The Dark Side of Optimism: Unrealistic Optimism About Problems With Alcohol Predicts Subsequent Negative Event Experiences

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College students were identified who were unrealistically optimistic about the likelihood they would experience severe problems due to alcohol consumption. These individuals were then followed over a 2-year period to determine whether they were more likely to report experiencing a range of alcohol-related negative events. Unlike the majority of studies on unrealistic optimism, this study (a) assessed bias at the individual rather than group level and (b) used a prospective rather than cross-sectional design. Participants completed measures at four times, each separated by 4-6 months. Findings showed that unrealistic optimism at Time 1 was associated with a greater number of negative events at Times 2, 3, and 4. Similarly, unrealistic optimism at Time 2 was associated with more negative events at Times 3 and 4. In all cases, the relationships were significant when controlling for previous negative events, suggesting the effects of unrealistic optimism can mount over time.

Keywords: *unrealistic optimism; risk perception; alcohol consumption; prospective design; alcohol-related negative events*

Researchers have often debated about whether unrealistically optimistic beliefs promote or deter risk-reduction behaviors (Armor & Taylor, 1998; Weinstein & Klein, 1996). This debate, in part, may stem from a reliance on nonexperimental, cross-sectional designs. In the absence of experimental designs, examining behaviors and behavioral consequences as a function of beliefs requires assessing beliefs and behavior at multiple time points. Only such prospective designs can provide insight into unrealistic optimism's effects on behavior over time. In this prospective study, we examined individuals who were unrealistically optimistic about their risk for experiencing severe problems related to consuming alcohol. We then tested the extent to which their unrealistically optimistic risk perceptions predicted negative consequences related to alcohol consumption over a subsequent 2-year period.

Unrealistic optimism is defined here as the mistaken belief that one's chances of experiencing problems are lower than those of other people (Weinstein, 1980). The belief must be in error to be labeled *unrealistically optimistic.* Without some criterion for determining accuracy, the

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belief is simply an example of *comparative optimism*. In other words, one can be comparatively optimistic about risk and be correct. Technically, one can be unrealistically optimistic in an absolute sense, for example, believing something will not happen when it will. However, in the present article, we use the term *unrealistic optimism* to refer to misplaced or inaccurate comparative optimism as it was originally defined (Weinstein, 1980).

People are unrealistically optimistic about a wide variety of health events (Helweg-Larsen & Shepperd, 2001; Weinstein, 1980, 1982). For example, they believe they are less likely than similar or average others to experience a heart attack (Avis, Smith, & McKinlay, 1989); become ill (Perloff & Fetzer, 1986); develop skin cancer (Clarke, Williams, & Arthey, 1997), breast cancer (Skinner, Kreuter, Kobrin, & Strecher, 1998), or lung cancer (Strecher, Kreuter, & Kobrin, 1995); contract HIV (Gold & Aucote, 2003); and experience health consequences due to environmental pollution (Pahl, Harris, Todd, & Rutter, 2005).

One problem with the majority of studies on unrealistic optimism is that they report bias at the group level. For example, if most members in a given group report that they possess lower than average risk of experiencing some negative event, the group can be defined as biased because, reasonably, most people in a group cannot have lower than average risk unless the distribution of risk is greatly skewed (Klein & Cooper, 2008). But assessing bias at the group level is problematic because it is impossible to determine which individuals are accurate (for whatever reason, some individuals in the sample may be less at risk than others and are accurate in their estimates of below-average risk) or biased and the extent to which they are biased. Because it does not collapse across people who may be accurate and people who may be biased, an approach that determines bias at the individual level leads to more precise conclusions about the types of outcomes associated with unrealistic optimism (Klein & Cooper, 2008; Weinstein & Klein, 1996).

To determine unrealistic optimism at the individual level, some kind of objective standard must be used. For example, researchers might compare participants' risk perceptions regarding a negative health event with an ad hoc or epidemiologic risk index created from relevant individual risk factors (e.g., Dillard, McCaul, & Klein, 2006; Gerrard & Warner, 1994; Kreuter & Strecher, 1995; Radcliffe & Klein, 2002). In the present study, to define unrealistic optimism, we determined whether people were unrealistically optimistic about their risk of experiencing severe problems with alcohol (alcoholism, alcohol poisoning) by using multiple measures of their alcohol use (e.g., quantity and frequency of alcohol consumption). If a given person perceived low comparative risk of alcohol problems despite consuming greater than average amounts of alcohol on greater than average numbers of occasions, that person was categorized as unrealistically optimistic.

