feelings after (vs. feelings about) risky drinking on a single occasion resulted in significantly higher levels of negative affect toward drinking but did not significantly affect drinking levels (Murgraff, McDermott, White, & Phillips, 1999). Results from a longitudinal study of binge drinking are more promising, demonstrating that AR for drinking negatively correlates with intentions to avoid binge drinking (Cooke, Sniehotta, & Schütz, 2007).

Several studies also have explored the role of AR in predicting smoking and related behaviors, and the available evidence suggests that AR may predict one’s own smoking intentions and behaviors. Both cross-sectional and longitudinal studies find that AR for smoking predicts low intentions to initiate or continue smoking, and longitudinal studies demonstrate that intention predicts smoking behavior measured both objectively and via self-report (Conner, Sandberg, McMillan, & Higgins, 2006; McMillan, Higgins, & Conner, 2005).

In adult samples, low AR significantly predicted non-compliance with smoking bans (Lazuras, Eiser, & Rodafinos, 2009), and high AR significantly predicted smokers’ intentions to quit in the next month (Janssen, Waters, van Osch, Lechner, & de Vries, 2014) or 3 months (Lazuras, Chatzipolychroni, Rodafinos, & Eiser, 2012). Recent evidence suggests that these effects may extend beyond smoking tobacco; a correlational study of youth attending adult education centers found that AR for using cannabis was positively associated with intention not to use cannabis (H. Gagnon, Côté, April, Julien, & Tessier, 2013).

Summary. Although relatively few studies have tested the potential role of AR in predicting or influencing substance use, available findings from mostly correlational research are promising. AR may predict intentions to consume alcohol, which in turn predict alcohol consumption. AR also appears to play a role in deciding whether to use other drugs.

Diet and Exercise Behaviors

Healthy Eating

In addition to demonstrating AR as a predictor of unhealthy behaviors, research has revealed AR as a predictor of healthy behaviors, such as consuming nutritious foods. No known studies have experimentally manipulated AR to test its effects on healthy eating; however, correlational evidence using various procedures suggests that AR for not eating healthfully predicts strong intentions to consume healthy food. For example, one study took a naturalistic approach, examining employees’ snack choices at their workplace (Weijzen, de Graaf, & Dijkstra, 2009). In this two-part study, participants reporting higher AR for not choosing a healthy snack reported greater intentions to choose a healthy snack and then more often actually chose a healthy snack than did participants who reported lower AR. Furthermore, in a longitudinal study of overweight or obese individuals, although AR for not eating the recommended amount of fruit and vegetables positively correlated with fruit/vegetable intake, AR did not uniquely predict fruit and vegetable consumption (G. Godin, Amireault, et al., 2010). However, additional analyses revealed a moderation effect: The intention-behavior link was strongest at the highest levels of AR.
This finding suggests that although low levels of AR for not increasing fruit/vegetable intake may not necessarily correspond with weak intentions, high levels of AR may correspond with particularly strong intentions to increase fruit and vegetable intake. Taken together, these results suggest that relatively high AR about eating poorly predicts relatively healthy eating.

**Exercise Behavior**

Studies investigating the relationship between AR and exercise offer additional evidence that AR predicts health-promoting intentions and behaviors. Strong evidence for the power of AR in promoting exercise emerges from studies that experimentally manipulated AR (for *not* exercising) by making AR salient before (vs. after) intention. Findings reveal that reporting AR before reporting exercise intentions increases exercise intentions (Abraham & Sheeran, 2004), strengthens the intention–behavior relationship (Abraham & Sheeran, 2003), and even increases exercise behavior, as assessed by an objective measure (i.e., swiping of an exercise center card; Sandberg & Conner, 2011).

Correlational studies reveal that AR predicts variance in exercise intentions above and beyond traditional TPB variables (Abraham & Sheeran, 2004; Boudreau & Godin, 2009). Specifically, higher AR for not exercising predicts stronger intentions to exercise. Such results emerged in a complex longitudinal study of moderators of the intention–behavior relationship in the domain of exercise, with AR moderating the intention–behavior relationship (Sheeran & Abraham, 2003). Specifically, consistency between intending to exercise and actually exercising was particularly high among participants reporting high levels of AR; intention stability (i.e., the degree to which behavioral intentions remain relatively steady over time) mediated this effect. Additional studies replicated this finding (Abraham & Sheeran, 2003), and comparable findings emerged even in a longitudinal study of obese participants, who often report barriers to exercising (G. Godin, Amireault, Bélanger-Gravel, Vohl, & Pérusse, 2009). One hypothesis explaining the results of all of these studies is that AR “binds people to their intentions” (Abraham & Sheeran, 2003, p. 496). Contemplating the regret that one may experience about skipping a planned exercise routine may strengthen one’s intention to exercise.

