Are Comparative Risk Judgments Consistent Across Time and Events?

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Research reveals pervasive optimism in people's comparative risk judgments such that people believe they are less likely than others to experience negative events. Two studies explored the extent to which people are consistent in their comparative risk judgments across time and events. Both studies found strong evidence for consistency across time and some evidence for consistency across events. The consistency across time and events was moderated by experience. Specifically, when viewed together, the studies suggest that experience produces an initial decrease in the consistency of comparative judgments (Study 2), followed by greater consistency in subsequent judgments (Study 1). The discussion focuses on reconciling evidence demonstrating consistency with evidence demonstrating variability.

Keywords: *comparative optimism; risk judgments; judgment consistency*

Investigations of how people evaluate their risks reveal remarkable predictability in comparative risk judgments, with people displaying a consistent optimistic bias. People believe that they are less likely than others to experience a variety of negative events, ranging from heart disease to divorce (Weinstein, 1980). Moreover, the optimistic bias (also called comparative optimism) in risk judgments seems generally resilient to change, withstanding a number of interventions designed to reduce it (Weinstein & Klein, 1995). The optimistic bias also appears quite widespread, extending even to people who engage in risky behavior and fail to take precautions. For example, people who engage in behaviors such as suntanning, smoking, and unprotected sex believe, respectively, that they are at lower risk for negative outcomes such as skin cancer, lung cancer, and sexually transmitted diseases (STDs) than their peers who engage in these same behaviors (Eiser, Eiser, & Pauwels, 1993; Segerstrom, McCarthy, Caskey, Gross, & Jarvik, 1993; van der Velde, Hooykaas, & van der Pligt, 1992). In addition, the optimistic bias appears at all income levels and in all age groups (Weinstein, 1987), across levels of intellectual ability (Klaczynski & Fauth, 1996), and across different occupations (Weinstein, 1987).

The persistence and pervasiveness of comparative optimism suggests that the bias is generally stable. Yet, researchers examining comparative risk judgments for various events typically focus on the mean risk judgments for an event rather than on individual responses. What researchers have not explored is the extent to which individuals are consistent in their individual comparative risk judgments across events and over time. It is possible that most people not only display optimism in their comparative risk judgments but that they are optimistic irrespective of the event examined. That is, people who are comparatively optimistic about their risk of heart disease also might be comparatively optimistic about their risk of suicide, crime, and car accidents. On the other hand, the consistent optimistic bias found

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across different events may belie an underlying variability in risk estimates. Whereas the mean comparative risk judgments of a group of people may indicate an optimistic bias for a variety of events, the responses of any one individual might be quite variable. A given individual may show optimism for some events, realism for other events, and pessimism for still other events.

Addressing whether people are consistent versus variable in their comparative risk estimates is important for several reasons. First, it can offer hints as to how people make judgments about their risk, whether people make quick, global judgments versus deliberative judgments in which they weigh relevant evidence. Second, to the extent that people are consistent across time and events in their comparative risk judgments, it suggests that these judgments may be an indicator or proxy for some underlying disposition such as depression, dispositional optimism, anxiety, or perceived control. Third, if comparative risk judgments are largely stable, then attempts to eliminate it (perhaps in the hopes of making people perceive their risk more accurately and, as a consequence, take more precautions) may be short lived, or researchers may need to undertake more dramatic or powerful manipulations. Fourth, most research on comparative risk judgments and unrealistic optimism focuses on one-time static judgments about distal outcomes, and many researchers collapse ratings across events or study isolated events. Thus, it is difficult to know from other investigations whether comparative risk judgments are consistent across time and events. Yet, this information is crucial because it speaks to the nature of these judgments, such as the extent to which they are meaningfully constructed, the extent to which they are trait driven, and whether they are able predictors of subsequent behavior. Finally, comparative risk judgments are regarded as important because researchers have proposed a link between comparative risk judgments and important outcomes such as health and well-being (S. E. Taylor & Brown, 1988) and precautionary behavior (Weinstein, 1982). It would seem that the link between comparative risk judgments and these outcomes is a cause for concern only to the extent the judgments are stable. If the judgments vary across time and events, presumably in response to changes in experience or risk-relevant behavior, it would suggest that comparative optimism is not a crucial factor in determining health behaviors.

The present study explored the extent to which people are consistent in their comparative risk judgments across time and events. Of importance, we can imagine several reasons why people should be consistent in their comparative risk judgments. However, we also can imagine several reasons why people should be inconsistent. As such, our goal was not to identify why people are or are not consistent but rather, whether people are or are not consistent.

Reasons for Consistency in Comparative Risk Judgments

Several reasons lead us to anticipate that people might be consistent in their comparative risk judgments across time and events. First, some researchers have argued that many social judgments are made globally without reference to diagnostic information and without much contemplation or deliberation (W. M. Klein, 2001). Indeed, some investigators have argued that judgments of comparative standings have a heuristic quality, with people responding reflexively and with little thought when making such judgments (Alicke, Klotz, Breitenbecher, Yurak, & Vredenburg, 1995). Stated otherwise, people might have an almost knee-jerk tendency to perceive themselves as better than average irrespective of the trait or event under investigation, relying on quick decision rules such as a "better-than-average heuristic." The decision rule may amount to nothing more than establishing a set distance between their personal risk estimate and their estimate of the risk of the average person. Yet, it permits the speedy conclusion that others are at greater risk. If people respond globally or heuristically when making comparative judgments, then presumably they will be relatively consistent across time and events in their comparative risk judgments.