Using similar procedures (although in cross-sectional designs), unrealistic optimism at the individual level has been related to how individuals process and interpret personally relevant health information. For example, Wiebe and Black (1997) asked college students to estimate their risk of becoming pregnant or contracting a sexually transmitted disease. The authors were able to estimate students' actual risk by asking them about their prior sexual behaviors (e.g., how frequently they engaged in sexual activity, percentage of time they used condoms). Compared to those who had accurate risk perceptions, those who were "illusional" (i.e., believed their risk to be low when it was estimated by the investigators to be high) were less interested in risk feedback and reported that it was less personally relevant.

In another study, Radcliffe and Klein (2002) asked older adults to estimate their comparative risk for a heart attack. The authors used a Health Risk Appraisal (HRA) to estimate each participant's actual comparative risk (e.g., the HRA allowed them to calculate a ratio of each participant's actual risk to actual risks of average same-age and same-sex others). The authors compared each participant's comparative estimate with his or her HRA-computed comparative risk. Relative to those who were accurate or unrealistically pessimistic, unrealistic optimists were less worried about their risk levels, had less knowledge about risk factors, and remembered less after reading an essay about risk factors. This study was unique because it defined unrealistic optimism at the individual level using comparative risk estimates and actual comparative risk rather than absolute risk estimates (e.g., numerical or probability likelihood risk estimate) and absolute actual risk. A comparative scale to assess risk may be preferable to an absolute scale for at least two reasons. First, people often think about their risk in comparative terms (Klein, 1997, 2002), and second, people find it difficult to use and understand numbers and probabilities (Lipkus, Samsa, & Rimer, 2001), which are the basis for many absolute scales. Thus, we followed Radcliffe and Klein and used comparative risk estimates and actual comparative risk (based on amount/frequency of drinking relative to peers) to define unrealistic optimism. Because both the risk estimate and actual risk are on a comparative scale, this type of optimism may be best termed *unrealistic comparative optimism,* but we continue to use the term *unrealistic optimism* as shorthand throughout the article.

In addition to having implications for how individuals respond to health information, unrealistic optimism has implications for individuals' behavioral intentions. In one example, Dillard et al. (2006) asked smokers

about their risk for lung cancer. The authors calculated each smoker's actual risk of lung cancer by using a risk algorithm based on gender, age, number of years having smoked, and number of cigarettes smoked per day. The authors then controlled for actual risk to determine whether risk perceptions (a measure of unrealistic optimism given that actual risk was controlled for) were associated with endorsement of smoking myths and cessation intentions. Compared to smokers who were accurate or pessimistically biased, those who were unrealistically optimistic were more likely to agree with statements such as, "Lung cancer depends mostly on genes," and they were less likely to plan to quit smoking, again suggesting that unrealistic optimism at the level of the individual can be harmful.

Given these associations among unrealistic optimism, responses to health information, and behavioral intentions, one might expect unrealistic optimism to cause an increase in risky health behavior. Although effects on behavior have been at the crux of the debate about the effects of unrealistic optimism (Colvin & Block, 1994; Robins & Beer, 2001; Taylor & Brown, 1988, 1994), few studies have truly examined this question (Klein & Cooper, 2008). In one, Taylor et al. (1992) showed that gay men who were unrealistically optimistic about developing AIDS in the future (e.g., they were seropositive for HIV) engaged in more health-promoting behaviors, although the unrealistic optimists were no more likely to engage in behaviors than the "realistic" optimists or those who were accurate in their optimism. Other studies claiming to support the positive illusions view have not provided clear tests of the hypothesis. They were either not prospective studies or failed to investigate bias at an individual level (e.g., Aspinwall & Brunhart, 1996; Aspinwall, Kemeny, Taylor, Schneider, & Dudley, 1991; van der Velde, Hooykaas, & van der Pligt, 1992).

Instead of being advantageous for health behavior, unrealistic optimism could cause an increase in risky behavior. The studies described earlier showed that unrealistic optimism was associated with less attention to risk information (Radcliffe & Klein, 2002; Wiebe & Black, 1997), less worry about risk behavior (Radcliffe & Klein, 2002), greater endorsement of self-protective myths, and higher risky intentions (Dillard et al., 2006). Risk behavior may follow from these other defensive strategies. For example, Klein, Geaghan, and MacDonald (2007) asked college students to estimate their risk of having unplanned sex as a consequence of drinking alcohol. The authors then determined whether students subsequently engaged in unplanned sexual activity. Compared to students who accurately estimated their risk, unrealistically optimistic students (i.e., those who estimated their chances were comparatively low but subsequently engaged in the behavior) reported higher levels of alcohol consumption.