**Summary.** Evidence consistently suggests that AR predicts and even influences intentions to improve levels of exercise and healthy eating, and these intentions in turn guide behavior. No known studies of healthy eating experimentally manipulated AR; thus, experimental investigation in this domain is needed. Results of experiments on exercise are particularly strong, given that they manipulated only whether AR items appeared before or after intention items. AR predicts consistency between intention and behavior, such that people who contemplate the regret they may feel about not engaging in healthy behaviors may be particularly likely to act on their healthy intentions.

**Medical Screening**

The research reviewed in the next several sections involves behaviors that may require considerable controlled mental processing. Deciding whether to be screened for possible diseases is one example of a decision that may involve extensive thought, as individuals weigh the pros and cons of the screening process and its outcomes. The existing evidence suggests that AR for screening and not screening may predict medical screening intentions, although the evidence is inconsistent.

Only one known study experimentally manipulated AR in the context of medical screening decisions. In an intriguing demonstration of the mere measurement effect, this longitudinal experiment compared the effects of two treatments (TPB and TPB + regret for *not* being screened) in which participants completed relevant measures to a control condition that did not involve these measures (Sandberg & Conner, 2009). Results revealed that among participants who completed and returned a questionnaire, those in the TPB + regret condition had significantly higher cervical screening attendance rates than did participants in the other conditions. The authors propose that merely measuring AR makes it salient when women form screening intentions, and these strong intentions subsequently influence screening behavior.

To date, results of several correlational studies reveal that AR for *not* undergoing medical screening is positively associated with screening intentions. Specifically, AR for not screening predicts intentions to attend screenings for breast cancer (Lechner et al., 1997) and cervical cancer (Walsh, 2005) and to perform self-examinations for testicular cancer (Lechner, Oenema, & de Nooijer, 2002; McGilligan, McClenahan, & Adamson, 2009). Similarly, AR for not screening positively predicts intentions to have genetic testing for cancer and heart disease (Sanderson & Wardle, 2008) and to attend an eye health screening (Prior et al., 2012), and a recent experiment found that AR mediated the effect of information valence on intention to undergo direct-to-consumer genetic testing (Sweeney & Legg, 2011). In contrast, AR for *being* screened negatively predicted intention to undergo genetic testing for susceptibility to Alzheimer’s disease (Frost, Myers, & Newman, 2001). Unfortunately, this study did not measure regret for *not* having the screening test, precluding the assessment of whether AR for failing to...
be screened (and possibly later developing Alzheimer’s) more strongly predicted screening intentions. Two recent studies found that higher AR for seeking breast cancer information appeared in nonseekers (i.e., those who did not seek breast cancer information) than in seekers, and higher AR for not seeking information appeared in seekers than in nonseekers (Melnyk & Shepperd, 2012). Thus, highlighting the regret that one might experience by avoiding testing may increase testing intentions, whereas highlighting the regret that one might experience by getting tested may weaken testing intentions.

In contrast to the aforementioned studies, several studies have not found a significant independent effect of AR on screening intentions or behavior. Specifically, results of a longitudinal study found that AR for not doing a breast self-examination (BSE) failed to independently predict BSE intention or behavior (Lechner, de Nooijer, & de Vries, 2004), perhaps because participants reported AR 6 weeks prior to reporting their BSE intention, thus preventing AR from being salient when participants reported their intention. Similar null findings (once TPB variables were controlled) emerged in a study predicting cervical screening intention and behavior (Bish, Sutton, & Golombek, 2000). The study’s authors speculate that women may not view avoiding a cervical smear as severe because they can simply have the test another time. This possibility may explain why attitudes emerged in this study as the strongest predictor of screening intentions, as attitudes toward the procedure itself may be more salient than the AR that women might experience for a one-time failure to have a test that they can easily reschedule. Thus, as the mixed findings illustrate, further research is needed to elucidate when AR does and does not predict medical screening decisions.