Second, researchers find that comparative risk judgments correlate reliably with individual differences measures such as depression and trait anxiety (see Helweg-Larsen & Shepperd, 2001, for a review). People who are dispositionally anxious or who score high on depression inventories typically display less comparative optimism than people who are not dispositionally anxious or score low on depression inventories. It is possible that comparative risk judgments tap some underlying stable and enduring trait dimension. The consequence would be consistency in comparative risk judgments over time and across events.

Third, researchers who examine comparative risk judgments often treat different risk events as equivalent and interchangeable. When reporting results, some researchers have summed or averaged comparative risk judgments made for several events (Hoorens & Buunk, 1993; Murray & Holmes, 1997; Otten & van der Plight, 1996; Shepperd, Findley-Klein, Kwavnick, Walker, & Perez, 2000; Zakay, 1984). Presumably, researchers combine different events because they assume that the same process underlies risk judgments for all events. Unless researchers have a specific interest in risk estimates for individual events, by summing or averaging across events, researchers can simplify the presentation of their results and reduce the likelihood of the Type I error. The

assumption researchers make is that research participants do in fact perceive and respond to different events similarly and will be consistent across events (and perhaps also over time) in their risk judgments.

Reasons for Variability in Comparative Risk Judgments

Although we can imagine several reasons for consistency in comparative risk judgments, there also is ample reason to expect that people will vary across time and events in their comparative risk judgments. First, research suggests that transient affective states can influence comparative risk judgments. For example, several studies find that people display less comparative optimism when induced to experience a negative mood than when induced to experience a positive mood (e.g., Abele & Hermer, 1993; Salovey & Birnbaum, 1989). These findings suggest that comparative risk judgments are contingent on people's mood states and may fluctuate across time in response to mood. The findings also suggest consistency across events in comparative judgments at any given point in time because mood states would presumably affect judgments at the same point in time similarly.

Second, although people display comparative optimism for some events, they do not do so for all events. A number of studies find that the less controllable people perceive an event, the less comparative optimism they display (Harris, 1996; C. T. F. Klein & Helweg-Larsen, 2001). For instance, in a study by McKenna (1993), people estimated their risk of experiencing a car accident as greater when they were a passenger (and thus had little control over the car) than when they were the driver. Thus, the research on perceived control suggests that people will vary across events in their comparative risk judgments. On the other hand, perceived control should lead to consistency over time to the extent that perception of control over an event remains invariant over time. For example, a person who perceives his or her weight as under personal control today is also likely to perceive weight as under personal control a year from now.

Third, research reveals that comparative risk judgments vary with experience such that people who have prior experience with an event display less comparative optimism than do people with no prior experience (Burger & Palmer, 1992; Dolinski, Gromski, & Zawisza, 1987; van der Velde et al., 1992; van der Velde, van der Pligt, & Hooykaas, 1994; Weinstein, 1980). Thus, for example, victims of tornadoes display less comparative optimism about their future risk of experiencing a tornado than do nonvictims (Weinstein, Lyon, Rothman, & Cuite, 2000). One implication is that experience will lead to inconsistency in comparative risk judgments over time, with people who experience an event displaying different comparative risk judgments before an event compared with after the event. On the other hand, experience with an event also might lead to greater subsequent temporal consistency in comparative risk judgments. Specifically, research on attitudes suggests that experience can lead to greater consistency by making relevant cognitions more accessible (Fazio, 1986), providing an anchor for subsequent cognitions (Zanna, Fazio & Ross, 1994), and leading to more elaborate processing of information and thus more persistent beliefs (Petty & Cacioppo, 1986).

Fourth, people often attend to their risk-relevant behavior when making comparative risk judgments. Smokers, for example, recognize that they face greater risk for smoking-related illnesses than do nonsmokers (Lee, 1989; McKenna, Warburton, & Winwood, 1993; Segerstrom et al., 1993). Examination of the literature reveals that the most common finding is that engaging in risky behavior is associated with less comparative optimism (Cohn, MacFarlane, Yanez, & Imai, 1995; Gladis, Michela, Walter, & Vaughan, 1992; Hansen & Malotte, 1986; W. M. Klein, 1996, Study 2; Lee, 1989; McKenna et al., 1993; Miller, Ashton, McHoskey, & Gimbel, 1990; Moore & Rosenthal, 1991; Riche & Thelen, 1990; Sparks, Shepherd, Wieringa, & Zimmermanns, 1995; Strecher, Kreuter, & Kobrin, 1995; van der Velde et al., 1992, 1994; Weinstein, 1987; although see Gerrard, Gibbons, & Warner, 1991; Gerrard & Warner, 1994, for exceptions). Thus, comparative risk judgments covary with people's risk behavior. The implication is that comparative risk judgments will vary over time to the extent that people change their risky behavior.

Finally, some evidence suggests that people will alter their risk judgments when they anticipate receiving information bearing on the accuracy of the judgments. Moreover, as the "moment of truth" draws near, people may shift from an optimistic outlook to a realistic or even pessimistic outlook (Shepperd, Ouellette, & Fernandez, 1996). For example, participants in one study estimated their risk of having a medical condition with serious consequences on two occasions. On the first occasion, participants believed they would receive their test results at a later date. On the second occasion, participants believed they would receive their test results in a few moments. Participants displayed less comparative optimism at the moment of truth than when they believed they would receive their results at a later date (K. M. Taylor & Shepperd, 1998). The research on risk judgments at the moment of truth suggests that comparative optimism declines in the face of impending feedback about the accuracy of one's judgments. Of importance, other research suggests that people discriminate in their risk judgments at the moment of truth, displaying less com-

parative optimism for events for which they anticipate information but not for events for which they anticipate no information (Butler & Mathews, 1987). This latter finding suggests that people will display consistency only for events for which they anticipate no information.