In the present study, we use a prospective design, assessing risk perceptions, behavior, and experience of negative outcomes at multiple time points. Absent an experimental approach, this design is ideal because it allows for both temporal precedence and preliminary causal interpretation—resolving the problems inherent in cross-sectional studies (Gerrard, Gibbons, & Bushman, 1996; Weinstein, Rothman, & Sutton, 1998). For example, negative relationships between risk perceptions and behavior in cross-sectional studies do not indicate that risk perceptions reduced behavior—the behavior could have instead reduced risk perceptions. A prospective design also allows us to examine the effects of unrealistic optimism over time. The current study examines associations between unrealistic optimism and self-reports of alcohol-related negative events at multiple future time points (up to 1.5 years later), allowing us not only to determine whether this bias is associated with behavioral consequences but whether that association holds over an extended period and whether the effects mount over time.

To investigate our research question, we examined college students' beliefs and behavior related to alcohol consumption. Research suggests that the chances of observing unrealistic optimism in this context are high. Sjöberg (1998) argued that alcohol-related risk perceptions are beset with both rationality and denial—although people seem to be aware that drinking alcohol increases health risk, they deny that they themselves are at risk when drinking. College students in Klein et al. (2007) acknowledged that drinking increases chances of unplanned sexual activity, yet many drinkers were still unrealistically optimistic about this event. Also, Weinstein (1980), in asking about more than 30 negative events, found that "having a drinking problem" was the one for which people were the most comparatively optimistic. Other studies have replicated this tendency to view the self as less at risk than peers for alcohol-related problems (Hansen, Raynor, & Wolkenstein, 1991; Leigh, 1987), but none have measured unrealistic optimism at an individual level.

In the United States, the majority of college students consume alcohol, and almost half of them report heavy consumption (O'Malley & Johnston, 2002; Wechsler et al., 2002; Wechsler, Lee, Kuo, & Lee, 2000). Alcohol consumption may have both short- and long-term consequences (Neal & Carey, 2007; Wechsler et al., 2000). For example, research suggests that students who regularly consume alcohol have increased risks for problems like hangovers (Drummond, 1990; Wechsler, Davenport, Dowdall, Moeykens, & Castillo, 1994) but also more severe problems such as alcohol poisoning, memory

loss, brain damage, and death (Browning, Hoffer, & Dunwiddie, 1992; Eigen, 1991; Hunt, 1993; Marklein, 1998). Importantly, problems that may seem less severe, such as missing a class or experiencing a hangover, can persist throughout one's college tenure (Baer, Kivlahan, & Marlatt, 1995) and lead to more severe problems with alcohol. For example, Smith and McCauley (1991) found that experiencing hangovers was positively associated with a pattern of alcohol abuse and dependence.

The present study tested whether unrealistic optimism about severe, long-term problems with alcohol placed students at risk for experiencing short-term, alcohol-related negative events. To categorize students as unrealistically optimistic, we compared their risk perceptions for experiencing long-term problems with alcohol with their self-reported alcohol consumption. Previous research has identified excessive alcohol consumption as a primary risk factor for long-term problems (Browning et al., 1992; Hunt, 1993; Marklein, 1998).

Participants were college students who completed surveys at four time points–two each during their freshman and sophomore years. At each time point, they were asked to report personal risk perceptions of experiencing alcohol poisoning and a chronic alcohol problem sometime in the future as a result of drinking alcohol. Alcohol consumption is an obvious risk factor for such problems, and indeed, it has been linked to such problems empirically (Browning et al., 1992; Hunt, 1993; Marklein, 1998). To categorize participants as unrealistically optimistic, realistic (i.e., accurate), or unrealistically pessimistic, we examined the degree to which participants' personal risk perceptions for experiencing future problems due to alcohol consumption corresponded with their consumption at corresponding time points. We then examined differences between the groups' subsequent reports of alcohol-related negative events.[1]

The first hypothesis was that unrealistic optimism about the likelihood of experiencing chronic alcohol-related problems would exist. This hypothesis is consistent with both the general finding that people are unrealistically optimistic across many negative events (Weinstein, 1982; Weinstein & Klein, 1996), as well as negative events specific to consuming alcohol (Hansen et al., 1991; Leigh, 1987; Sjöberg, 1998) including becoming an alcoholic (Weinstein, 1980). The second and more central hypothesis was that unrealistic optimism would be associated with greater occurrences of alcohol-related negative events in the future. For example, compared to students who are realistic or unrealistically pessimistic, students who are unrealistically optimistic will report experiencing a greater number of negative events as a result of alcohol consumption. Importantly, this second hypothesis examines the effects of unrealistic optimism on multiple future time points. If unrealistic optimism is associated with negative events in the future, it would suggest that the effects of these beliefs are relatively robust, possibly influencing risk behavior up to 1½ years later. Our analyses control for previous negative events at each stage, allowing us to determine whether the effects of unrealistic optimism mount over time. This is one of the first studies to assess the relationship between unrealistic optimism and behavioral consequences as it evolves (see also Klein et al., 2007).