**Summary.** Some empirical evidence supports the notion that AR influences intentions to undergo medical screening, yet the few studies that also assessed behavior have yielded mixed results, and the vast majority of studies in this domain did not experimentally manipulate AR. Additional research is necessary, for example, to ascertain when AR does and does not predict cervical and breast cancer screening intentions and behavior.

**Vaccination Decisions**

Available evidence demonstrates the influence of AR in potentially difficult vaccination decisions, both in the decisions that parents make for their children and in the decisions that people make for themselves. Deciding whether to vaccinate one’s child may pose a dilemma for parents. On the one hand, parents may consider the protection that a vaccine affords their child. On the other hand, parents may consider the less-than-perfect efficacy and possible side effects of some vaccines. Few studies have experimentally manipulated AR to test its effects on vaccination decisions; however, one recent experiment manipulated AR for not vaccinating, as well as the type of presentation (graphical vs. text) of information on HPV and vaccination presented to mothers of adolescent daughters (Cox, Sturm, & Cox, 2014). Results revealed that responding to questions about AR for not vaccinating increased vaccination intentions, but only when information was presented graphically. These findings build upon results of an earlier experiment, which revealed that the effects of AR (for both vaccinating and not vaccinating) were stronger when participants predicted their regret before (as compared to after) their hypothetical vaccination intentions for a child (Connolly & Reb, 2003, Experiment 1).

Evidence from correlational research has found that AR predicts decisions about childhood vaccines. In a longitudinal study of decisions regarding various vaccinations for children, pregnant women responded to a series of items about specific diseases, including their AR for immunizing and not immunizing their child (Wroe, Turner, & Salkovskis, 2004). A follow-up interview after childbirth determined whether the women actually immunized their newborns. AR for inaction (i.e., not immunizing) was the strongest predictor of participants’ initial ratings of their likelihood of vaccinating, whereas AR for action (i.e., immunizing) was the next strongest predictor. In fact, these emotion ratings emerged as even stronger predictors of self-reported immunization likelihood than were more cognitive factors such as perceived risks and benefits of immunization. At follow-up, analyses demonstrated that immunizers (vs. nonimmunizers) reported significantly higher ratings of AR for harm after inaction and significantly lower AR for harm after action. Thus, although the majority of pregnant women predicted that they would immunize their newborns, AR emerged as an important factor in explaining both these self-reported predictions about vaccination and subsequent vaccination decisions.

Studies of parents’ decisions regarding the recently approved vaccine against human papillomavirus (HPV) also find that AR predicts parents’ vaccination decisions. In two cross-sectional studies, AR for not vaccinating their daughters positively predicted parents’ vaccination intentions (Morison, Cozzolino, & Orbell, 2010; Ziarnowski, Brewer, & Weber, 2009), and a longitudinal study similarly found that AR for not vaccinating uniquely predicted having daughters vaccinated at follow-up (Brewer et al., 2011). AR for vaccinating also negatively predicted vaccination in one of these studies (Ziarnowski et al., 2009). Research on parents of adolescent sons replicated these effects, even though
the HPV vaccine is less common for adolescent boys than for adolescent girls (Reiter et al., 2011).

Available evidence also suggests that AR predicts the vaccination decisions that people make for themselves. One study just noted found that not only did parents’ AR predict HPV vaccination status; their adolescent sons’ own AR also uniquely predicted HPV vaccination status (Reiter et al., 2011). Similarly, AR for not vaccinating uniquely predicted willingness to obtain HPV vaccination in samples of heterosexual (Reiter, Brewer, & Smith, 2010) and gay and bisexual men (Reiter, Brewer, McRee, Gilbert, & Smith, 2010).

Research examining whether AR predicts people’s decisions regarding influenza vaccine also has found that AR predicts vaccination intentions and/or behavior. Initial evidence suggested that AR for not vaccinating uniquely predicts flu vaccination intentions among older adults (Gallagher & Povey, 2006); subsequent studies also assessed whether intentions predict vaccination behavior. Several prospective studies found that among university faculty and staff (Chapman & Coups, 2006; Weinstein et al., 2007) and healthcare workers (Godin, Vézina-Im, & Naccache, 2010), AR uniquely predicted seasonal influenza vaccination status. However, in one of these studies (Godin, Vézina-Im, et al., 2010), AR did not uniquely predict vaccination intention when other predictors (e.g., various types of norms) were controlled. In contrast, AR emerged as a significant predictor of intention in a longitudinal study of H1N1 vaccine in Hong Kong (Liao, Cowling, Lam, & Fielding, 2011). Specifically, AR for not vaccinating positively predicted vaccination intention, as well as vaccination planning (i.e., implementation intention); in turn, both intention and planning predicted self-reported vaccination status at follow-up. Thus, research generally suggests that AR predicts people’s influenza vaccination decisions for themselves, either indirectly (via intentions) or directly.