The Present Research

With these issues in mind, we examined the consistency of comparative risk judgments in two studies. We sought to address two questions. First, to what extent are people consistent in their comparative risk judgments across time and events? As noted earlier, there are both empirical and theoretical reasons to expect either consistency or variability. Second, are comparative risk judgments consistent irrespective of changes in personal experience? We focused on prior experience because of considerable evidence suggesting that it moderates comparative risk judgments.

Study 1 drew from data published in a previous article examining comparative risk judgments following the 1994 Northridge earthquake in California (Helweg-Larsen, 1999). College students supplied risk judgments for 10 events at eight points in time, allowing us to examine the consistency of comparative risk judgments across events and over time. In addition, we collected information regarding participants' personal experience with the Northridge earthquake, thereby allowing us to examine whether personal experience moderated the consistency of participants' comparative risk judgments regarding experiencing injury in an earthquake.

Study 2 examined the consistency of comparative risk judgments among college women on two occasions separated by 2 months. Study 2 also examined comparative risk judgments for two types of events. Traditionally, researchers studying comparative risk judgments have examined events such as suicide, colon cancer, and depression. Although these events typically elicit comparative optimism, they often occur in the distant future and, in some cases, are uncommon. Participants typically have little personal experience with the events. We examined these traditional negative events in Study 2. However, we also included a second set of events that we believed would be commonplace among college students (e.g., failing an exam, experiencing a hangover). Including these more common events allowed us to examine more closely the effect of personal experience on the consistency of comparative risk judgments.

The persistence and pervasiveness of comparative optimism led us to predict that people would generally be consistent in their risk judgments across time and events. However, we also predicted that experience with an event would lead to a decline in comparative optimism. The result would be less consistency in comparative judgments among participants who experienced versus did not experience the event during the intervening period. On the other hand, we predicted that experience could lead to greater subsequent consistency in people's comparative risk judgments. Specifically, based on research and theorizing on attitudes showing that attitudes grounded in experience are more stable and resistant to change (Fazio, 1986; Petty & Cacioppo, 1986; Zanna et al., 1994), we predicted that having a memorable, consequential experience with an event would elicit even greater consistency in comparative risk judgments. In short, we predicted that experience would produce an initial adjustment in comparative risk judgments after the experience compared with before the experience but then would lead to even greater subsequent consistency in judgments.

STUDY 1

Method

Overview. Participants responded to a series of questions about their risk perceptions immediately after the 1994 Northridge earthquake. The earthquake occurred in Northridge, California (outside Los Angeles), on January 17, 1994, at 4:31 a.m. Pacific Standard Time. The earthquake measured 6.7 on the Richter scale and lasted about 20 s. It was the nation's most costly earthquake, with a final toll at $12.5 billion (Noble, 1996). University of California, Los Angeles (UCLA), undergraduates provided comparative risk judgments four times during in-class sessions (1, 3, 5, and 7 weeks after the earthquake) and four times over the phone (11-12, 12-14, 15-16, and 17-19 weeks after the earthquake). A full report of these measures and results is available in Helweg-Larsen (1999).

Participants. One week after the earthquake, undergraduate students (47% men and 53% women), age 18 to 49 ($M = 23$, *Mdn* age = 21) were recruited from a psychology course at UCLA. Forty-seven percent of the participants were White, 6% Black, 22% Asian, 16% Chicano or Hispanic, and 9% other ethnicities. The initial sample size declined from $n = 100$ at Time 1 (T1) to $n = 24$ at T8. Participation during all sessions was voluntary.

Materials. Participants rated their comparative risk for 10 events using the direct method (Weinstein & Klein, 1996). The first item read, "Compared to the typical UCLA college student of my gender, my chances of getting a drinking problem in the future are . . . ." The 7-point scale ranged from 1 (*much less than the typical UCLA student's chances*) to 4 (*the same as the typical UCLA student's chances*) to 7 (*much more than the typical UCLA student's chances*). The items assessing the other 9 events used the same wording and were (in order): getting seriously injured in a fire, getting a heart attack, getting a divorce,

getting seriously injured in a flood, getting HIV, getting seriously injured in an earthquake, getting hypertension, getting mugged, and having (or causing) an unplanned pregnancy.

Finally, participants responded to items designed to assess experience with the Northridge earthquake. The items assessed personal experience with injury ("Who do you know who was injured in the earthquake: no one, acquaintances, close friends or relatives, me"), monetary damage ("How much money did you personally lose as a result of damage caused by the earthquake"), and damage in the area they lived (5-point scale from 1 = *none* to 5 = *a great deal*). We used the same 5-point scale to assess how much their daily lives were inconvenienced by the earthquake and how much stress they experienced because family members or friends in the area were injured in the earthquake or because their homes were damaged or could not be reached. Of note, because the study focused primarily on the earthquake, no items were included to assess experience with the other nine events.

Procedure. For the first four sessions (T1-T4), participants responded to the items during class. We ensured anonymity in responses by having participants create a unique code number at T1 that they reconstructed for all subsequent session. Participants who agreed at T4 to continue participation for the remaining four sessions (T5-T8) provided their phone numbers (but not their names) and were contacted by trained interviewers who asked to speak to the person who "had political psychology last quarter."

Result

As noted earlier, portions of the data for Study 1 were published previously. As reported by Helweg-Larsen (1999), participants showed no comparative optimism in risk judgments for earthquake injury at any of the eight time periods. By contrast, participants display comparative optimism in their judgments for the other nine events at all eight time periods.

To explore whether participants were consistent across events in their comparative risk judgments, we intercorrelated the 10 risk estimates at Time 1, yielding 45 correlations. We then computed the average of these 45 correlations. We repeated this procedure for the remaining seven time periods. The results appear in Table 1 and reveal only modest evidence for consistency. It would appear that participants are not particularly consistent across events in their comparative risk judgments.