METHOD

Participants

Eight-hundred and nine freshman college students at a Northeastern liberal arts college were randomly selected to participate in a longitudinal study of alcohol-related risk perceptions, experiences, attitudes, perceived norms, and behavior. After the first semester of their freshmen year (T1), these students were sent information about the study, including a description of the study, a consent form, and questionnaires. Students who were willing to participate were instructed to read and sign the consent form and then complete the first set of questionnaires before mailing the packet to the researchers in a self-addressed envelope. Participants received a similar set of questionnaires after their second semester (T2), the first semester during their sophomore year (T3), and the second semester during their sophomore year (T4). In exchange for their participation, individuals received coupons for pizza and tickets to a lottery.

Six hundred and seventy-seven participants returned questionnaires at T1 (84% of the packets sent). One participant was excluded from analyses for being 28 years old. The rest of the sample ranged in age from 17 to 21 years (M = 18.31, SD = .51) and was composed of 37% males and 63% females. Only participants who indicated that they consumed alcohol, 80% of the sample (n = 534), were included in the analyses. The participants who reported drinking alcohol did not differ in age or gender from participants who reported not drinking alcohol (ps > .05). Longitudinal data for T1 and T2 were available for 69% (n = 367) of the 534 participants, whereas data for T1 and T3 and T1 and T4 were available for 47% (n = 252) and 41% (n = 220), respectively. Data for T2 and T3 were available for 47% (n = 253) of participants, and data for T2 and T4 were available for 37% (n = 196) of participants.

TABLE 1: Categorization Scheme For Identifying T1 and T2 Group Status

	Alcohol Consumption		
Risk Perception	*Below Group Average*	*Average*	*Above Group Average*
Below average	Realists	Unrealistic optimists	Unrealistic optimists
Average	Unrealistic pessimists	Realists	Unrealistic optimists
Above average	Unrealistic pessimists	Unrealistic pessimists	Realists

Measures

Risk perception. At T1 and T2, we asked participants to rate the likelihood of having severe problems in the future related to alcohol consumption. We asked participants: "How do you feel your own chances of having alcohol poisoning in the next year compare to those of other university students of your age and sex?" and "How do you feel your own chances of having a drinking problem at some time in your life compare to those of other university students of your age and sex?" Participants responded on 7-point scales ranging from 1 (*much below average*) to 7 (*much above average*). The two items were averaged to form a composite measure of risk perception. At both T1 and T2, the two items were significantly correlated, both *r*s = .54, *p*s < .001.

Alcohol consumption. Participants answered four questions about alcohol consumption at each time point.[2] They were asked (a) "How many times in a typical month do you drink alcohol?" (b) "How many drinks have you had in the past week?" (c) "How many drinks do you have in a typical week?" and (d) "How many drinks do you typically have at one time?" We instructed participants to define a drink as a can of beer, a glass of wine, or a shot of hard liquor. At each time point the four items were significantly correlated with each other, all *r*s ≥ .57, all *p*s < .001. The four items were standardized using *z* scores and then summed to form a composite measure of alcohol consumption, and scale reliabilities (alphas) were .81 at T1 and .87 at T2.

Unrealistic optimism. To categorize participants into groups, the risk perception composite from one given time point was matched to the alcohol consumption composite from the same time point. For risk perception, we used the midpoint of the scale (4) to divide participants into the categories below average, average, or above average. The alcohol consumption measure was standardized. Individuals whose scores placed them .5 *SD* or greater from the mean (i.e., 0) were labeled above the group average, individuals whose scores placed them below –.5 *SD* from the mean were labeled below the group average, and individuals whose scores were within 1 *SD* of the mean (i.e., –.5 to .5) were labeled average. We also used the .5 *SD* cutoff to identify "average" for risk perception. The two composites were then compared.[3] For example, individuals who reported below-average risk perception yet average or above-average consumption were categorized as unrealistically optimistic. Table 1 presents the categorization scheme, showing all combinations. We followed this method for categorizing participants at T1 and T2. At both time points, risk perception and alcohol consumption composites were significantly correlated, $r = .36$, $p < .001$ for T1, and $r = .38$, $p < .001$ for T2.

Alcohol-related negative events. Participants reported whether they had experienced, during the current semester, any of the following 10 events because of alcohol consumption (from Wechsler et al., 2000). The events were "had a hangover," "forgot where you were or what you did," "got behind in school work," "did something you later regretted," "got into trouble with security or local police," "missed class," "argued with friends," "damaged property," "got injured," and "required medical treatment." Participants checked *yes* or *no* to each event. The 10 items were summed to form a composite measure of alcohol-related negative events. Overall, participants responded *yes* to 1.83 events (*SD* = 2.00) at T1, 1.49 events (*SD* = 1.93) at T2, 1.65 events (*SD* = 1.92) at T3, and 1.73 events (*SD* = 2.01) at T4.