Summary. Most of the available evidence suggests that AR for not vaccinating positively predicts and AR for vaccinating negatively predicts vaccination intentions. However, most of the available research on AR in vaccination decisions is correlational; only one known study on actual vaccination decisions has experimentally manipulated AR.

Blood and Posthumous Organ Donation

Studies of blood and organ donation decisions provide perhaps some of the most compelling demonstrations of AR’s influence. Blood donors typically will not know who benefits from their donation; thus, the contemplation of regret for not helping an unknown other is an intriguing possibility. Even more intriguing is the contemplation of regret for not registering as a posthumous organ donor. Anticipating regret in this context may involve contemplating how one might feel after one’s own death. Initial evidence provides mixed yet promising results for AR’s influence in these paradoxical situations.

To date, studies that have assessed AR in blood donation decisions have provided inconclusive results. Although several experiments have examined AR in this domain, few have employed manipulations that isolated the potential effects of AR (cf. France et al., 2013; Godin, Sheeran, Conner, & Germain, 2008). One experiment that tested whether AR for not giving blood influenced actual donation rates randomly assigned novice donors to receive one of four questionnaires: behavioral-intention only, behavioral intention + regret, implementation intentions only, and implementation intentions + regret (Godin, Sheeran, & Smith, 2006). A fifth, control condition did not include a questionnaire. Results revealed that although mere measurement of implementation intentions significantly increased donor registrations over 12 months, neither augmenting these intentions with AR (for not donating) nor measuring AR without implementation intentions further improved donation rates. However, a recent study of lapsed blood donors that compared an intention + regret condition with other experimental conditions found that completing a questionnaire in which questions about AR for not donating appeared before questions assessing intention to donate significantly improved objectively measured donation levels 15 months later (Godin, Germain, Conner, Delage, & Sheeran, 2014). Thus, the most recent experiment on AR in blood donation offers promising results.

Results from correlational studies have demonstrated that AR predicts blood donation intentions and behavior. For example, results of two studies comparing donors to nondonors revealed that AR for not donating uniquely predicted intentions to donate, regardless of donation experience (Godin et al., 2005; McMahon & Byrne, 2008). A study focused on nondonors found that AR for not donating emerged as a predictor of intentions to donate for the first time within the next 3 months, and results of a longitudinal study of experienced donors revealed that AR for not donating predicted intentions, which predicted self-reported clinic attendance 3 months later (Masser, White, Hyde, Terry, & Robinson, 2009; Robinson, Masser, White, Hyde, & Terry, 2008). Similar results emerged in longitudinal studies of novice and experienced donors, with the added finding that AR uniquely predicted objectively assessed behavior (Conner, Godin, Sheeran, & Germain, 2013; Godin, Conner, Sheeran, Bélanger-Gravel, & Germain, 2007).
Recent research on AR in posthumous organ donation is more conclusive. Three experiments demonstrated the power of simple interventions employing AR measures. Specifically, two experiments demonstrated that a simple AR manipulation—insertion in a larger survey of two items tapping AR for not registering as an organ donor—significantly increased donor registration intentions (O’Carroll, Foster, McGeechan, Sandford, & Ferguson, 2011). In contrast, donors and nondonors did not significantly differ on more “rational-cognitive” variables such as knowledge about organ donation. A recent pilot study tested whether these intentions translate into behavior. In this web-based experiment, nondonors were randomly assigned to one of three conditions: TPB (which included a measure of traditional TPB variables), AR (which included the TPB items plus two AR items), and control (which included no AR or TPB items; O’Carroll, Dryden, Hamilton-Barclay, & Ferguson, 2011). In all conditions, the study concluded by directing participants to a national donation website where participants could register as an organ donor, or at least obtain more information. One month later, participants reported whether they had registered as an organ donor. Although descriptive statistics were omitted, results indicated that simply responding to two AR items significantly increased donor registration. Further analyses on only the AR condition demonstrated that AR fully mediated the intention-registration link. Apparently, merely answering two questions about anticipating regret from not registering as an organ donor made AR salient, which increased registration intentions, which in turn increased registration behavior. Results from a recent correlational study enhance confidence in these findings by illustrating that AR predicts blood donation intentions or behavior, even when statistically controlling the original TPB predictors of intention (Newton et al., 2013).