To explore whether participants were consistent across time in their comparative risk judgments, for each participant we correlated the comparative risk estimates for the 10 events at Time 1 with the comparative risk estimates for the same 10 events at Time 2. The average correlation was high, $r(57) = .72$, range = .00 to .98. A repeat of these procedures comparing comparative risk estimates at Time 1 and Time 4 also yielded a sizable average correlation, $r(54) = .65$, range = .00 to 1.00. Together, these findings suggest that although participants were only modestly consistent in their comparative risk judgments across items, on average, they were quite consistent across time.

TABLE 1: Mean Correlation Among the 10 Risk Items (Study 1)

	n	M
Time 1	99	.19
Time 2	74	.29
Time 3	70	.29
Time 4	55	.33
Time 5	29	.23
Time 6	27	.24
Time 7	28	.24
Time 8	24	.19

NOTE: The average correlation was significantly different from zero ($p < .0001$) at all eight time periods.

Experience and the consistency of comparative risk judgments. We explored whether experience with an event affects the consistency of comparative risk judgments across events and time. Because all participants were in Los Angeles during the earthquake, they all had some personal experience with the earthquake. However, we distinguished between participants who experienced less serious consequences (less experience) from participants who experienced more serious consequences (more experience). Because of insufficient data, we examined whether less versus more experience moderated consistency in comparative risk judgments only for the first four time periods. As noted earlier, we predicted that participants with more experience with the earthquake would show greater consistency in their risk judgments than would participants with less experience.

Consistent with Helweg-Larsen (1999), we operationalized earthquake experience in three ways. First, we asked participants how much money they personally lost as a result of the earthquake. The range in monetary loss was considerable ($0-$10,000). To simplify analysis, we drew a distinction between participants who lost nothing (less experience) and participants who lost $100 or more (more experience). The analysis excluded 9 participants with losses falling between $0 and $100. Eliminating these participants reduced our power somewhat. However, it drew a cleaner distinction between the more and less experience groups. Second, we operationalized experience in terms of whether participants experienced or knew someone who experienced injury as a result of the earthquake. Third, the study included three

additional questions addressing participants' experiences: (a) how much damage occurred in their area of residence, (b) how inconvenienced they were as a result of the earthquake, and (c) how much stress they experienced as a result of worrying about others. We summed these items and categorized participants into two groups via a median split ($Mdn = 7$) reflecting whether participants reported high (more experience) versus low (less experience) damage, inconvenience, and worry in response to the earthquake.

The findings for comparative risk judgments for experiencing an earthquake for people with more versus less experience appear in Table 2. The three rows of numbers in Table 2 represent the correlations that emerged from the three approaches to operationalizing experience. Each row presents the correlations between judgments at T1 and T2 and between judgments at T1 and T4. The findings suggest greater consistency among participants with more experience with the earthquake.

We used meta-analytic procedures to compute the weighted mean correlation and d for the three approaches to assessing experience. We then examined whether the d for participants with less experience fell outside the 95% confidence interval of the d for participants with more experience. These procedures allowed us to evaluate whether participants with more versus less experience differed significantly in the consistency of their comparative risk judgments. The results for the Time 1/Time 2 correlations yielded mean correlations of .45 in the less experience condition and .71 in the more experience condition. More important, the d value for less experience participants ($d = 1.00$) fell outside the 95% confidence interval of the d value for more experience participants ($d = 2.01$, $CI = 1.44/2.59$). Similarly, the results for the Time 1/Time 4 correlations yielded a d value for less experience participants (mean $r = .33$, $d = .69$) that fell outside the 95% confidence interval of the d value for more experience participants ($r = .60$, $d = 1.50$, $CI = 1.08/1.93$). In sum, more experience with the earthquake corresponded to higher consistency in comparative risk judgments.

Assessing absolute consistency. Thus far we have operationalized consistency as a correlation, either between people's judgments for one event and their judgments for other events or between people's judgments at one time with their judgments at other times. Correlation, however, is a measure of relative rank. It compares people's ranks on one variable with their ranks on another variable. Correlation tells us nothing about a person's absolute level on either variable. The result is that correlation can reveal information about one type of consistency—the consistency with which people's responses are ranked across time and events. However, it reveals nothing about another type of consistency—the consistency of a given person's mean rating across events or over time. For instance, imagine a woman who rates her comparative risk for hypertension on two occasions using a 7-point scale anchored by 1 (*much lower than the risk of others*) and 7 (*much higher than the risk of others*). Suppose she reports a 6 at Time 1 but a 3 at Time 2. If we merely consider her ratings relative to other participants in the sample, she might appear consistent in her judgments to the extent that all participants made comparable adjustments in their comparative risk judgments for hypertension. However, moving from a 6 to a 3 suggests considerable variability in absolute ratings.

TABLE 2: Correlations Across Time for Different Types of Earthquake Experience (Study 1)

	Time 1 and Time 2 Correlation				*Time 1 and Time 4 Correlation*			
	Low Experience		*High Experience*		*Low Experience*		*High Experience*	
Type of Experience	r	n	r	n	r	n	r	n
Monetary loss	.51**	44	1.00**	13	.26	39	.92**	14
Injury	.45**	45	1.00**	13	.40*	39	.54*	16
Damage and inconvenience	.38*	30	.59**	28	.32	25	.50**	30

*$p < .05$. **$p < .01$.

