

Taking Stock of Unrealistic Optimism

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Abstract

Researchers have used terms such as *unrealistic optimism* and *optimistic bias* to refer to concepts that are similar but not synonymous. Drawing from 3 decades of research, we discuss critically how researchers define unrealistic optimism, and we identify four types that reflect different measurement approaches: unrealistic *absolute* optimism at the individual and group levels and unrealistic *comparative* optimism at the individual and group levels. In addition, we discuss methodological criticisms leveled against research on unrealistic optimism and note that the criticisms are primarily relevant to only one type: the group form of unrealistic comparative optimism. We further clarify how the criticisms are not nearly as problematic as they might seem, even for unrealistic comparative optimism. Finally, we note boundary conditions on the different types of unrealistic optimism and reflect on five broad questions that deserve further attention.

Keywords

unrealistic optimism, comparative optimism, optimistic bias, risk judgments

Researchers have long argued that people are not objective in their predictions (S. E. Taylor & Brown, 1988; Weinstein, 1980). Rather, people believe that their futures will be better than can possibly be true. This bias toward favorable outcomes—often known as unrealistic optimism—appears for a wide variety of negative events, including diseases such as cancer (Waters et al., 2011), natural disasters such as earthquakes (Burger & Palmer, 1992), and a host of other events ranging from unwanted pregnancies (Gerrard, Gibbons, & Warner, 1991) and radon contamination (Weinstein & Lyon, 1999) to the end of a romantic relationship (MacDonald & Ross, 1999). It also emerges, albeit often less strongly, for positive events, such as graduating from college, getting married, and having favorable medical outcomes (Hoorens, Smits, & Shepperd, 2008; Jansen et al., 2011; Weinstein, 1980).

Researchers have investigated unrealistic optimism for more than 30 years, yielding on average 21 articles published per year. A Web of Knowledge database count of the five most common related terms (i.e., *unrealistic optimism*, *comparative optimism*, *optimistic bias*, *optimism bias*, and *illusion of invulnerability*) reveals 984 published papers. The number climbs still higher when terms such as *planning fallacy* and *positive illusions* are included. The seminal paper in which Weinstein (1980)

coined the term *unrealistic optimism* had received 1,418 citations as of February 2013. *Unrealistic optimism* also appears in virtually every social psychology textbook and in most introductory psychology textbooks. Researchers have demonstrated unrealistic optimism in a variety of Western countries (e.g., Belgium, Canada, Denmark, England, France, and the United States; Drace, Desrichard, Shepperd, & Hoorens, 2009; P. Harris, Middleton, & Joiner, 2000; Heine & Lehman, 1995; Helweg-Larsen & Nielsen, 2009; Hoorens & Buunk, 1993; Hoorens et al., 2008) and at least one Eastern country (Japan; Heine & Lehman, 1995).

Interest in unrealistic optimism extends beyond psychology. It is a pervasive concept in many social sciences (including law, economics, and decision sciences) and in medicine. For example, economists describe the perils of unrealistic optimism among entrepreneurs and investors (Bay, 2010), and medical researchers discuss unrealistic optimism among patients with advanced disease

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(Jansen et al., 2011). A recent book argues that unrealistic optimism has a neurological basis and that people have evolved to be unrealistically optimistic (Sharot, 2011b). In fact, unrealistic optimism is now a topic of interest in biologically oriented journals such as *Nature Neuroscience* (Sharot, Korn, & Dolan, 2011) and *Current Biology* (Sharot, 2011a; Sharot, Guitart-Masip, Korn, Chowdhury, & Dolan, 2012). Although the neurological evidence is limited, the findings suggest that people may be predisposed to be optimistic (Sharot, 2011b).

Unrealistic optimism has clear practical implications. For example, unrealistic optimism can produce problems regarding informed consent when patients overestimate the likelihood of benefiting personally from participation in clinical trials (Jansen et al., 2011). Likewise, testimony in the U.S. Department of Justice lawsuit against American tobacco companies (Weinstein, 2001) highlighted how people underestimate their health risks from smoking and overestimate their ability to quit. Unrealistic optimism has received attention in mainstream media outlets such as the *New York Times* (Chen, 2011), in books for the general public (e.g., Kahneman, 2011), and in new media formats such as Technology, Entertainment, Design (TED), the online lecture series dedicated to disseminating “ideas worth sharing,” where a lecture on unrealistic optimism posted in May 2012 was viewed by more than half a million people in the first 4 months after it appeared (Optimism Bias, 2012). Finally, empirical evidence links unrealistic optimism to behavior. The direction of that link, however, can vary dramatically. For example, one study found that gay men infected with HIV who showed unrealistic optimism about not developing AIDS also showed more health-related behavior, such as following safe-sex guidelines, limiting the number of sexual partners, and avoiding use of recreational drugs (S. E. Taylor et al., 1992). Conversely, another study found that unrealistic optimism among college students about their chances of having drinking problems in the future corresponded with experiencing more alcohol-related negative events (e.g., hangover, missing classes) 1 month later (Dillard, Midboe, & Klein, 2009).

The rapid and widespread growth of unrealistic optimism research provides an opportunity to reflect on its meaning and on the ways researchers assess it. We approach this task by using the extensive empirical evidence to clarify theoretical, methodological, and practical issues surrounding unrealistic optimism and to raise several questions that deserve further research.

The Faces of Unrealistic Optimism

We define unrealistic optimism as a favorable difference between the risk estimate a person makes for him- or herself and the risk estimate suggested by a relevant,

objective standard (such as epidemiological, base-rate data). Unrealistic optimism also includes comparing oneself to others in an unduly favorable manner. Our definition makes no assumption about how the difference manifests. It may reflect a distortion in personal risk estimates, a distortion in the perceived risk of the comparison target, or both. Our definition also makes no assumption about why the difference exists. The difference may originate from motivational sources, such as a desire to deny vulnerability to harm, or from cognitive processes, such as the person-positivity bias, egocentric thinking, or overuse of the representativeness heuristic (Chambers & Windschitl, 2004; Shepperd, Carroll, Grace, & Terry, 2002).

Unfortunately, researchers are not consistent in their terminology or the assessment approach they use to study unrealistic optimism. They sometimes assume that different, but similar, terms refer to the same construct and that various measurement strategies yield the same result. Likewise, researchers sometimes assume that moderators of one type of unrealistic optimism also moderate other types of unrealistic optimism. Some researchers, as well as science writers, have even conflated unrealistic optimism with dispositional optimism, the enduring tendency to expect positive outcomes. In fact, different types of optimism are not only distinct in their definitions and operations but also empirically. Different measurement approaches elicit different levels of optimism, and the data from these different measures correlate across events only moderately, if at all (Radcliffe & Klein, 2002; Waters et al., 2011).