Summary. Research has not yet firmly established that AR predicts blood donation intentions or behavior, but results from correlational studies are encouraging. Despite the paradoxical nature of anticipating regret for events that may occur after one’s death, available evidence from both correlational and experimental research demonstrates that AR influences intentions to become a posthumous organ donor, and these intentions translate into donor registration behavior.

Road Safety

Road safety is one last area in which multiple studies have demonstrated the influence of AR on intentions and behavior. In the only known experiment in this area, a video designed to elicit AR for speeding (compared with videos designed to target beliefs and PBC) induced the highest levels of “not feeling good” about and negative attitudes toward speeding (Parker, Stradling, & Manstead, 1996). However, this video (compared with the other videos) failed to significantly influence intentions about future speeding. This null effect may be due to a weak manipulation. The actors in the video apparently did not specifically mention “regret,” and although scores on the “not feeling good” item were significantly higher for the regret video than for the other videos, scores on the other item designed to tap AR did not significantly differ across conditions. Thus, additional research is necessary to develop a procedure that induces AR for speeding.

Although results of the experimental study just described were not conclusive, results of correlational research more consistently demonstrate that AR is associated with safe driving intentions and behavior. In the earliest known study on AR and road safety, participants responded to measures tapping predicted reactions to committing three driving violations: cutting across lanes of traffic, inattentive weaving through traffic, and passing on the inside lane (Parker, Manstead, & Stradling, 1995). The authors speculated that AR may be particularly important in driving violations, as the act of committing such violations may actually bring positive affect (e.g., the excitement of exceeding the speed limit). Thus, the emotional thrill of committing driving violations (e.g., speeding) may contrast with the regret linked to the consequences of getting caught (e.g., receiving a speeding ticket). Results of the scenario study revealed that AR for committing driving violations negatively predicted intentions to commit each of the three driving violations, even after statistically controlling traditional TPB variables. This effect was replicated in a recent study of intentions to commit additional driving violations (Elliott, 2012).

Most of the remaining studies of AR in the context of road safety examined predictors of speeding. For example, a recent study found that AR for speeding was negatively associated with speeding intentions among motorcyclists; however, this study did not

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1One prospective study indicated that AR did not uniquely predict intentions to sign a donor card, but unexpectedly, AR moderated the intention–behavior relationship, such that the intention–behavior relationship was weakest among participants with the highest AR (Godin, Bélanger-Gravel, Gagné, & Blondeau, 2008). Participants with relatively low intentions drove this effect. To date, though, no other published study has replicated this complex and unanticipated effect.

2In a scenario study designed to assess speeding intentions (Conner, Smith, & McMillan, 2003), traditional TPB items emerged as significant predictors of speeding intentions, but anticipated affect did not; however, ambiguity regarding the affect measure prevents strong conclusions. The anticipated affect measure contained two items that explicitly mentioned “regret,” and these were combined with a measure of feeling “exhilarated.” Because there is no report of the resulting Cronbach’s alpha, one cannot determine whether combining these measures was appropriate.
examine actual speeding behavior (Chorlton, Conner, & Jamson, 2012). The majority of the road safety studies demonstrated that AR significantly predicts speeding intentions, which in turn predict speeding behavior, even after statistically controlling TPB variables. This pattern of results emerged among drivers in both their work and personal vehicles (Newnam, Watson, & Murray, 2004), among drivers who had previously received speeding tickets (Elliott & Thomson, 2010), and when driving was measured objectively, in either a real or simulated context (Conner et al., 2007). In fact, results of a prospective study revealed that this pattern held even when statistically controlling past speeding behavior (Elliott & Thomson, 2010). Further enhancing confidence in such findings, a recent two-panel study (with a 6-month gap between measurements) also demonstrated that AR significantly predicted speeding intentions, above and beyond extended TPB variables (Elliott, Thomson, Robertson, Stephenson, & Wicks, 2013). Unexpectedly, AR also directly predicted speeding behavior; the authors speculate that this result indicates that AR may work both consciously (via intentions) and automatically.\(^3\)

**Summary.** Results of studies employing multiple methods and varied samples reveal that AR for speeding negatively predicts intentions to speed, which in turn predict speeding. However, only one known experimental study exists in this domain, with a fairly weak manipulation. Focusing on the regret that one may experience after the consequences of dangerous driving (e.g., causing an accident), rather than on the pleasure that one may experience from dangerous driving itself (e.g., the excitement of risk taking), may weaken intentions to drive carelessly and in turn lessen unsafe driving behavior.