To examine the effect of experience on the consistency of participant's absolute comparative risk judgments, we computed the standard deviation of participants' first four judgments for earthquake risk. We then compared the mean standard deviation for participants with more versus less experience. The greater the standard deviation, the more variable (i.e., less consistent) participants are in their judgments. The means for participants with more versus less experience were significantly different when monetary loss was the index of experience ($Ms = .05$ vs. .24, respectively), $t(36) = 2.21$, $p < .05$, but not when injury ($Ms = .10$ vs. .19) or damage and inconvenience ($Ms = .17$ vs. .21), were the indices of experience, both $ts < 1$. Consistent with the correlation data, the direction of the means indicates that participants with more experience were more consistent across time in their comparative risk judgments than were participants with less experience.

Discussion

The correlation data revealed remarkable consistency in participants' comparative risk judgments across time but only modest consistency in their risk judgments across events. Participants who displayed the greatest comparative optimism at Time 1 tended to display the greatest comparative optimism at Times 2 and 4. On the other hand, at any given point in time, the consistency of responding to the 10 items was modest. In addition, the

extent to which people were consistent across time in their comparative risk judgments varied by experience. Specifically, participants who suffered greater experience with the earthquake in terms of monetary loss, personal injury, or property damage or inconvenience, were subsequently more consistent in their comparative risk judgments for earthquakes than were participants who suffered less in response to the earthquake. However, the mean level of variability (i.e., the mean standard deviation) in comparative earthquake risk judgments for participants with more versus less experience, although always in the predicted direction, was significantly different only when monetary loss was the index of experience.

STUDY 2

A virtue of Study 1 was that it assessed comparative risk judgments at multiple time points, permitting an examination of the consistency of judgments over time. A drawback of Study 1 was that many of the events examined were relatively rare and unlikely to occur in the near future, giving participants little reason to vary in their risk judgments over time. Study 2 addressed this limitation. In addition to examining the lifetime events typically investigated in studies of comparative optimism, Study 2 examined events for which our sample was likely to have or would soon gain experience.

Study 2 differed in two other important ways from Study 1: First, Study 1 assessed risk using the direct method, whereby participants reported their comparative risk using a single item. By contrast, Study 2 assessed risk using the indirect method, whereby participants separately judged their risk and the average person's risk and then the former was subtracted from the latter to yield a comparative risk judgment (Weinstein & Klein, 1995). Elsewhere, we have explored the theoretical and empirical implications of the two methods (Helweg-Larsen & Shepperd, 2001). Our concern here was in examining whether the consistency in comparative risk judgments found in Study 1 replicated when the indirect rather than the direct method was used.

Second, whereas Study 1 explored the consistency of comparative risk judgments after people experienced an event, Study 2 examined how comparative risk judgments made before experiencing an event compare to comparative risk judgments made after experiencing an event. Research finds that people who experience a negative event display less comparative optimism about the event in the future than do people who do not experience the event (e.g., Weinstein et al., 2000). The implication is that comparative risk judgments change in response to experience. Study 2 assessed risk judgments for various events at the beginning and end of a 2-month period and assessed whether participants experienced each event during the intervening period. We predicted that people who experiencing an event during the intervening period would display less temporal consistency in their comparative risk judgments for that event than would participants who did not experience the event.

Method

Participants. Female undergraduates participated in partial fulfillment of a requirement for introductory psychology. Of the 152 students who participated at Time 1, 138 participated 2 months later at Time 2. All analyses are based on participants who took part in both sessions.

Materials and procedures. Participants responded on two occasions to items addressing a variety of behaviors and perceptions. The present study, however, focused on people's risk judgments and prior experience. In this respect, participants responded to items assessing two types of events. The first type comprised eight events that were relatively common among college students. Participants separately estimated the probability that they and the probability that the average college student their age and sex and from their university would experience each event in the next 2 months. The events were weight gain, failing an exam, dissolving a relationship, physical injury, a parking ticket, a cold, being the victim of a crime, and a hangover. The second type comprised 10 events more commonly used in research examining comparative risk judgments. As is typical in this research, participants estimated for each event their lifetime risk and the lifetime risk of the average students their age and sex from their university. The events were severe clinical depression, severe hearing loss, obesity (20% over ideal weight), drinking problem, clinical panic disorder or attack, colon cancer, injury in a car accident, divorce, unplanned pregnancy, and suicide. For both types of events, participants responded using a scale ranging from 0% (*not at all likely*) to 100% (*extremely likely*). Participants also checked (yes or no) whether they had experienced each event in the prior 2 months. At Time 2 (2 months later), participants completed all items a second time and then were debriefed.

Results

Evidence for comparative optimism. We first examined whether people displayed comparative optimism in their risk judgments at Time 1 and Time 2. These analyses involved subtracting participants' personal risk judgments from their target risk judgments for each event and then conducting dependent t tests to determine whether the difference scores were significantly different from zero. A positive difference would indicate comparative optimism whereby participants estimated that their personal risk for the event was less than the average student's risk for the event. Consistent with prior

TABLE 3: Mean Difference in Personal and Target Risk Judgments at Time 1 and Time 2 (Study 2)