We distinguish between two broad types of unrealistic optimism: *unrealistic absolute optimism* and *unrealistic comparative optimism* (see Table 1). Both types can be expressed at either the individual level or the group level, yielding four distinct categories.

Unrealistic absolute optimism

Unrealistic absolute optimism refers to the erroneous belief that personal negative outcomes, assessed on some form of absolute likelihood scale, are less likely to occur than is objectively warranted (see Table 1). Finding an objective standard to use in determining the accuracy of risk beliefs is the biggest challenge in this approach. Many outcomes (such as having a heart attack or dying from lung cancer) may not occur until the distant future and cannot be assessed within a reasonable time frame. In addition, for the standard to be relevant, the objective indicator must apply to the particular people or groups being studied (e.g., adults, Hispanics, women), so data about the overall population may not be relevant. Nevertheless, a number of studies have solved this problem in creative ways.

Table 1. The Faces of Unrealistic Optimism.

Type of individual risk estimate	Level of analysis	
	Individual	Group
Absolute	<p>Unrealistic absolute optimism—Individual</p> <p>An individual gives a personal absolute risk estimate that is lower than the absolute risk indicated by an appropriate, individual-level objective standard (e.g., a woman says her risk is 20% but a risk calculator says that it is 30%).</p>	<p>Unrealistic absolute optimism—Group</p> <p>Individuals give personal, absolute risk estimates. The average of these estimates is lower than the absolute risk of an appropriate group-level objective standard (e.g., the average of the groups' personal estimates is 20%, but the base rate for this group is 30%).</p>
Comparative	<p>Unrealistic comparative optimism—Individual</p> <p>An individual gives a comparative risk estimate that is lower than the estimate indicated by an appropriate, individual-level comparative risk standard (e.g., a woman says her risk is below average but a risk calculator says that it is above average).</p>	<p>Unrealistic comparative optimism—Group</p> <p>Individuals give estimates that compare their risk (directly or indirectly) with that of a relevant comparison group. The average of these estimates is lower than the comparison group (e.g., on average, students at a college say that their risk of developing drinking problems is lower than the average risk at their college).</p>

As evidenced in Table 1, unrealistic absolute optimism has two forms. At the individual level, unrealistic absolute optimism occurs when a person's estimate of his or her personal risk is too low relative to some individual-level standard. The individual-level standard might be personal outcomes that actually occur at a later date or personal risk as calculated from an empirically validated risk algorithm. Objective outcomes, such as whether a person does have a heart attack, represent more reliable standards than the predictions of risk algorithms and other actuarial models, which are based on group data and by definition contain uncertainty. If risk algorithms were perfect predictors, they would yield a dichotomous prediction: the event will happen or it will not. Nevertheless, we can assert that a person is displaying unrealistic absolute optimism if his or her prediction is lower than the prediction made by the best available risk algorithm.

At the group level, researchers cannot tell whether any given individual is unrealistic. Rather, unrealistic absolute optimism occurs when the average of the risk estimates given by a group of people is lower than a group-level objective standard, such as the base rate for this event in this group. Indeed, the most widely used standard for such determinations is the base rate.

Examples: Unrealistic absolute optimism—Individual. A number of studies find unrealistic absolute optimism when comparing personal predictions with later

experience. For example, studies find unrealistic absolute optimism in students estimating the grades they will achieve on forthcoming exams (Shepperd, Grace, Cole, & Klein, 2005; Shepperd, Ouellette, & Fernandez, 1996), financial analysts predicting the economy (Calderon, 1993), and students estimating their starting salary after graduation (Shepperd et al., 1996). Studies also show unrealistic optimism in people's predictions of the likelihood that they would engage in benevolent behavior. For example, although 83% of participants in one study said they would buy a flower from fellow students to benefit a national charity, only 43% actually did (Epley & Dunning, 2000).

Perhaps nowhere is unrealistic absolute optimism more evident than in people's estimates of the time to complete a task, better known as the planning fallacy (Tversky & Kahneman, 1974). Researchers have demonstrated unrealistic absolute optimism in estimates for tasks such as completing a tax return (Buehler, Griffin, & MacDonald, 1997), solving puzzles (Buehler et al., 1997), writing a report (Koole & Spijker, 2000), completing mundane tasks (Griffin & Buehler, 1999; Newby-Clark, Ross, Buehler, Koehler, & Griffin, 2000), assembling a computer stand (Byram, 1997), and making Japanese origami (Byram, 1997).

Examples: Unrealistic absolute optimism—Group. Some studies have observed unrealistic absolute optimism when comparing group estimates to the population base

rates. For instance, one study found that homeowners were optimistic relative to the local population base rate when asked about the likelihood of finding radon problems in their own homes (Weinstein & Lyon, 1999). Whereas 73% of homes in the area had elevated radon levels, people on average estimated that their own likelihood of having a problem was 27%. Moreover, homeowners continued to display unrealistic absolute optimism even after they were provided the base rate (revised mean estimate = 54.1%). Likewise, a study by Rothman, Klein, & Weinstein (1996) found evidence of unrealistic absolute optimism for 4 of 10 events (divorce, chlamydia, pregnancy, and human papillomavirus [HPV]) when participants' mean personal predictions were compared with the base rate for the events. As in the radon study, this form of unrealistic optimism persisted even after participants received accurate base-rate information.

A third study asked a nationally representative sample of smokers and nonsmokers to estimate their likelihood of living to age 75 or longer, then used a nationally representative sample of death certificates to establish the true survival rate at age 75. Participants were generally accurate in their estimates with one notable exception—heavy smokers. Male heavy smokers reported a 50.1% likelihood of seeing their 75th birthday; female heavy smokers reported a 60.1% likelihood of seeing their 75th birthday. However, the sample of death certificates suggests that only 26.3% of such men and 30.8% of such women would actually survive to age 75 (Schoenbaum, 1997).

Other studies have compared risk estimates relative to past experience or with the experience of a comparable sample. For instance, one cross-sectional study examined the perceived likelihood of an unplanned pregnancy in a sample of women in the U.S. Marine Corps. All women reported being sexually active before joining the Marines. The women estimated that they had on average a 14.5% chance of an unplanned pregnancy in the next 12 months. Yet 27% of them reported having been pregnant before joining the Marines. Of course, prior experience with pregnancy, coupled with the personal commitment associated with joining the Marines, may have prompted these women to use birth control in sexual encounters after they joined the Marines. Accordingly, the 14.5% estimate could be realistic if they had altered their sexual behavior to reduce pregnancy risk. Yet evidence from a second, comparable sample of Marine Corps women who were observed longitudinally suggests that the perceived likelihood of pregnancy was indeed optimistic. The observed 12-month pregnancy rate for the comparable sample was 22%—significantly higher than the estimate of 14.5% (Gerrard et al., 1991).