**General Summary of the Relationship Between Anticipated Regret and Health/Safety Intentions and Behavior**

Research demonstrates a link between AR and a plethora of health- and safety-related behaviors, including safer sex practices, alcohol consumption, diet and exercise, medical screening, vaccination decisions, posthumous organ donation, and road safety. The most commonly studied of these areas is condom use, perhaps due to its obvious public health benefits. Many studies examining links between AR and health/safety draw on the TPB, and the majority of these studies have established the utility of augmenting the original TPB with AR as a predictor of behavioral intention. The typical pattern is that AR predicts (or influences) intention, which in turn predicts behavior. This pattern emerges most consistently in the areas of safer sex practices, diet/exercise, and vaccination decisions but less consistently in the areas of cancer screening and blood donation. On the whole, AR appears to be a particularly valuable variable to examine when attempting to understand people’s decisions about health and safety.

Furthermore, empirical evidence suggests that AR may be an especially effective intervention target for some behaviors (e.g., condom use), whereas other behaviors (e.g., cervical screening) require additional empirical attention to evaluate AR’s efficacy as an intervention target.

Although the present review illustrates the potential benefits of inducing AR to promote health and safety, unanswered questions remain. The questions that follow address some of the most potentially pressing concerns for researchers and practitioners interested in evaluating AR’s role in health and safety behaviors. For example, designing interventions that target AR may first involve assessing any potentially negative effects of manipulating AR, considering carefully the measurement of AR, and contemplating what empirical questions about AR thus far remain unanswered.

**CAN AR EVER BE MALADAPTIVE IN HEALTH AND SAFETY DECISIONS?**

In their early theorizing, Janis and Mann (1977) cited procrastination as a potential maladaptive response to AR. Decision-makers who anticipate regret may procrastinate making a decision due to unknown risks or dangers. Such procrastination may be maladaptive in some circumstances. For example, a mother deciding whether to have her daughter immunized against HPV may procrastinate making a decision, believing that the vaccine is too new to have accumulated strong evidence of its safety. Similarly, people may procrastinate making health decisions because of fear of unknown consequences (Janis & Mann, 1977). For example, fear of receiving a cancer diagnosis—and the uncertainty resulting from that diagnosis—may lead to postponement of cancer screening. Such postponement may prevent someone who actually has cancer from receiving vital treatment in cancer’s early stages. Thus, AR may be maladaptive when it leads to procrastinating health-related decisions.

Studies outside of the health/safety domain reveal a pattern of overpredicting regret. In three studies, participants overpredicted the regret that they experienced in two “near-miss” situations: narrowly missing out on a small prize and narrowly missing a subway train (Gilbert, Morewedge, Risen, & Wilson, 2004). Additional studies demonstrated that participants overpredicted the

\(^3\)The only other known study on AR in the context of road safety examined seat belt use in Turkey (Şimşekoğlu & Lajunen, 2008). Adding AR to TPB variables did not significantly improve the prediction of seat belt intentions. However, the explanation for this null effect may be a methodological one: AR was assessed with a one-item measure (which used “sorry” rather than “regret”), whereas all other predictors were assessed with more than one item.
long-term regret that they experienced for choosing vice (e.g., enjoyment during spring break, a decadent chocolate cake) over virtue (e.g., work during spring break, a healthy fruit salad; Kivetz & Keinan, 2006). Eventually, time attenuated the guilt of indulgence but amplified the wistfulness of missing out on life’s pleasures. Taken together, the results of these lines of research suggest that when the prospect of regret is salient, people estimate that they will experience significantly more regret than they ultimately experience. Thus, perhaps anticipating regret is maladaptive in the sense that its inaccurate prediction results in unnecessary anxiety.

Additional evidence, though, suggests that anticipating regret may actually be adaptive (Zeelenberg, 1999b) when making health and safety decisions. Janis and Mann (1977) offered the intriguing term “constructive procrastination” in describing how postponing a decision may actually be an adaptive response to AR. Such postpone-ment may avoid a snap decision (e.g., selecting an inexpensive health care plan that offers poor coverage). Procrastination affords the opportunity to gather additional information, perhaps ultimately leading to more careful and deliberative decisions. In line with Janis and Mann’s (1977) theorizing, results of a series of five experiments support the role of AR in improving the quality of the decision process (Reb, 2008). Compared to partic-ipants in control conditions, participants in conditions designed to elicit AR deliberated longer and searched more information before making a decision.