	Time 1			Time 2		
	M	t	p	M	t	p
Two-month events						
Weight gain	25.7	10.6	.0001	20.6	8.7	.0001
Fail exam	24.8	11.1	.0001	22.1	10.1	.0001
Dissolve relationship	30.8	11.8	.0001	21.8	8.9	.0001
Physical injury	12.8	6.4	.0001	11.1	6.5	.0001
Catch a cold	7.8	3.5	.0006	9.4	4.8	.0001
Parking ticket	37.0	12.6	.0001	33.2	12.8	.0001
Victim of crime	13.4	8.1	.0001	12.4	6.6	.0001
Hangover	23.7	7.7	.0001	25.5	9.4	.0001
Lifetime events						
Depression	27.8	13.4	.0001	23.0	12.4	.0001
Hearing loss	18.7	10.5	.0001	21.7	13.8	.0001
Obesity	36.8	18.6	.0001	35.8	20.4	.0001
Drinking problem	51.9	24.9	.0001	43.0	21.3	.0001
Panic disorder	26.1	12.5	.0001	22.6	15.5	.0001
Colon cancer	21.8	13.7	.0001	19.9	16.7	.0001
Injury in car accident	21.6	12.3	.0001	22.4	13.5	.0001
Divorce	29.7	12.5	.0001	32.8	16.5	.0001
Unplanned pregnancy	37.0	19.8	.0001	31.2	17.2	.0001
Suicide attempt	32.6	108.4	.0001	25.9	15.6	.0001

NOTE: Higher means indicate greater optimistic bias.

research, analyses revealed comparative optimism for all events at Time 1 and Time 2 (see Table 3).

We next explored whether experience with an event moderated comparative risk judgments. Because experience with the lifetime events was rare (typically under 5%), we excluded lifetime events from our analyses. Consistent with past research, in 13 of the 16 instances for the 2-month events, personal experience with an event correlated significantly (and negatively) with comparative risk judgments (for the significant correlations, $M = -.29$, $SD = .29$, range = $-.18$ to $-.60$). The negative valence indicates that experience with an event corresponded to less comparative optimism for the event. Two of the exceptions involved judgments about being a victim of a crime, an event experienced by only six participants at Time 1 and four participants at Time 2. The third exception involved judgments about being in a car accident at Time 1.

Examining consistency in comparative risk judgments across events. Were comparative risk judgments consistent across events? To address this question, at Time 1 and again at Time 2 we intercorrelated the comparative risk estimates for the eight 2-month events (yielding 28 correlations) and the 10 lifetime events (yielding 45 correlations), as was done in Study 1. We then computed the average correlation for each group of events at Time 1 and Time 2. As in Study 1, the results revealed only modest evidence for consistency. For the 2-month events, $M = .17$ ($SD = .07$) at Time 1 and $M = .28$ ($SD = .11$) at Time 2. For the lifetime events, $M = .27$ ($SD = .11$) at Time 1 and $M = .32$ ($SD = .12$) at Time 2. Nevertheless, in all four instances, dependent t tests revealed the average correlation differed significantly from zero (all $ts > 11.0$, all $ps < .0001$).

To examine whether experience moderated the consistency of comparative risk judgments, we summed the number of 2-month events each participant reported experiencing in the prior 2 months (at Time 1, $M = 1.9$, $SD = 1.4$, range = 0-6; at Time 2, $M = 2.5$, $SD = 1.9$, range = 0-7). We excluded lifetime events from analysis because few people reported experiencing them. To simplify analyses, we next separated participants into more and less experience groups based on a median split of experience (at Time 1, $Mdn = 2$; at Time 2, $Mdn = 3$) and then computed the average correlation among the eight 2-month events separately for the two groups. At Time 1, the average correlation among the 2-month events was significantly lower among participants with more experience ($M = .13$, $SD = .13$) than among participants with less experience ($M = .21$, $SD = .09$), $t(54) = 2.60$, $p < .05$. Similarly, at Time 2, the average correlation among the 2-month events was significantly lower among participants with more experience ($M = .19$, $SD = .16$) than among participants with less experience ($M = .35$, $SD = .11$), $t(54) = 4.38$, $p < .01$.

Examining consistency in comparative risk judgments across time. Were comparative risk judgments consistent across time? It is noteworthy in Table 3 that the level of optimism was significantly smaller at Time 2 than at Time 1 for six of the events (dissolving a relationship, depression, drinking problem, panic disorder, unplanned pregnancy, and suicide), all $ts > 2.34$, all $ps < .05$. This finding suggests that comparative risk judgments may not be consistent over time for all events.

Unlike Study 1, we were unable in Study 2 to assess consistency across time by correlating comparative risk judgments at Time 1 and 2 because we operationalized comparative risk judgments as a difference score. It is difficult to interpret a significant correlation between two difference scores because the correlation could arise from a correspondence in the size of the difference scores, from people rating themselves consistently, or from people rating the target consistently (see Cronbach & Furby, 1970). Consequently, we used an alternative approach to assess consistency. Specifically, at both Times 1 and 2, we classified people as optimists, pessimists, or realists based on whether they rated their personal risk less than, greater than, or equal to the risk of the average target. We then computed the proportion of participants whose classification changed from Time 1 to Time 2. Because we were interested in the role that

experience played in the consistency of risk judgments, we distinguished between participants reporting experiencing versus not experiencing the event in the intervening 2 months.

Table 4 presents the proportion of participants classified into each category. Examination of the bottom half of Table 4 reveals that participants were quite consistent in their comparative risk judgments for the lifetime events. For each lifetime event, more than 80% of participants (collapsing across experience) showed no change in their comparative risk classification across time. Examination of the top half of Table 4 reveals considerable change of classification across time, with 27% to 52% of participants (collapsing across experience) changing their comparative risk classification depending on the event. Chi-square analyses revealed that for four of the events, the classification change occurred significantly more often among participants who experienced the event than among participants who did not experience the event. These events were weight gain, $\chi^2(1, N = 135) = 4.41$, $p < .05$, dissolving a relationship, $\chi^2(1, N = 135) = 9.55$, $p < .01$, getting a parking ticket, $\chi^2(1, N = 135) = 8.83$, $p < .01$, and having a hangover, $\chi^2(1, N = 135) = 31.64$, $p < .001$. For the remaining events, experience did not moderate whether participants changed classification from Time 1 to Time 2.

