

Precancer Risk Perceptions Predict Postcancer Subjective Well-Being

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Objective: The present study used longitudinal data to explore whether subjective well-being in cancer survivors was related to predisease judgments of their likelihood of getting cancer. **Method:** Subjective well-being was assessed in terms of affective well-being (frequency of positive and negative affective states) and satisfaction with one's life overall. The sample consisted of 158 participants in the National Survey of Midlife Development in the U.S. (MIDUS) who developed cancer during the 8–10 years between the first and second waves of the survey (average time since diagnosis = 3.37 years; $SD = 2.48$), and 3,243 control participants who reported no history of cancer at either wave. **Results:** Controlling for demographic variables and well-being at Wave 1, the effect of cancer on well-being depended on whether, prior to being diagnosed, people judged themselves to be at low or high risk of cancer. For those perceiving a high risk, a cancer diagnosis had a modest but significant negative impact on affect and life satisfaction, whereas no negative impact emerged for those perceiving a low risk. Similar effects were not observed for heart attack risk perceptions, or for measures of trait optimism or depression, suggesting that the effect was domain-specific. **Conclusions:** Low precancer risk perceptions were associated with long-term benefits for subjective well-being in people who developed cancer.

Keywords: risk perception, cancer, subjective well-being, resilience, optimism

Perceived risk of disease has been found to predict health outcomes in people confronted with serious illness. In one early study, believing oneself to be unlikely to develop AIDS was associated with the use of healthy coping strategies and engagement in health-promoting behaviors in a group of men undergoing testing for HIV (Taylor et al., 1992). More recently, lower perceived risk of cancer recurrence was linked to improved health-related quality of life in cancer survivors (Waters, Arora, Klein, & Han, 2010), extending prior findings of an association between perceived risk of recurrence and anxiety and depression assessed 6 months later (Partridge et al., 2008). In addition to its association with mental health outcomes, perceived risk has also been linked to biological outcomes. In one study, men's perceptions of themselves as at low risk for a heart attack predicted lower 15-year cardiovascular disease mortality, even after controlling for objective risk factors (Gramling, Klein, Roberts, Waring, & Eaton, 2008; see also Barefoot et al., 2011). As Gramling and Epstein (2011) noted, "These studies suggest that optimism [about personal health outcomes] is a powerful 'drug' that compares favorably with highly effective medical therapies" (p. 935).

Predisease Risk Perceptions and Postdisease Outcomes

One important limitation of the literature on perceived risk and health outcomes is that studies have focused on the effects of

expectations either before or after the onset of disease, without examining how predisease risk perceptions may influence postdisease outcomes. For example, Taylor et al.'s (1992) study of men undergoing HIV testing did not examine adjustment to life with AIDS in the subset of men who eventually developed the disease. This is an important omission because the adaptive effects of low perceived risk of a disease may be mitigated or even reversed when a disease is in fact diagnosed. That is, low perceived risk may leave people psychologically unprepared to deal with a disease, whereas high perceived risk may allow people to prepare for and adapt to life with the disease.

Support for this possibility comes from several domains. First, research on mourning has found that unanticipated deaths are more likely than anticipated ones to lead to long-lasting grief in the bereaved (Lehman, Wortman, & Williams, 1987; Rando, 1992). In such cases, there is evidence that forewarning (e.g., a progressive decline in a loved one's health) allows people to preemptively adapt to the anticipated loss, or that "the anticipation of loss accelerates the adaptation process" (Frederick & Loewenstein, 1999, p. 315). Similarly, research on pain management has found that forewarning people about an impending aversive experience can, under certain circumstances, reduce the painfulness of the experience (Weisenberg, Schwarzwald, & Tepper, 1996).¹ Finally, at least one experiment has found that being diagnosed with a medical condition feels worse when the news is unexpected rather than expected. Shepperd and McNulty (2002) informed a sample of college students about a (fictitious) disease known as thioamine acetylase enzyme deficiency, a condition that was said to lead to

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¹ However, it is important to note that such forewarning also produces stress during the period leading up to the aversive experience (Brenzitz, 1967), which may have serious health consequences with longer periods of forewarning (Sapolsky, 1999).

serious problems with the pancreas as people reached their 20s. Participants were told that they were either at high or low risk for the deficiency based on their status as college students, and they were then “tested” for the deficiency. Among participants randomly assigned to receive a positive diagnosis, those who were led to believe that they were at low risk reported worse mood following the diagnosis. Such results, rather than highlighting the benefits of low perceived risk, reinforce popular expressions such as “Expect the worst and you will never be disappointed” (Shepperd & McNulty, 2002, p. 87).