Moreover, a closer inspection of the studies demonstrating overprediction of regret suggests that they may not be particularly informative in this context. The previously described studies involved behaviors that—in comparison with health- and safety-related behaviors—are quite trivial. Working instead of studying on a single occasion, choosing one piece of chocolate cake instead of one fruit salad, failing to win a sweatshirt, and missing a subway train are minor events in comparison to failing to practice safer sex, eschewing exercise and healthy foods, consuming dangerous quantities of alcohol, and ignoring recommendations for potentially life-saving vaccines and screening procedures. Although people may not accurately predict how much regret they ultimately experience, the short-term emotional cost may pale in comparison with the long-term benefit of making a healthy decision. Recent empirical evidence provides preliminary support for this possibility. In a study of participants’ responses to a hypothet-ical visit to a physician to discuss possible kidney stone symptoms, a high-AR vignette (as compared to a low-AR vignette) resulted in significantly more negative affect, but it simultaneously resulted in a stronger desire to seek more information (Ogden, Daniells, & Barnett, 2009). Perhaps for trivial decisions, the costs of anticipating regret outweigh the benefits, whereas for important decisions, the benefits of anticipating regret outweigh the costs.

WHAT ARE THE INTERVENTION IMPLICATIONS OF ANTICIPATING REGRET?

The findings reviewed suggest that AR may be a particularly effective intervention target. Targeting traditional TPB variables may involve actually changing attitudes, increasing perceptions of control, and altering perceptions of important others’ behaviors. Although not impossible, creating changes in these variables may pose considerable challenges. Alternatively, targeting AR may involve simply making a variable salient, rather than actually changing it. A study described earlier offers evidence for this possibility. In the longitudinal experiment that manipulated time perspective, the AR manipulation involved simply randomly assigning some participants to predict their feelings about a casual sex encounter and other participants to predict their feelings after a casual sex encounter (Richard et al., 1996b). Thus, rather than actually altering AR levels, the experimental manipulation might simply draw attention to the possible regret that behavior may cause. Similarly, the concept of mere measurement illustrates the potential simplicity of an intervention designed to elicit AR. For example, the pilot study on registrations for posthumous organ donation involved two experimental conditions that were largely similar (O’Carroll, Dryden, et al., 2011). The AR condition differed from the TPB + control condition by only two additional items, which merely invited participants to consider the regret they might feel in the coming weeks if they did not register as an organ donor. Simply making AR salient increased registration intentions, which in turn increased actual registration.

Interventions that target AR may not only have the advantage of being simple yet effective, they also may outperform fear appeals in effecting positive change in health and safety. Although fear appeals can be effective if they provide information about how to change behavior (Witte & Allen, 2000), they also may heighten defensiveness (Bakker et al., 1997). Interventions that increase awareness of potential negative emotional consequences of risky behavior and highlight the possibility that precautionary measures may avoid such consequences may bring about positive changes in health-and safety-related behaviors (Richard et al., 1995). Given that regret is a “cognitive emotion” (Pieters & Zeelenberg, 2007, p. 4), messages that heighten AR involve both cognitive and affective factors and therefore may be particularly persuasive (Connolly & Reb, 2005). To date, though, the idea that interventions targeting AR are superior to those targeting fear remains speculative, and some evidence suggests an alternative possibility. In an experiment comparing the effects of various persuasive messages, presenting HIV as highly threatening but easy to prevent resulted in particularly strong intentions to use condoms (Smerecnik & Ruiter, 2010). Under conditions of high threat, AR mediated the link
between coping information and intentions to use condoms. Apparently, portraying HIV as severe yet avoidable increased AR, which strengthened condom use intentions. Thus, interventions that target AR may be more effective than fear appeals, or interventions that target fear may work via increasing AR. Future research may directly test these possibilities.

Designing, testing, and implementing interventions that target AR require several methodological considerations. For example, in testing interventions that implement a mere measurement procedure, a true control group may be necessary (Abraham & Sheeran, 2003). An especially strong procedure would involve one experimental condition in which participants respond to an AR measure and one true control condition in which participants do not respond to any initial measures, with additional conditions comparing AR to other variables (e.g., traditional TPB variables). This procedure would permit confidence in the results by demonstrating that any apparent effects of AR are due truly to the measurement of AR and not of other variables.