Assessing absolute consistency. As with Study 1, we also compared the consistency of the absolute level of comparative risk for participants who did and did not report experiencing the event in the prior 2 months. Because we had only two observations, we analyzed the range of responses rather than the standard deviation. Specifically, we subtracted the comparative risk judgments made at Time 2 from the comparative risk judgments made at Time 1 and then analyzed the absolute value of this difference score. For each event, we excluded participants who reported experience with the event at Time 1. In addition, we did not analyze "victim of a crime" or any of the lifetime events because too few participants reported experiencing these events. Presumably, people who experienced an event between Time 1 and 2 would display a greater difference between their Time 1 and Time 2 comparative risk judgments than would participants who did not experience the event. As evident in Table 5, experience corresponded to lower temporal consistency in comparative risk judgments for some events (dissolving a relationship and physical injury) but not others (weight gain, failing an exam, catching a cold, receiving a parking ticket, and having a hangover).

TABLE 4: Percentage of Participants Within the Experience and No Experience Conditions Whose Classification As Optimist, Pessimist, or Realist Changed From Time 1 to Time 2 (Study 2)

	Experience				*No Experience*			
	Classification Changed		*Classification Unchanged*		*Classification Changed*		*Classification Unchanged*	
	%	n	%	n	%	n	%	n
Two-month events								
Weight gain[a]	49	(25)	51	(26)	31	(26)	69	(58)
Fail exam	30	(12)	70	(28)	26	(25)	74	(71)
Dissolve relationship[a]	58	(21)	42	(15)	29	(29)	71	(70)
Physical injury	67	(12)	33	(6)	47	(55)	53	(63)
Catch a cold	54	(42)	46	(36)	49	(28)	51	(29)
Parking ticket[a]	45	(17)	55	(21)	20	(19)	80	(78)
Victim of crime	50	(2)	50	(2)	50	(66)	50	(67)
Hangover[a]	63	(40)	37	(24)	15	(11)	85	(60)
Lifetime events								
Depression	25	(1)	75	(3)	14	(18)	86	(113)
Hearing loss	50	(1)	50	(1)	18	(24)	82	(110)
Obesity	0	(0)	100	(6)	8	(10)	92	(120)
Drinking problem	33	(1)	67	(2)	3	(4)	97	(130)
Panic disorder	67	(2)	33	(1)	6	(8)	94	(125)
Colon cancer	0	(0)	0	(0)	7	(9)	93	(124)
Injury in car accident	28	(5)	72	(13)	13	(15)	87	(103)
Divorce	0	(0)	100	(1)	12	(17)	88	(119)
Unplanned pregnancy	33	(1)	67	(2)	10	(13)	90	(121)
Suicide attempt	50	(5)	50	(5)	6	(7)	94	(119)

NOTE: Statistical analyses were not performed on the lifetime events because few participants experienced them.

a. Reflects a significant difference between the experience and no experience groups at $p < .05$ using the chi-square statistic.

Discussion

Similar to Study 1, Study 2 revealed evidence for consistency in comparative risk judgments across time and events. The consistency emerged both for the lifetime events that are typically examined in comparative risk research as well as for the 2-month events that were commonplace in our sample and for which many of our participants gained experience during the study. Personal experience moderated the consistency of comparative risk judgments across items and across time for the 2-month events. Specifically, at both Time 1 and Time 2, the average correlation among items was higher among participants with less experience in the prior 2 months than among participants with more experience in the prior 2 months. Similarly, for several of the events, participants reporting experience with an event were more likely than participants reporting no experience to show a change in their comparative risk classification (e.g., from comparative optimism to comparative realism). Finally, the analysis of absolute risk judgments also revealed greater variability in comparative risk judgments among participants who experienced an event (vs. those who did not experience the event) during the

TABLE 5: Mean Absolute Difference in Comparative Risk Judgments Across Time for People Who Did Versus Did Not Experience the Event in the Intervening Time Period (Study 2)

Two-Month Events	No Experience *M*	Experience *M*	*t*	*p*
Weight gain	22.5	28.8	1.22	*ns*
Fail exam	20.3	23.1	< 1	*ns*
Dissolve relationship	24.8	35.8	1.84	.07
Physical injury	17.4	40.0	4.00	.0001
Catch a cold	22.3	20.5	< 1	*ns*
Parking ticket	25.1	32.6	1.45	*ns*
Victim of crime	—	—	—	—
Hangover	20.7	25.2	1.06	*ns*

NOTE: Higher means reflect greater difference between comparative risk judgments at Time 1 and Time 2.

intervening period, but only for physical injury and dissolving a relationship.

GENERAL DISCUSSION

We found consistency in people's judgments in two studies using different methods for assessing comparative risk judgments. Participants were consistent over time in their risk judgments such that participants who were most optimistic about their risk for an event at one point in time tended also to be most optimistic for the same event at other times. Participants were also somewhat consistent in their comparative judgments across a variety of events such that the participants who were most optimistic for one event tended also to be the most optimistic for other events. The consistency emerged not only for distant events that were relatively infrequent and unlikely to occur in the near future in our sample but also for events that were quite commonplace and could occur at any time in our sample.

Although we found evidence for consistency in comparative risk judgments, our participants were not invariant in their judgments. Indeed, several findings suggest considerable underlying variability. First, the consistency in risk judgments over time was tempered by personal experience, with personal experience producing both increases and decreases in the consistency of people's judgments. Specifically, the correlation data revealed that personal experience corresponded to lower consistency in risk judgments among participants who experienced the event between the first and second assessment of their risk judgments (Study 2). However, the correlation data also revealed that more experience with an event was linked to greater temporal consistency in risk judgments subsequent to the event. Participants who suffered more in response to an earthquake displayed greater consistency in subsequent risk judgments than did participants who suffered less (Study 1). Collectively, the correlation findings from Study 1 and 2 suggest that experience produces an initial adjustment in comparative risk judgments followed by even greater subsequent consistency in judgments. Of importance, this conclusion comes from viewing two studies alongside each other. Clearly needed is a study that provides multiple observations both before and after an event, thereby permitting a test of the effect of experience on risk judgments within a single study.