Another study compared participants' absolute personal risk estimates with the personal estimates of a

second group of participants who were indisputably at lower risk. Surprisingly, gay men who were infected with the HIV virus estimated a lower likelihood that they would develop AIDS than did a second sample of gay men who were uninfected (S. E. Taylor et al., 1992).

Admittedly, it may seem odd to describe people as unrealistic in their estimates when they do not know the base rate. For example, a group on average may underestimate their risk of a radon gas problem simply because they are unaware that radon gas is a problem in their community. Yet, although the underestimation reflects erroneous beliefs, it is still unrealistic optimism. Likewise, unrealistic optimism is sometimes less clear in absolute risk judgments in part because it is obscured by erroneous beliefs about the actual rate in the population, especially when people make numerical judgments. The consequence is that people underestimate their personal risk for some events and overestimate their personal risk for others. Nevertheless, unrealistic optimism is likely to contribute to most or all risk judgments.

Unrealistic comparative optimism

As evidenced in Table 1, unrealistic comparative optimism also has two forms. At the individual level, unrealistic comparative optimism occurs when a person incorrectly judges how his or her risk compares with that of other people. For example, a man may claim that his risk is below that of the average man even though an empirically validated individualized risk-assessment algorithm (e.g., a risk calculator) indicates that his risk is above average (acknowledging, of course, the imperfect nature of risk calculators, as mentioned earlier). At the group level, unrealistic comparative optimism refers to situations in which people in a sample estimate that they are less likely on average to experience a negative outcome or more likely on average to experience a positive outcome than are their peers. Studies consistently demonstrate the presence of unrealistic comparative optimism. This optimism appears across different types of samples, for many different events, and with a variety of assessment scales.

Examples: Unrealistic comparative optimism—Individual. Several studies have used an objective standard to evaluate whether comparative risk judgments are optimistic. In one study, participants estimated their risk, relative to the average person, of having a fatal heart attack. Next, researchers used a heart attack risk-assessment algorithm to categorize participants' actual risk as above average, below average, or average. Comparing the personal and objective comparative risk judgments, 56% of participants were classified as unrealistically optimistic, 25% were classified as unrealistically pessimistic,

and 19% were classified as accurate. This level of unrealistic predictions was far greater than chance ($p < .0001$; Radcliffe & Klein, 2002). A second study used the same approach and found that 66% of the college-student sample was unrealistically optimistic about the risk of experiencing severe alcohol problems in the future (Dillard et al., 2009).

In a third study, a nationally representative sample of more than 14,000 women estimated their risk for breast cancer by indicating whether they believed they were less likely, more likely, or about as likely to get breast cancer as the average woman their age. Next, the authors used the Gail risk assessment algorithm (Gail et al., 1989) to compute the objective risk of breast cancer for each woman and classified them as above average, below average, or average in risk. Comparing participants' personal risk classification with their objective risk classification revealed that 41.8% of women were unrealistically optimistic about their breast cancer risk, 13.4% were unrealistically pessimistic, 34.7% were accurate, and 10.1% did not respond to the risk item or reported that they did not know (Waters et al., 2011). This study is important for two reasons. First, it demonstrated that a large number of women were unrealistically optimistic. Second, the sample was part of an ongoing population-based, nationally representative survey that can generalize to the larger U.S. population. Thus, this study is a better indicator than most studies regarding the prevalence of unrealistic risk beliefs in the United States. Although this finding may seem to contradict other research showing that women overestimate their breast cancer risk (Lipkus, Klein, Skinner, & Rimer, 2005), the study by Waters et al. (2011) demonstrated unrealistic comparative optimism, whereas studies showing overestimation of breast cancer risk typically examine unrealistic absolute optimism. When viewed together, the two lines of research illustrate that unrealistic comparative optimism and unrealistic absolute optimism tap different constructs and can coexist.

Finally, one nationally representative study of smokers merits mention. These smokers separately reported whether their risk of heart attack and cancer were higher, lower, or about the same as the average, same-sex person their age. Because smoking substantially increases the risks of both heart attack and cancer (U.S. Department of Health and Human Services, 2004), nearly all of the participants were above average in risk for both diseases. However, only 29% of smokers reported that their personal risk of heart attack was higher than average and only 40% believed that their personal risk of cancer was higher than average (Ayanian & Cleary, 1999).

Examples: Unrealistic comparative optimism—Group. Unrealistic comparative optimism at the group

level is distinct from the other forms of unrealistic optimism because of the method used to determine accuracy. Here, the requirement for accuracy is that the mean of all individual comparative risk judgments combined should be “average.” The logic of this approach is grounded in the definition of “average”; if the group as a whole is accurate, people who say they have a risk that is above average should balance others whose say their risk is below average, assuming the distribution of risk is not highly skewed. Researchers can assess this type of unrealistic optimism in two ways (Weinstein & Klein, 1995). With the *direct* approach, people use a single scale to report how much higher or lower their risk of experiencing an event is compared with that of an average person. Researchers operationalize unrealistic optimism as occurring when the mean estimate of the group differs significantly from the midpoint (i.e., “average risk”) in an optimistic direction.

Most unrealistic optimism studies—hundreds of them—have examined unrealistic comparative optimism using the direct approach. For instance, the article that coined the term *unrealistic optimism* demonstrated that study participants estimated that they were less likely than the average person to experience such events as contracting a sexually transmitted disease, getting fired from a job, and being sued by someone (Weinstein, 1980). Other research demonstrated unrealistic comparative optimism in a community sample for events as varied as drug addiction, asthma, food poisoning, and sunstroke. The level of optimism was unaffected by participants' age, sex, education, job status, or their ratings of the seriousness of the event, and they never displayed unrealistic comparative pessimism (Weinstein, 1987).

With the *indirect* approach, people estimate on two separate scales the likelihood that they and some comparison target, such as the average person, will experience an event. Researchers operationalize unrealistic optimism as occurring when the mean of the personal estimates differs significantly in an optimistic direction from the mean of the estimates made for the comparison target. Although unrealistic comparative optimism is often weaker when assessed indirectly than when assessed directly (C. T. F. Klein & Helweg-Larsen, 2002; Otten & Van Der Pligt, 1996), the effect is nevertheless robust. Using the indirect method, researchers have demonstrated unrealistic comparative optimism for events such as suicide, alcohol problems, smoking-related illnesses (McCoy et al., 1992), injury in a natural disaster (Burger & Palmer, 1992), getting AIDS or cancer (Hoorens & Buunk, 1993), and getting HPV and chlamydia (Rothman et al., 1996). Interestingly, the magnitudes of direct and indirect comparative judgments are not always closely correlated (Ranby, Aiken, Gerend, & Erchull, 2010).