Trait optimism. Although previous studies found negligible correlations between dispositional optimism and unrealistic optimism (Klein et al., 2007; Radcliffe & Klein, 2002), we thought it useful to determine whether that was true here. At T1, we assessed participants' trait optimism with the Revised Life Orientation Test (LOT-R; Scheier, Carver, & Bridges, 1994), a measure of individual differences in optimism. Examples of items on the LOT-R are: "In uncertain times, I usually expect the best" and "If something can go wrong for me, it will." Participants rated their agreement with the statements on a 1 (*I agree a lot*) to 5 (*I disagree a lot*) scale. We summed across the items to create a trait optimism score, and scale reliability (alpha) was .86. Because of high reliability, we did not divide the scale

into optimism and pessimism items. The correlation between the subscores was high, $r = -.57$, $p < .001$.

Social desirability. To protect against response bias, we had participants complete the 33-item Marlowe–Crowne Social Desirability Scale (Crowne & Marlowe, 1960). The scale assesses individuals' tendencies to respond in socially desirable ways. Examples of items on the scale include: "I'm always willing to admit when I make a mistake" and "I always try to practice what I preach." Participants were instructed to rate the items as true or false.

RESULTS

Analytic Strategy

As part of the preliminary analyses, a test of assumptions was performed for all analyses and appropriate transformations were conducted when necessary. Group status (i.e., unrealistic optimists, realists, and unrealistic pessimists) was the independent variable. Because of the small number of participants categorized as unrealistic pessimists at each time point, they were collapsed into the realists group for analyses.[4] ANOVAs were used to compare the two groups (unrealistic optimists and realists) on baseline trait optimism and social desirability measures as well as risk perceptions and alcohol consumption.

ANCOVAs were used to examine the primary hypotheses. In the first set of ANCOVAs, the prospective relationships between T1 group status and subsequent alcohol-related negative events were examined. In the second set of ANCOVAs, the prospective relationships between T2 group status and subsequent alcohol-related events were examined. Each set of ANCOVAs controlled for previous risk perceptions and previous negative events.

Preliminary Analyses

Baseline and follow-up alcohol-related negative events. At all four time points, previous alcohol-related negative events were positively associated with follow-up negative events, rs $\geq .58$ and $\leq .70$, ps $< .001$ (see Table 2).

Individual difference measures and alcohol-related negative events. Trait optimism or social desirability was not significantly associated with negative events at the four time points.

Risk perception and alcohol-related negative events. Correlations revealed positive relationships between risk perceptions at T1 and alcohol-related negative events at all four time points (Table 2). Time 2 risk perceptions were also positively related to negative events at each time point. Thus, people who experienced more events tended to recognize their higher risk, and they appeared to maintain their higher risk over time.

Alcohol consumption and alcohol-related negative events. As one would expect, alcohol consumption was positively associated with negative events at all time points (Table 2).

Group status and baseline measures. No differences were found among groups at T1 or T2 for baseline social desirability or trait optimism.[5] Thus, as shown in previous work (e.g., Radcliffe & Klein, 2002), trait optimism was unrelated to unrealistic optimism. It also appears to be unrelated to social desirability. In other words, people who are unrealistically optimistic are not necessarily those who desire positive social standing.

Group status and risk perception. Although unrealistic optimism does not need to be related to risk perceptions (i.e., people can be biased in either direction whether they think their risk is low or high), we did find that unrealistic optimists at T2 reported lower risk perceptions than realists at T2, $F(1, 371) = 9.56$, $p < .01$ (see Table 3 for composites; the difference was not significant at T1). As a consequence, and so that differences could be attributed to bias in risk perceptions, not the risk perceptions themselves, risk perception was controlled for in all of the primary ANCOVAs that follow.

Group status and alcohol consumption. Unrealistic optimists reported greater alcohol consumption than realists at T1, $F(1, 367) = 115.27$, $p < .001$ (Table 3). The same pattern was observed at T2, $F(1, 371) = 82.46$, $p < .001$.