A second methodological consideration concerns careful wording. Although most of the reviewed studies assessed AR for not engaging in a health-promoting behavior, several studies alternatively or additionally assessed AR for engaging in a health-promoting behavior. Although results of a recent study suggest that AR predicts intentions only when measured in an opposite direction (e.g., avoiding a behavior) to other predictors (e.g., performing a behavior; Ajzen & Sheik, 2013), some research suggests that AR for both action and inaction may predict intentions to perform a behavior. For example, as previously noted, AR for being screened for Alzheimer's negatively predicted screening intentions (Frost et al., 2001), and AR for immunizing negatively predicted immunization intentions (Wroe et al., 2004; Zimowski et al., 2009). Thus, successful interventions may require highlighting the regret that people may experience if they do not behave in health-promoting ways while not highlighting the regret that people may experience if they do behave in health-promoting ways. Generic messages that merely encourage people to “consider the regret you might feel” may make both types of regret salient and therefore backfire.

One important topic that has received scant empirical attention is the role of AR in physicians' decision making. For example, a scenario-based pilot study found that physicians anticipated higher regret for not ordering (vs. ordering) restraints for agitated dementia patients (Colenda, Poses, Rapp, & Leist, 1995), and a similar pattern emerged in a scenario study of physicians’ use of anticoagulation therapy (Gross et al., 2003). An interesting yet disconcerting possibility is that physicians may weigh their own potential regret more heavily than that of their patients when deciding on a course of action; however, this possibility remains an empirical question. In another study, American and French physicians responded to various hypothetical situations in which they might decide to order prostate-specific antigen (PSA) tests (Sorum et al., 2004). AR strongly predicted likelihood of ordering a PSA test, and AR was highest for scenarios in which the target patient was relatively young, the prostate appeared somewhat irregular, and the patient had explicitly requested a PSA test. On the one hand, AR may prompt a physician to order a test that ultimately benefits the patient and protects the physician from later regret. On the other hand, AR may prompt a physician to order an unnecessary test. Future research may elucidate the conditions in which AR promotes beneficial versus harmful decisions by physicians.

Research on the role of AR in health insurance decisions may become increasingly important as more insurance choices become available. In situations in which individuals must select a health plan—either to supplement a national plan or to provide primary health care—the decision process may be quite complex. Decision-makers may weigh plans’ type, cost, and coverage, as well as various other factors. For example, an employee deciding between two employer-sponsored health plans may weigh the potential regret for purchasing an expensive plan with a low deductible against the potential regret for purchasing a less expensive plan with a high deductible. Several studies investigating responses to such hypothetical situations have explored the role of AR in decision aversion (Beattie, Baron, Hershey, & Spranca, 1994), but no known research has examined the role of AR in actual insurance decisions. Future research may explore the mechanisms of how AR influences health insurance decisions.

A third potential area for future research involves road safety. Although several reviewed studies examined AR as a predictor of speeding intentions, research has not sufficiently examined AR in the context of another hazardous driving behavior, highlighted in the present review’s opening example: the use of cell phones or other electronic devices while driving. Talking and texting while driving are dangerous yet completely avoidable behaviors. Making AR salient in this context may decrease intentions to perform these dangerous behaviors and thereby improve road safety.4

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4A recently published study investigated the potential role of AR for concealing texting while driving (Gauld, Lewis, & White, 2014). Although participants responded to questions involving both concealed and “obvious” (i.e., nonconcealed) texting while driving, because the authors were interested in predictors of concealed texting, they did not present results for “obvious” texting. Thus, the possibility that AR for texting may be associated with weak intentions to text (without concealment) while driving still awaits empirical investigation.
SUMMARY AND CONCLUSIONS

The present review’s opening example described a public service campaign aimed at preventing distracted driving (http://www.isitworthit.ca). The review suggests that simply drawing attention to potential regret may strengthen safe-driving intentions (e.g., intentions to drive attentively) and consequently result in safe-driving behavior (e.g., ignoring a cell phone while driving). Research has examined the role of AR in domains as varied as safer sex, drug use, diet and exercise, medical screening, blood and organ donation, and road safety. On the whole, the evidence demonstrates that AR is an ideal target for health and safety interventions, as subtle manipulations that make AR salient can have considerable practical benefits.

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