Researchers recognized early on the necessity of specifying the comparison target, because population differences in outcome base rates can create interpretational problems. For instance, asking college students to compare their risk for a smoking-related illness with that of the average person (which includes smokers and non-smokers) could yield comparative optimism, not because the college students are being unrealistic, but because college graduates smoke less than the rest of the population and thus really are less likely than the average person to experience smoking-related illnesses (Centers for Disease Control and Prevention, 2011). To solve this problem, researchers constrain the identity of the comparison target. For example, researchers typically ask college students to compare their risk with that of the average same-age, same-sex student at their university. When the study group has a known risk factor, it is necessary to constrain the comparison group further. For example, researchers studying college smokers would need questions referring to the average same-age, same-sex smoker at their university. Yet even with this constraint, people show unrealistic comparative optimism. For example, immigrant farm workers rated their risk of experiencing health problems from pesticide exposure as lower than the risk of the average immigrant farm worker (Vaughan, 1993), college women rated their risk of pregnancy as lower than the risk of the average college woman (Whitley & Hern, 1991), sixth-grade children rated their risks for a variety of health problems as lower than the risks of the average sixth-grade student (Whalen et al., 1994), and drivers rated their risk of a road accident as lower than the risk of the average driver (McKenna, 1993).

An inherent limitation of this assessment approach is that it reveals optimism only at the group level. Indeed, it is possible that the group estimate is “average,” suggesting no unrealistic optimism, even when individual estimates are actually quite inaccurate, with half of the participants underestimating their risk and the other half overestimating their risk to the same degree. Thus, this form of unrealistic optimism does not indicate whether any given *individual* is unrealistic but only whether the group is unrealistic on average.

Alternative Accounts for Unrealistic Optimism

Although hundreds of studies demonstrate unrealistic optimism, assess moderators, and explore possible causes, some researchers have argued that statistical artifacts plague studies of the phenomenon (A. J. L. Harris & Hahn, 2011). According to these critics, evidence for unrealistic optimism may be overstated, and the phenomenon may not, in fact, exist at all.

The first proposed artifact is *scale attenuation*, whereby the restricted nature of the response scale used to assess outcomes (e.g., a -3 to $+3$ relative risk scale) might force some people to supply responses that are inaccurate. Scale attenuation may be particularly problematic for uncommon events in which a small portion of the population is at high risk (e.g., a rare genetic mutation). In this case, most people are below the group average, and a small number are far above the group average in risk. A scale that limits the responses of these high-risk people and prevents them from indicating their true perceptions could lead to a false appearance of unrealistic optimism in the group as a whole.

The second proposed possible artifact is *minority undersampling*, which could occur in studies that contain a disproportionate number of people who will not experience the negative event. Again, this artifact is most relevant for rare events, when there may be no one in the sample who will actually experience the event. In such cases, the sample might seem biased toward optimism when, in fact, respondents are responding accurately.

The third potential artifact is *base-rate regression* (Moore & Small, 2007). People often know little about the average person, including the average person's risk factors, family history, or actions that may increase or decrease their risk. For extreme outcomes (i.e., outcomes that are very rare or very common), researchers have argued that estimates of the average person's risk are less extreme than the actual base rate for the outcome (i.e., estimates are regressive). Accordingly, people overestimate the average person's likelihood of experiencing rare outcomes and underestimate the average person's likelihood of experiencing common outcomes. For example, whereas the base rate may be 1% in the population, people might estimate that the average person's risk is 5%. Conversely, when the base rate is 90%, people might estimate that the average person's risk is 80%. In contrast, people have more information about themselves to use in estimating their own risk. For example, for rare outcomes, most people will have few risk-increasing factors and many risk-decreasing factors, leading them to believe that their personal likelihood of experiencing the outcome is very low. Thus, people may accurately estimate that their personal risk for a rare event is 1%. Conversely, for common outcomes people may have many risk-increasing factors and few risk-reducing factors, leading them to believe that their personal likelihood of experiencing the outcome is very high. The consequence of these two processes is that people believe rare events are less likely to happen to them than to other people, but that common events are more likely to happen to them than to other people.

A closer look at scale attenuation and minority undersampling

Although these three issues may seem problematic, all three refer largely to one of the four types of unrealistic optimism we have identified: unrealistic comparative optimism at the group level. That is, these artifact explanations are more pertinent to the comparative estimates made by a group of people than to the estimates made by individuals or to situations where researchers compare absolute risk estimates with an objective standard. Furthermore, for several reasons, we believe scale attenuation and minority undersampling are not serious concerns.

First, the proposed artifacts are chiefly a concern for rare, negative events. Yet unrealistic optimism is not limited to rare negative events. Numerous studies reliably demonstrate unrealistic comparative optimism for common events, including divorce, heart disease, hypertension, influenza, and auto accidents. Second, the scale-attenuation argument claims that unrealistic optimism is caused by a ceiling effect that prevents people at high risk from indicating the full magnitude of their risk. In fact, however, responses at the top of comparative risk scales are quite rare even for people known to be at high risk. For example, three separate studies found that smokers rated their risk of smoking-related health problems about average or only slightly above average (Milam, Sussman, Ritt-Olson, & Dent, 2000; Reppucci, Revenson, Aber, & Reppucci, 1991; Strecher, Kreuter, & Kobrin, 1995). In none of the studies did smokers report that their risk was “moderately,” “substantially” or “much” higher than that of the average person. The typical observation with comparative risk judgments is that a majority of people claims much below-average to slightly below-average risk, and a minority claims slightly above-average risk. Thus, a ceiling effect is rarely, if ever, the reason why the mean response is “below average.”

Third, some researchers have included both attenuated and nonattenuated scales to assess personal and target risk estimates within the same study by using either a within-subjects design (K. M. Taylor & Shepperd, 1998) or a between-subjects design (Otten & Van Der Pligt, 1996). Although the effect was larger when using an attenuated scale, these studies found unrealistic optimism with both types of scales, suggesting that scale attenuation, although a valid artifact in principle, may pose little threat in practice. Moreover, a host of studies that controlled for scale attenuation and minority undersampling demonstrated unrealistic comparative optimism for outcomes such as divorce (Rothman et al., 1996), heart disease (Lee, 1989), smoking-related illnesses (Kreuter & Strecher, 1995; McCoy et al., 1992; McKenna, Warburton, & Winwood, 1993; Williams & Clarke, 1997), smoking cessation (Weinstein, Slovic, & Gibson, 2004; Williams &

Clarke, 1997), the end of a romantic relationship (MacDonald & Ross, 1999), common events among students such as getting a parking or speeding ticket (Dunning & Story, 1991; Shepperd, Helweg-Larsen, & Ortega, 2003), and spontaneously self-generated events (Hoorens et al., 2008).