Primary Analyses

Hypothesis 1. *T* tests were used to compare risk perceptions at T1 and T2 with the natural midpoint of the scale (4) to determine whether the sample was unrealistically optimistic at the group level. Analyses revealed that participants exhibited unrealistic optimism at both T1 ($M = 2.57$, $SD = 1.20$), $t(371) = -23.01$, $p < .001$, and T2 ($M = 2.80$, $SD = 1.21$), $t(372) = -19.36$, $p < .001$. Thus, at the group level, participants exhibited unrealistic optimism about having long-term problems with alcohol in the future. This can also be seen by noting the high number of participants categorized as unrealistically optimistic relative to those categorized as realistic or unrealistically pessimistic (recall that

TABLE 2: Bivariate Associations Among Primary Variables

Variable	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1. T1 Risk perception	.60**	.36**	.29**	.48**	.37**	.38**	.23**
2. T2 Risk perception	—	.29**	.38**	.39**	.38**	.37**	.24**
3. T1 Consumption		—	.72**	.55**	.51**	.52**	.53**
4. T2 Consumption			—	.47**	.56**	.51**	.52**
5. T1 Negative events				—	.67**	.60**	.62**
6. T2 Negative events					—	.59**	.58**
7. T3 Negative events						—	.70**
8. T4 Negative events							—

NOTE: T1 = Time 1; T2 = Time 2; T3 = Time 3; T4 = Time 4.
*$p < .05$. **$p < .01$.

TABLE 3: Descriptive Statistics of Risk Perceptions and Alcohol Consumption Across Group Status

Group Status	*Time 1*		*Time 2*	
Realists				
Risk perceptions	2.67	(1.55)	3.01	(1.50)
Times drink per month	3.68	(3.04)	3.22	(2.94)
Drinks in past week	3.40	(7.53)	3.52	(7.93)
Drinks in typical week	3.57	(5.54)	3.65	(5.69)
Drinks typically at one time	3.53	(2.32)	3.65	(2.54)
Unrealistic optimists				
Risk perceptions	2.50	(0.94)	2.62	(0.92)
Times drink per month	7.53	(3.76)	6.99	(3.77)
Drinks in past week	13.89	(12.28)	10.17	(10.46)
Drinks in typical week	10.90	(8.24)	10.42	(7.72)
Drinks typically at one time	5.61	(2.52)	6.07	(2.79)

NOTE: Means for risk perception composites and individual alcohol consumption items are presented. Standard deviations are in parentheses.

participants were allowed a margin of error in our categorization scheme).

Hypothesis 2. In the first set of ANCOVAs, the relationship between group status at T1 and alcohol-related negative events at the three later time points (T2, T3, T4) was examined. In the second set of ANCOVAs, the relationship between group status at T2 and alcohol-related negative events at the two later time points (T3, T4) was examined. Prior risk perceptions were controlled to ensure that group status explained variance beyond that of present risk perceptions. All analyses also controlled for previous negative events (i.e., T1 and T2 negative events for T1 and T2 unrealistic optimism, respectively).

Time 1 group status and subsequent alcohol-related negative events. ANCOVAs revealed that compared to T1 realists, T1 unrealistic optimists reported experiencing a greater number of alcohol-related negative events at T2, $F(1, 361) = 4.77$, $p < .05$ (see Table 4). Similar patterns were observed at T3, $F(1, 234) = 10.61$, $p = .001$, and T4, $F(1, 204) = 10.08$, $p < .01$, with T1 unrealistic optimists reporting significantly more negative events compared to T1 realists. Thus, the association of unrealistic optimism and negative consequences of drinking remained over time, and given that we controlled for previously experienced events at each time point, we can conclude that the effects mounted over time.

Time 2 group status and subsequent alcohol-related negative events. Similar to the preceding findings, compared to T2 realists, T2 unrealistic optimists reported experiencing a greater number of alcohol-related negative events at T3, $F(1, 235) = 11.11$, $p = .001$ (Table 4). Time 2 group status was similarly associated with T4 negative events: Unrealistic optimists (again) reported experiencing significantly more events because of their alcohol consumption than realists, $F(1, 206) = 22.59$, $p < .001$. Again, these relationships held while controlling for previous events, showing that the effects were not only durable but additive over time.

In short, these findings support our hypothesis that unrealistic optimism—defined at the individual level—is associated with subsequent risk-increasing behavior. At both T1 and T2, unrealistic optimists reported a greater

TABLE 4: Self-Reported Negative Event Experiences Related to Alcohol (Adjusted Means) Across Group Status

	Estimated Marginal Mean	*Standard Deviation*	*Sample Size*
T1 to T2*			
Realists	1.73	1.45	124
Unrealistic optimists	2.10	1.40	241
		Partial eta squared = .01	
T1 to T3**			
Realists	1.50	1.62	73
Unrealistic optimists	2.25	1.54	165
		Partial eta squared = .04	
T1 to T4**			
Realists	1.44	1.66	69
Unrealistic optimists	2.22	1.65	139
		Partial eta squared = .05	
T2 to T3**			
Realists	1.63	1.69	88
Unrealistic optimists	2.40	1.60	151
		Partial eta squared = .05	
T2 to T4***			
Realists	1.34	1.74	84
Unrealistic optimists	2.51	1.68	126
		Partial eta squared = .10	