The analyses examining the absolute level of comparative risk provided a partial replication of the correlation analyses, with participants who experienced an event displaying less consistency in their judgments prior to versus after the event but also displaying greater subsequent consistency in their comparative judgments than participants who did not experience the event. However, these effects were less robust, occurring for only one of the three measures of experience in Study 1 and for only two of the seven events in Study 2.

The second indicator of underlying variability is the finding that the average correlation of the comparative risk judgments was not strong. Perhaps people are indeed contemplative about their comparative risk judgments, arriving at each independently and thoughtfully based on experience, and not merely relying on some judgment heuristic.

Third, in Study 2, a comparison of the means at Time 1 with the means at Time 2 (see Table 3) suggests a general decline in comparative risk judgments across time, suggesting that participants were not that consistent after all. Finally, we cannot ignore the evidence from past research that comparative risk judgments vary. For instance, research suggests that comparative optimism is moderated by mood, anxiety, perceived control, culture, event severity, and proximity of feedback (see Helweg-Larsen & Shepperd, 2001, for a review). Likewise, as we noted earlier, people do not display comparative optimism for all events. Whereas people generally display comparative optimism for controllable events, they display less comparative optimism for uncontrollable events (C. T. F. Klein & Helweg-Larsen, 2001).

When we consider our evidence for consistency in light of the equally compelling evidence from our research and the research of others indicating that people are quite variable in their risk judgments, we face a beguiling question: How can we reconcile the evidence that people are generally consistent in their comparative risk judgments with the evidence that people are quite variable?

Reconciling the Evidence for Consistency and the Evidence for Variability

The evidence from past research demonstrating moderators of comparative risk judgments would seem to merit special attention. One way to reconcile our find-

ings of consistency with prior research demonstrating moderators of comparative risk judgments is to think about how moderators work. It seems likely that each of the moderators of comparative risk judgments identified in prior research, when present, affect the consistency of comparative risk judgments. However, with the exception of prior experience, which we specifically designed Study 2 to investigate, most of these moderators were probably not present in our study at levels that would strongly affect participants' risk judgments. Participants in our study may have differed, for example, in their mood at Time 2 from their mood at Time 1. However, we suspect that degree difference in mood and the number of people experiencing difference in mood was too small to have much influence on the consistency in comparative risk judgments across time.

Moving beyond moderators, a second way to reconcile our findings of consistency with evidence for variability is to realize that our evidence for consistency leaves room for variability. Specifically, although a given person may be consistent in his or her risk judgments for most events, he or she is unlike to be consistent for all events. For example, a given person may be consistently optimistic in his or her comparative risk judgments for 8 out of 10 events. For the remaining 2 events, he or she may stray from the consistency, displaying little or no comparative optimism (perhaps even displaying pessimism) because of, for example, experience with the event or because of a family history that suggests heightened risk. The general pattern of consistency for the eight events, however, may mask the inconsistency that occurs for the two events. In addition, it is likely that the small number of events for which any given person strays from his or her general pattern of consistency differs from person to person. The net result would be that people would generally appear consistent across events in their risk judgments even though they are displaying variability in their responses to specific events. As such, the consistency we found over time and across events should not be taken as perfect correspondence but as a general pattern.

A third way to reconcile our findings for consistency with evidence for variability is to recognize that different operations of consistency mean different things and can yield different findings. Our studies yielded evidence for consistency when we operationalized consistency as a correlation, either between people's judgments for one event and their judgments for other events or between people's judgments at one time with their judgments at other times. We found less evidence for consistency when we operationalized consistency as the extent to which people are variable in their mean comparative risk judgments over time. We suspect that most variables that moderate comparative risk judgments produce a greater impact on people's mean ratings than on their relative rankings.

The distinction we make between mean ratings versus relative rank makes clear that our evidence for consistency across time and events in comparative risk judgments should not be interpreted as indicating that comparative optimism is immutable and that attempts to reduce it will be futile. Our analysis suggests that although the relative ranks of people's comparative judgments may remain stable, individual judgments can shift dramatically, producing fluctuation in their mean comparative risk judgments. The result could in fact be a shift from optimism to pessimism in people's comparative risk judgments in response to situational factors. In addition, the finding that the consistency of people's judgments varied with personal experience suggests that the judgments are not made completely in a vacuum but instead can be colored by situational factors.

Conclusion

Given that we generally found consistency in people's comparative risk judgments, it seems fitting that we return to the question of why people display any consistency in their judgments even though the events they are judging vary dramatically. We can think of three somewhat overlapping explanations. It is possible that there is a degree of comorbidity for the different events such that people who are at high risk for one event also tend to be at high risk for the other events. Few of the events we examined occur randomly and so perhaps some people in our sample were truly blessed while others were cursed. Alternatively, some dispositional factor, such as depression or anxiety, may be driving the consistency in risk judgments. Finally, as we suggested earlier, people may make risk judgments globally with little reference to diagnostic information and with little contemplation or deliberation. As such, the consistency we found over time and across events may reflect the fact that a single global or heuristic process underlies people's risk judgments. Each of these explanations for the consistency in comparative risk judgments, although speculative, is likely to possess an element of truth. Clearly, more research is needed before we understand fully the source of consistency in comparative risk judgments.

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