Although minority undersampling may present a problem for a single sample, it is not problematic when researchers evaluate many samples. Minority undersampling is the finding that, with an uncommon population characteristic (such as a rare genetic mutation), more samples will have fewer than the expected number of cases of the characteristic than will have more than the expected number of cases. Note that this finding refers to the number of samples of each type. However, the rate of an event in a population is not estimated from the number of samples, but rather from the number of cases in the samples. For example, a genetic mutation that occurs in only 2% of the population may not appear in any given sample of 50 people. However, if we examine 20 groups of 50 people, we will observe the disease, on average, 2% of the time. In some samples, the incidence may be 0 or 1%; in other samples, the incidence will be higher than 2%. However, the average across samples will be 2%. Minority undersampling does not bias estimates of the frequency of a characteristic in the population. Likewise, it has no relevance to the issue of whether more people overestimate or underestimate their risk. In short, although some samples may contain no cases of a rare event, other samples may contain a disproportionate number of cases. When researchers average across samples, the sample estimates should balance out and eliminate the influence of minority undersampling.

Our comments about the first two potential artifacts are not meant to suggest that researchers can uniformly ignore issues of scale attenuation and minority undersampling. We note merely that these two issues cannot account for the widespread presence of unrealistic optimism.

A closer look at base-rate regression

Base-rate regression is the tendency to make less extreme evaluations of the average person than of oneself. Base-rate regression is peculiar. For several reasons, we doubt that it should even be considered an artifact. Rather, it should be viewed merely as one of many explanations for the finding that people can believe that they are at lower risk than their peers.

The first way in which base-rate regression is peculiar is that people sometimes do not even think of the average person when asked to compare their risk with that of the average person. Rather, they think of an exemplar for the event (Perloff & Fetzter, 1986; Weinstein, 1980). For

negative events, the exemplar is often a high-risk person. Thus, people may think of a friend who drinks heavily when estimating their comparative risk for a drinking problem and a friend who drives poorly when estimating their comparative risk for an automobile accident. In short, estimates for the average person depart from actual base rate not because of base-rate regression, but because people think of an exemplar high-risk person when asked to consider the average person.

Second, it can be hard to pinpoint the pattern of data required to demonstrate the base-rate artifact. When the actual base rate is extremely rare (e.g., 1%), the pattern that presumably illustrates the base-rate artifact is straightforward. The pattern is less clear, however, when the actual base rate is not extreme. For example, one study reported that the actual base rate for divorce was 38% (Rothman et al., 1996). Would an estimated base rate higher or lower than 38% be regressive? One might argue that any difference between the estimated base rate and the actual base rate illustrates regression. However, such a response is problematic in that it means that both more extreme and less extreme estimates can illustrate base-rate regression. Such a prospect contradicts the definition of statistical regression. Incidentally, in the study by Rothman et al. (1996), participants estimated that the average person had a 42.7% chance of divorce, yet estimated that they personally had a 21.1% chance of divorce.¹ Both estimates differed significantly from the actual base rate of 38%, and it is difficult to see how this pattern illustrates base-rate regression.

Third, several studies demonstrate unrealistic comparative optimism even after providing people with base-rate information, which should control for base-rate regression. The studies that included base-rate information were often designed to examine hypotheses regarding bracing for bad news (Sweeny & Shepperd, 2007; K. M. Taylor & Shepperd, 1998). These studies find that people will show unrealistic comparative optimism even though they have base-rate information.

Perhaps the most sensible approach is to regard base-rate regression not as an artifact, but rather as merely one of several explanations for the observation of egocentrism in comparative judgments. When making comparative judgments, people tend to focus primarily on their personal qualities and neglect the qualities of the more generalized target (such as the average person; Chambers, Windschitl, & Suls, 2003; Eiser, Pahl, & Prins, 2001; Klar & Giladi, 1997; Kruger, 1999). When evaluating their comparative risk, people typically consider how their own behavior influences personal risk yet neglect to consider how other people's behavior influences their own risk (Weinstein & Lachendro, 1982). Evidence suggests that egocentrism arises for many reasons. The reasons

include focusing attention on oneself rather than on the others (i.e., focalism; Windschitl, Kruger, & Simms, 2003), having more information available about self than about others when making judgments (i.e., rational discounting; Kruger, Windschitl, Burrus, Fessel, & Chambers, 2008), using different information to evaluate oneself versus others (i.e., case-based vs. distributional information; Klar, Medding, & Sarel, 1996), and, yes, base-rate regression (Moore & Small, 2007). These various reasons, much like base-rate regression, illustrate how unrealistic optimism can arise from how people respond to and process information at their disposal.

Other studies that cannot be explained as artifacts

Two studies have examined the group form of unrealistic comparative optimism yet are by their very nature not subject to an artifact interpretation. In the first study, 62.5% of participants in a Phase 1 clinical trial reported that they were more likely than the average participant to experience health benefits from the trial (Jansen et al., 2011). These reports occurred even though it was clearly explained at the outset of the study (and most patients reported understanding) that the purpose of the trial was to determine the feasibility of conducting a randomized clinical trial in the future and that the treatment offered little likelihood of any health benefits. Because health benefits for all participants were effectively zero, the findings cannot be explained by minority undersampling (there was no undersampling of people who would not receive benefits), scale attenuation (even a dichotomous scale would be sufficiently sensitive to uncovering effects), or to base-rate regression (the base rate for everyone was 0%).

In the second study, people rated equivalent groups differently depending on the context. Students at two equivalent universities who rated eight negative events estimated their own risk ($M = 25.6\%$) and the risk of fellow students from their university ($M = 25.6\%$) to be the same, but they rated the risk of students at the other university as higher ($M = 28.3\%$; P. Harris et al., 2000). Participants made estimates for several common events (controlling for minority undersampling) using a 100-point probability scale (controlling for scale attenuation). More important, however, the findings themselves cannot be explained by the three artifacts, which predict that participants would show unrealistic comparative optimism relative to students at both their university and the other university. None of the three artifact accounts explains why introducing a new comparison group should eliminate the comparative optimism typically seen when people compare their risk to that of people at their own university.