NOTE: Significance levels refer to the omnibus effect of group status. As a rule for interpreting partial eta squared, small effect size = .01, medium effect size = .06, large effect size = .14. Analyses controlled for previous negative events experienced. T1 = Time 1; T2 = Time 2; T3 = Time 3; T4 = Time 4.
*$p < .05$. **$p < .01$. ***$p < .001$.

number of alcohol-related negative consequences than realists. Moreover, unrealistic optimism had a proximal as well as a distal relationship with negative consequences.

DISCUSSION

In this study, many college students were unrealistically optimistic about the likelihood they would experience alcohol-related problems in the future. We found that this unrealistic optimism was positively associated with occurrences of alcohol-related negative events approximately 6 months later, 1 year later, and 1½ years later. For example, compared to participants who were realistic or unrealistically pessimistic, unrealistically optimistic participants were more likely to report having experienced events such as hangovers, missed classes, and arguments with friends because of their drinking. The results were observed from T1 to T2, T3, and T4, and from T2 to T3 and T4, suggesting that the negative consequences of unrealistic optimism are potentially both proximal and distal. We controlled for previous negative events in each analysis, making it easier to infer a temporal relation as well as draw the conclusion that the effects of unrealistic optimism could build over time.

Debate has long existed over whether unrealistic optimism is adaptive (Colvin & Block, 1994; Robins & Beer, 2001; Taylor & Brown, 1988, 1994). Freud (1928) was one of the first to weigh in on the uncertainty. He argued that although optimism was fundamental to the human condition, it nonetheless represented denial and, most likely, poor psychological health. Taylor et al. (1992) found that unrealistic optimism was beneficial for mental and physical health, but other studies attempting to lend support to the view have not tested unrealistic optimism per se (e.g., Aspinwall & Brunhart, 1996; Aspinwall et al., 1991; van der Velde et al., 1992). Instead, a growing number of studies find harmful effects of being unrealistically optimistic, at least with respect to health-related feedback and risky behavioral intentions (Dillard et al., 2006; Radcliffe & Klein, 2002; Wiebe & Black, 1997).

The debate about whether unrealistic optimism has harmful or beneficial effects can be partially reconciled by distinguishing between psychological and physical health. Despite the harmful effects reported here and elsewhere, unrealistic optimism may have positive effects on psychological well-being. Because unrealistic beliefs

may allow individuals to discount threatening information and maintain current risk behavior, the beliefs may protect individuals from experiencing the negative emotion that may be associated with these messages or changing behavior. Robins and Beer (2001) have similarly argued that unrealistic optimism may serve emotion-regulation purposes. More studies are needed to investigate the consequences of unrealistic optimism, including both measures of health behavior and psychological well-being.

In connecting unrealistic optimism to negative health consequences, the present study extends the literature on unrealistic optimism and risk behavior. We also provide preliminary evidence of a causal influence of unrealistic optimism on risk behavior. An important next step is to conduct experimental studies that can verify this causal sequence (e.g., Klein & Kunda, 1994). Our study also contributes to the literature on risk perception and behavior, which has often addressed the circumstances under which people decide to engage in risk-reduction behaviors. Although health behavior models are guided by the assumption that greater risk perception should be associated with greater inclination to engage in risk-reducing behavior (Weinstein, 1993), the evidence that risk perceptions cause risk-reducing behavior is mixed, with some studies finding a positive association (for a review, see Brewer et al., 2007), and others finding only small or negligible associations (for reviews, see Gerrard et al., 1996; Harrison, Mullen, & Green, 1992). Two reasons for the disagreement are the prevalence of cross-sectional designs (Weinstein et al., 1998) and a failure to account for past behavior (e.g., see Aspinwall et al., 1991). Because of its prospective design, in which we control for past behavior, our study avoids these limitations and provides preliminary evidence that risk perceptions cause risk reduction behavior.

Future studies should explore why and when unrealistic optimism may cause people to experience negative consequences. In terms of a cognitive explanation, the bias may relate to how people define risk. In a study by Green, Polen, Janoff, Castleton, and Perrin (2007), the authors found that many people defined moderate alcohol consumption in terms of how much alcohol one could drink without experiencing negative consequences. These definitions, in turn, were associated with ignoring the long-term risks of consumption. One possibility is that unrealistic optimists tend to have these skewed definitions of consumption, which places them at greater risk of negative consequences. In terms of a motivational explanation, Leffingwell, Neumann, Leedy, and Babitzke (2007) found evidence of defensiveness among individuals who drink alcohol. Because it may be linked to self-enhancing tendencies (Weinstein, 1989), it is reasonable to expect that unrealistic optimism in the alcohol domain could be tied to defensiveness. Thus, unrealistic optimists may be more likely to discount messages about consumption and be predisposed to experience more negative consequences.