Boundary Conditions on Unrealistic Optimism

We do not suggest that unrealistic optimism occurs at all times for all events. Research reveals a number of moderators or boundary conditions that influence the extent to which people display unrealistic optimism. People are most likely to display unrealistic absolute optimism about their future when they anticipate no imminent challenge to their predictions and when they believe that they can control the outcome (Carroll, Sweeny, & Shepperd, 2006). For example, students often overestimate the score they will receive on a forthcoming exam when the exam is several weeks away. However, as the day of the exam draws near, they tend to shelve their optimistic forecast for a more realistic one. On the day the scored exams are returned, students abandon their optimism in favor of pessimism (Shepperd et al., 1996). In such instances, concerns with accountability and with bracing for bad news become preeminent.

Research also shows that a variety of factors can reduce unrealistic absolute optimism, including having people “unpack” their task completion estimates (i.e., asking them to estimate the time to complete each part of a task; Kruger & Evans, 2004) and giving people base-rate information (Rothman et al., 1996; Sweeny & Shepperd, 2007; Weinstein & Lyon, 1999). Other research finds situations in which people are decidedly pessimistic. For example, people often overestimate their absolute risk for rare events (Chambers et al., 2003; Kruger & Burrus, 2004; Price, Pentecost, & Voth, 2002) and for highly publicized risks such as breast cancer (Lipkus et al., 2005), colon cancer (Weinstein, Atwood, et al., 2004), and AIDS (van der Velde, van der Pligt, & Hooykaas, 1994).

Several studies reveal boundary conditions for unrealistic comparative optimism. For example, a review of the literature (Helweg-Larsen & Shepperd, 2001) revealed that people show less unrealistic comparative optimism at the group level when (a) the event is uncontrollable, (b) people have prior experience with the event, (c) feedback is proximal, and (d) the comparison is with close others as opposed to distant others. And, in contrast to the findings for unrealistic absolute optimism, researchers find that people typically display *greater* unrealistic comparative optimism for rare negative events than for common negative events. Indeed, a number of studies find something akin to unrealistic comparative pessimism for common negative events (Chambers et al., 2003; Kruger & Burrus, 2004; Price et al., 2002), a finding that appears to arise largely from egocentric thinking, in that people fail to recognize that common events are not only likely to happen to them but also likely to happen to other people.

The fact that unrealistic optimism is responsive to psychologically rich environmental forces such as controllability, personal experience, and outcome proximity suggests that unrealistic optimism is not easily reducible to a statistical artifact, and offers even further evidence that unrealistic optimism is a robust human characteristic.

Questions That Remain

Our identification of four categories of unrealistic optimism raises questions about the extent to which the different types of optimism are similar. Our answers to these questions are largely speculative and speak to a need for more research, because few studies have assessed multiple types of unrealistic optimism simultaneously.

Conceptual distinctions among types of unrealistic optimism

The first question is whether the four types of unrealistic optimism are really different or whether they merely differ in measurement but otherwise represent a single underlying construct. We suspect that the difference between the two forms of unrealistic absolute optimism (i.e., individual vs. group) is simply one of measurement. Each represents a bias in judgment relative to some objective standard. Although measured differently, they nevertheless are likely to be highly correlated and interchangeable. We suspect the same is true for the two forms of unrealistic comparative optimism (i.e., individual vs. group); they differ in how they are measured but probably are tapping the same underlying construct. It is noteworthy that our suspicions lack empirical demonstration. It remains to be seen whether the individual and group forms of unrealistic absolute and unrealistic comparative optimism merely reflect measurement differences.

We suspect that unrealistic absolute optimism and unrealistic comparative optimism reflect different underlying constructs. With unrealistic absolute optimism, people make a single judgment—their personal risk—typically on a numerical scale. That judgment is then compared with an external, objective representation of their actual risk, about which they are likely to have only a vague sense. With unrealistic comparative optimism, people ostensibly make two judgments—their personal risk and the risk for someone else—both typically on a verbal scale. In some instances of unrealistic comparative optimism, people do make a single judgment, but that single judgment reflects an evaluation of how their personal risk compares with the risk of someone else (e.g., “How does your risk compare with the average person’s risk?”). Either way, there is no externally derived, objective standard. Thus, with unrealistic comparative optimism, people can be inaccurate in their personal estimate, their

comparison target estimate, or both. By contrast, with unrealistic absolute optimism, people can be inaccurate only about their personal estimates.

Prevalence

The second question is whether the different types of unrealistic optimism differ in their prevalence. We suspect that laypeople's absolute risk estimates are largely guesses for most events and are responsive to contextual factors. For instance, the more information people have about their own risk and the objective standard (e.g., base-rate information), the less likely it is that they will show unrealistic absolute optimism. Indeed, unrealistic absolute optimism sometimes can be difficult to find in research, in part because people overestimate small probabilities, and many negative events are relatively rare. In contrast, unrealistic comparative optimism is quite robust. Although researchers have identified a variety of conditions that influence the occurrence of unrealistic comparative optimism (Helweg-Larsen & Shepperd, 2001), and it, too, is responsive to base-rate information (K. M. Taylor & Shepperd, 1998), it can be quite difficult to eliminate (Weinstein & Klein, 1995). It is thus likely to be more prevalent and more resistant to intervention.

We do not wish to imply that comparative predictions are never accurate. Fast runners in a marathon can accurately predict that they are likely to finish the race sooner than the average runner, whereas slow runners can accurately predict that they are likely to finish the race later than the average runner. In a similar vein, people may understand risk in a relative sense. For example, they may know that they are more at risk for heart disease than cancer even if they overestimate (or underestimate) the risk of both outcomes. In this sense, people may be generally accurate in comparative estimates irrespective of the accuracy of their absolute estimates.

Causes

Third, do the different types of optimism have different causes? Three decades of research on unrealistic optimism suggest that cognitive, affective, and motivational factors likely contribute to both unrealistic absolute optimism and unrealistic comparative optimism. However, the specific factors that give rise to the two forms of unrealistic optimism and their ultimate effects can vary. To illustrate, many of the causes of unrealistic comparative optimism (e.g., representativeness heuristic, person-positivity bias, underestimating other's control) arise from how people think about the comparison target such as the average person (Shepperd et al., 2002). These causes do not apply to unrealistic absolute optimism because unrealistic absolute optimism does not entail making an

estimate for a comparison target. Of course, there are some causes that can contribute to both unrealistic absolute and unrealistic comparative optimism, including self-enhancement and overestimations of personal control (Shepperd et al., 2002). Few studies have explored both unrealistic absolute and unrealistic comparative optimism simultaneously, and thus a clear understanding of how different causes may influence the two forms of unrealistic optimism awaits further research.

Situational determinants

Fourth, do the different types of optimism manifest in different situations? Although more research is needed on this question, some evidence suggests that the situational factors that elicit unrealistic absolute optimism may also elicit unrealistic comparative optimism. For instance, unrealistic absolute optimism and unrealistic comparative optimism are likely to be more common when people perceive that events are under personal control (Carroll et al., 2006; P. Harris, 1996; C. T. F. Klein & Helweg-Larsen, 2002) and when they believe that their estimates will go unchallenged (Sweeny & Shepperd, 2007). Finally, evidence suggests that negative mood and prior experience with a negative event can decrease both unrealistic absolute optimism and unrealistic comparative optimism, primarily because both seem to affect personal risk estimates rather than risk estimates for others (Helweg-Larsen & Shepperd, 2001). However, not all studies have replicated this mood effect (Drace et al., 2009).

We know of at least one situational factor—the extent to which an event is rare—that has opposite effects on unrealistic absolute and unrealistic comparative optimism. People appear particularly inclined to show unrealistic comparative optimism for low-frequency, negative events, a finding that seems largely attributable to ego-centric thinking (Chambers et al., 2003; Eiser et al., 2001; Klar & Giladi, 1997; Kruger, 1999; Kruger & Burrus, 2004; Price et al., 2002). Thus, when people compare personal risk estimates with their risk estimates for the average person, they appear optimistic. However, when their personal risk estimates for rare negative events are compared with base rates, people appear pessimistic, apparently because of a poor understanding of probability and small numbers (Lyon & Slovic, 1976). That is, people recognize that their chance of experiencing a rare event is small yet fail to appreciate just how small that chance is. Thus the same rare event may prompt unrealistic comparative *optimism* and unrealistic absolute *pessimism*. The reverse is also possible for rare positive events: People often fail to recognize the rarity of low-frequency positive events and thus overestimate the likelihood that the positive event will happen to them (demonstrating unrealistic absolute optimism). However,

they often simultaneously conclude that because the event is unlikely to happen to them, it is also less likely to happen to them than to others (demonstrating unrealistic comparative pessimism).

Consequences

Fifth, do unrealistic absolute and unrealistic comparative optimism have different consequences? This question is perhaps most important because of the common assumption that unrealistic optimism may place people at risk for negative outcomes. A central component of several psychological models of health, such as the Health Belief Model and Protection Motivation Theory, is that people must perceive themselves as at risk before they undertake positive health behaviors (Maddux & Rogers, 1983; Rogers, 1975; Rosenstock, 1990). Moreover, evidence suggests that people are less likely to take precautions if they perceive their absolute risk as low (Floyd, Prentice-Dunn, & Rogers, 2000; Janz & Becker, 1984). The implication is that unrealistic absolute optimism about one's health can undermine preventive health behaviors. Consistent with this notion is the finding that smokers who exhibit unrealistic absolute optimism reported lower intentions to quit smoking (Dillard, McCaul, & Klein, 2006).

These effects for unrealistic absolute optimism may extend beyond health outcomes. For example, unrealistic absolute optimism may lead to insufficient preparation to complete tasks. In addition, to the extent that it produces the planning fallacy, unrealistic absolute optimism can lead to inadequate allocation of time to complete tasks, which can lead to its own set of problems (Buehler, Griffin, & Ross, 1994). In addition, unrealistic absolute optimism can lead to disappointment, regret, and other problems when outcomes fall short of expectations (Carroll et al., 2006). For example, one study found that students who were unrealistically optimistic in their exam-score estimates reported increases in negative affect after receiving their score, whereas participants who were realistic or pessimistic in their estimates reported a decrease in negative affect after receiving their score (Sweeny & Shepperd, 2010). Another study revealed that college students who displayed unrealistic absolute optimism about their academic performance suffered declines in self-esteem and well-being over time (Robins & Beer, 2001).

We would be remiss if we did not acknowledge possible benefits of unrealistic absolute optimism. Evidence suggests that dispositional optimism offers a number of benefits including greater goal persistence, positive affect, and hope (Armor & Taylor, 1998; Scheier & Carver, 1988). It stands to reason that unrealistic absolute optimism may offer similar benefits. Moreover, one study found that men infected with HIV who were unrealistically

optimistic reported more healthful behavior than did men infected with HIV who were not unrealistically optimistic (S. E. Taylor et al., 1992).

Regarding unrealistic comparative optimism, some evidence suggests that unrealistic comparative optimism can have more subtle and worrisome consequences. For instance, one study found that middle-aged adults who displayed unrealistic comparative optimism about their risk of a heart attack were also less knowledgeable about the risk factors for heart disease, less able to retain new information, and less worried about having a heart attack (Radcliffe & Klein, 2002). Another study offered suggestive evidence that unrealistic optimism about the time to complete an easy (vs. difficult) task corresponded with wagering more money on the outcome of a trivia test (Moore & Small, 2007). Perhaps most persuasive are the results of an experimental study that actually manipulated rather than measured unrealistic comparative optimism, thus permitting a clearer understanding of the causal relationship. People who were led to believe that their risk of causing an automobile accident was below (as opposed to above) average reported lower intentions to use seat belts, to drive more slowly on the freeway, and to use public transportation (W. M. Klein, 1997).

It is noteworthy that many of the studies of unrealistic comparative optimism, as well as many of the studies of unrealistic absolute optimism, are correlational. That is, the researchers measured comparative or absolute risk judgments and correlated these judgments with health behaviors. We cannot establish from these correlational studies whether unrealistic optimism influenced the behaviors, whether the behaviors produced the optimism, or whether a third variable produced both (Weinstein & Nicolich, 1993). Also, given that comparative risk ratings can be accurate or inaccurate even if they are low, one cannot use a correlation between comparative optimism and a behavior to infer anything about the behavioral consequences of unrealistic optimism. Studies that manipulate unrealistic optimism and observe the consequences are sorely needed.

Just as important as the need for experimental studies that manipulate unrealistic optimism is the need for studies that examine behavior. Few studies link unrealistic optimism to actual behavior, let alone examine whether unrealistic absolute and unrealistic comparative optimism have different behavioral consequences. The evidence is clear that when outcomes fall short of optimistic expectations, unrealistic optimism can lead to negative emotional consequences, such as negative affect and declines in self-esteem (Robins & Beer, 2001; Sweeny & Shepperd, 2010), and can influence behavior intentions. However, evidence linking unrealistic optimism to behavior remains thin. The meager evidence leads to some sobering questions. For example, what difference does it make that

people underestimate their risk for cardiovascular disease or having radon gas problems if there are no behavioral consequences? Why does it matter that smokers perceive themselves as being at lower risk for smoking-related illnesses than similar smokers if it does not influence smoking rates or quitting? Although unrealistic optimism *may* have behavioral consequences, the behavioral consequences need empirical demonstration.