In the present study, we measured only negative, not positive, expectancies and outcomes. This distinction is important because studies show that individuals expect a number of positive outcomes from alcohol consumption (e.g., increased sociability, relaxation), and these expectancies lead them to drink more (Critchlow, 1986; Leigh, 1987; Nagoshi, Nakata, Sasano, & Wood, 1994; Rohsenow, 1983). How might positive expectancies relate to negative expectancies and outcomes? Although in the present study, we defined events such as having a hangover and missing class as negative and indicative of risky behavior, students may have perceived such events as a means to experiencing the positive outcomes or, simply, as a derivative of those desirable, positive outcomes of consumption. This idea may help explain findings that college students seem to aspire to a "high-risk" status in the domain of alcohol consumption (Klein et al., 2007).

Future studies should examine unrealistic optimism about positive events due to alcohol consumption. For example, do expectations about positive events (regardless of how unrealistic they may be) overwhelm those about negative events in predicting consumption? Such unrealistic optimism would be "strategic." This notion would support Seligman's (1991) view of optimism as a flexible strategy—something people use when they believe it will lead to positive outcomes but forego when they believe it will lead to negative outcomes (see Armor & Sackett, 2006).

Additional Future Directions

In general, more studies are needed to examine the relationship between unrealistic optimism and health behaviors. To provide clear tests of the hypothesis that unrealistic optimism influences behavior, we need studies investigating the bias at the individual level and using prospective designs. Only when these conditions are met can we begin to draw precise conclusions about what is (or is not) associated with unrealistic optimism. In linking the bias to negative behavioral outcomes, our study underscores the importance of developing interventions to reduce unrealistic optimism, which have been shown to be challenging (e.g., Weinstein & Klein, 1995). Work of this kind can also begin to identify moderators of the relationship between unrealistic optimism and behavior given the likelihood that it is detrimental in some contexts yet helpful in others.

This study relied on self-report, which can be influenced by numerous factors. Unrealistic optimism at the individual level represents an individual difference

variable, and as with all individual difference variables, it could have acted as a proxy for other individual differences (e.g., self-esteem or even socioeconomic status). However, our finding that unrealistic optimism was unaffected by individual difference variables such as trait optimism or social desirability suggests that it is robust across individual characteristics (see Weinstein, 1987). Though adequate statistical power was present for analyses, the potential impact of attrition cannot be minimized. Finally, many of the effects we observed were small to medium in size.

Conclusion

This is the first study to demonstrate unrealistic optimism at the individual level, in college student drinkers, about the likelihood of experiencing future problems with alcohol. Importantly, unrealistic perceptions had implications for experiences of alcohol-related negative events up to 1½ years later. The findings of this study are a significant contribution to the literature on unrealistic optimism and risk perception more generally. Future studies should investigate the possible pathways through which unrealistic optimism may cause risky health behavior. Such research may provide insight into how to curb unrealistically optimistic perceptions and ultimately reduce risky health behaviors and consequences of these behaviors.

NOTES

1. We would like to thank the editor for suggesting that we revise the analytic strategy. It should be noted that in the original analyses, we defined group status by combining risk perceptions with alcohol-related negative events. We then examined alcohol consumption as a function of group status. In these original analyses, we found that compared to realists and unrealistic pessimists, unrealistic optimists engaged in greater alcohol consumption subsequently and over time (e.g., T1 to T2, T3, and T4; T2 to T3 and T4).

2. These dependent measures have been previously reported for individuals from the same sample who reported engaging in sexual activity (Klein, Geaghan, & MacDonald, 2007).

3. When defining unrealistic optimism by using the difference score between standardized risk perception and standardized alcohol consumption, analyses for T1 and T2 were also significant, showing the same pattern of results.

4. At T1 and T2, only 10 participants were categorized as unrealistic pessimists. Thus, we combined pessimists with realists for primary analyses. However, when pessimists were included as a separate group (i.e., when group status consisted of unrealistic optimists, realists, and unrealistic pessimists), analyses for T1 and T2 were significant as well.

5. We also examined differences with regard to gender. Chi-square analyses were used to compare males and females across the two groups. At T1, a greater number of females were identified as realistic rather than unrealistically optimistic. However, when gender was entered as a covariate in primary analyses, ANOVAs revealed that the variable did not affect final results. The distribution of males and females was equivalent across groups for T2.

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