Summary and Conclusions

Unrealistic optimism is not a unitary construct. Rather, evidence suggests four distinct types of unrealistic optimism that vary according to the standard of comparison (an objective standard vs. other people) and the level of analysis (individual vs. group). As many researchers in this area are already aware, different measurement approaches to unrealistic optimism are influenced by different variables and can represent different psychological constructs (W. M. P. Klein & Zajac, 2009; Shepperd et al., 2002).

The need for consistent terminology

Our review should be viewed as a call for researchers to take greater care in their use of terminology. First, although we have used the terms ourselves on occasion, it may be time to retire the terms *optimistic bias*, *optimism bias*, *overoptimism*, and *illusion of unique invulnerability*. Researchers have used these terms to refer to the tendency for people to believe that they are more likely to experience positive events and less likely to experience negative events than a comparison group, but the terms are too imprecise to be useful (Shepperd et al., 2002). The term *illusion of unique invulnerability* is particularly problematic because it is not clear that the judgment represents an illusion, is unique, or should be interpreted as conveying perceptions of invulnerability. Fortunately, we have found only a few instances of researchers using this term. Regarding *optimism bias*, *overoptimism*, or *optimistic bias*, the difference in estimates for oneself versus others may arise from distortions in personal estimates, distortions in estimates for others, or both. For example, people may be pessimistic in their personal estimates and even more pessimistic in their estimates for the average person—leading to comparative optimism. In such instances, optimism exists only in a relative sense, and it is potentially misleading to label the distortion as optimism when the estimates could actually represent varying degrees of pessimism.

We advocate that researchers adopt common terminology to refer to different operations of optimistic outcome expectations and believe that common terminology will help the area in many ways. We suggest that the terms *unrealistic absolute optimism* and *unrealistic comparative optimism* describe the relevant phenomena adequately.

Unrealistic absolute optimism conveys the idea that the expectation is unrealistic and optimistic relative to an objective standard, whereas *unrealistic comparative optimism* conveys the idea that the expectation is unrealistic and optimistic relative to the estimates a person makes for other people. At present, readers cannot determine with certainty from the title, the list of key terms, or sometimes even the abstract, which type of optimism researchers are examining in a given study. Using consistent terminology will expedite literature searches, reduce the possibility of researchers generalizing or drawing conclusions from findings regarding one type of optimism to other types of optimism, and reduce the likelihood that researchers erroneously criticize one type of optimism based on shortcomings in research on a second, empirically distinct type of optimism.

Addressing the artifact criticisms

Our review also reveals that recently proposed artifact explanations are not nearly as problematic as they might seem. Scale attenuation is potentially relevant, but there is scant direct evidence of bias from ceiling effects in this body of research, and unrealistic optimism remains when scales are unrestricted. In addition, careful examination reveals that minority undersampling is not relevant to any of the ways in which unrealistic optimism is actually assessed, and base-rate regression does not seem to be an artifact at all. Finally, the artifacts largely pertain to only one of the four types of unrealistic optimism—unrealistic comparative optimism at the group level. Moreover, several studies demonstrating this form of unrealistic optimism cannot be explained in terms of statistical artifacts. Researchers should always attempt to minimize the potential influence of artifacts to avoid interpretational ambiguity. Indeed, we believe that some of the basic findings of comparative optimism, such as the conditions that moderate the effect, deserve replication, and careful attention should be given to controlling for the purported statistical artifacts.

In some instances, the influence of variables other than the tendency to downplay personal risk may keep a particular measurement approach from revealing unrealistic optimism. An example is the overestimation of the base rate of colon cancer, which leads people to overestimate their probability of developing this disease despite their claim that their risk is below that of their peers. However, the collective evidence suggests that their unrealistic comparative optimism about colon cancer is real, strong, and quite robust (Rothman et al., 1996).

To minimize artifact criticisms, we recommend that researchers take the following precautions in designing studies. Our recommendations are specific to research on unrealistic comparative optimism because this form of optimism has received the most criticism by proponents

of the artifactual explanations (A. J. L. Harris & Hahn, 2011). Our recommendations must also be viewed cautiously for reasons we discuss. First, researchers should be as specific as possible in describing the comparison group. Asking people to compare their risk with that of the “average person” is too vague to be useful. When possible, researchers should direct people to compare their risk with that of the average person of their same age and sex in their community, at the university (if students), or participating in the research study. Constraining the comparison target eliminates interpretational ambiguity that arises from not knowing who people are thinking about when making comparative judgments. However, we acknowledge that this recommendation may be problematic if constraining the comparison target leads to unnatural or cumbersome wording of survey items. The recommendation may also be problematic when constraining the comparison target undermines the investigator’s research goal.

Second, when reasonable, researchers should use separate scales to assess participants’ estimates of their personal risk judgments and a comparison group’s risk, thereby permitting examination of which judgments change in response to experimental manipulations. research must recognize that indirect comparative judgments are not synonymous with direct comparative judgments (Ranby et al., 2010). Moreover, there are likely to be circumstances in which direct comparative judgments are preferable to indirect comparative judgments.

Third, when possible, researchers should examine risk perceptions using more than one scale (e.g., a 0–100% plus a Likert-type subjective probability scale). A 0%-to-100% scale eliminates range restriction as a potential artifact. Researchers must be careful, however, not to overinterpret mean responses on this scale because of people’s poor numeracy skills and their idiosyncratic use of percentage scales (Bruine de Bruin & Carman, 2012; Cameron, Sherman, Marteau, & Brown, 2009). A Likert-type scale can create a range restriction, but is less susceptible to innumeracy problems. By including both scales in research, investigators can be more confident in their findings if results are consistent across the two scales.

Conclusions

The measurement and conceptualization of unrealistic optimism has become much richer and more complex over the past several years, which necessitates a more nuanced treatment of the role that moderating variables and artifacts might play. For instance, although people show a strong tendency toward unrealistic optimism in predictions, when people make absolute judgments, mistaken beliefs about the absolute sizes of risks can sometimes mask the tendency toward optimism, especially

when people make numerical judgments. This tendency leads to underestimation of personal risk for some events and to overestimation of personal risk for others. When people make comparative judgments, however, the wealth of evidence for unrealistic optimism is clear and consistent and cannot be easily explained by statistical artifacts. Thirty years of research has illuminated the prevalence, causes, moderators, and consequences of unrealistic optimism. We hope that the next generation of research in this area witnesses more experimental work, more research on moderators and behavioral consequences, and more efforts to reduce unintended negative consequences of unrealistic optimism.

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Note

1. This example illustrates unrealistic comparative optimism in that personal estimates ($M = 21.1\%$) averaged lower than estimates for the average same-sex person ($M = 42.7\%$). It also illustrates unrealistic absolute optimism in that personal estimates averaged lower than the population base rate of 38%.

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