In sum, it is unclear whether predisease risk perceptions are associated with postdisease benefits or harms. Low perceived risk may promote health by buffering chronic stress responses and enabling goal pursuit, either in response to the threat of disease or during recovery (Barefoot et al., 2011; Waters et al., 2010). On the other hand, low perceived risk may be detrimental to postdisease health by heightening affective responses to an unexpected diagnosis (Shepperd & McNulty, 2002) and leaving people unprepared for life with the disease (Lehman et al., 1987).

Risk Perceptions and Trait Optimism

A second limitation of recent research linking risk perceptions and health outcomes is that studies often focus on disease-specific cognitions without considering potential confounds with trait optimism. Trait optimism refers to a general tendency to “expect the best” (Klein & Zajac, 2009, p. 313), a psychological characteristic that has itself been linked to physical and mental well-being (Scheier, Carver, & Bridges, 1994). Importantly, although trait optimism and perceived risk of specific events are distinct constructs (Radcliffe & Klein, 2002), they tend to be moderately correlated such that dispositionally optimistic individuals often perceive a lower likelihood of experiencing specific negative events than do less dispositionally optimistic individuals (Davidson & Prkachin, 1997). Thus, failing to control for trait optimism in analyses linking perceived risk to health outcomes is problematic because it is unknown whether any link is due to perceived risk or to general optimistic tendencies. Determining which construct is more reliably predictive of outcomes is important, because perceived risk of specific diseases may be more amenable to change through interventions than is trait optimism (Klein & Zajac, 2009).

The Cancer Context

The present study examined the effects of predisease risk perceptions in the domain of cancer, a condition for which increasing survival rates demand an understanding of factors promoting long-term health and resilience. In 2012, there were nearly 14 million cancer survivors in the U.S., a figure expected to approach 18 million by 2022 (de Moor et al., 2013). Cancer can be a particularly challenging illness. Historically, it has been a disease “feared beyond all others,” and it continues to present survivors with a range of complex issues such as symptom and pain management, psychological reactions such as fear and sadness, concerns about the future of one’s family, existential questions of life and death, and the search for meaning in one’s new world (Holland, 2003). Accordingly, a substantial amount of research has been conducted to understand and improve psychological well-being in the popu-

lation of cancer survivors, an effort that represents one of the major aims of the field of *psycho-oncology* (Holland et al., 2010; see Holland, 2003, for an overview of the history and development of this field).

In many studies, cancer survivors have been found to adjust reasonably well in the long-term, and recent studies suggest that certain sociodemographic factors may buffer against enduring negative effects of cancer on well-being. For instance, by 5 years postdiagnosis, survivors of cervical and endometrial cancer reported quality of life similar to control participants, but survivors who were unemployed or living alone were at risk for persisting negative outcomes (Bradley, Rose, Lutgendorf, Costanzo, & Anderson, 2006). Other research has found disturbances in mental health and mood in the years following a diagnosis, although older age conferred resilience against these effects (Costanzo, Ryff, & Singer, 2009). Finally, the long-term psychological effects of cancer may depend on birth cohort and social context: In older birth cohorts (e.g., 1920s) that experienced low cancer survival rates and a public discourse that portrayed people with cancer as victims rather than survivors, experiencing cancer appeared to exacerbate normal age-related declines in personal growth (Pudrovskaya, 2010). On the other hand, in younger birth cohorts (e.g., 1950s) that experienced higher survival rates and more optimistic public discourse surrounding cancer, experiencing cancer actually tended to slow the age-related declines in personal growth (Pudrovskaya, 2010).

The Present Study

Against this backdrop of growing interest in cancer survivorship, the present study explored predisease risk perceptions as a moderator of the effects of cancer on well-being. The study focused on subjective well-being (Diener, 2000), which refers to people’s summative evaluations of their lives and is commonly used to assess the impact of serious illness and other life-altering events on quality of life (Luhmann, Hofmann, Eid, & Lucas, 2012). Precancer risk perceptions were assessed as people’s judged likelihood of developing cancer. In addition to examining the moderating role of precancer risk perceptions, this study also evaluated whether there were similar effects of trait optimism, risk perceptions concerning a different illness (heart attack), and depression, which tends to be associated with less optimistic views of oneself and one’s future (Taylor & Brown, 1988).

Method

Data

Data for the present study were drawn from the National Survey of Midlife Development in the U.S. (MIDUS), a longitudinal study that surveyed a large, adult cohort in 1995–1996 (Wave 1) and again in 2004–2006 (Wave 2; Brim et al., 2011; Ryff et al., 2012). Four subsamples were recruited for Wave 1 of the survey, including a national random digit dialing (RDD) sample ($n = 3,487$), oversamples from five metropolitan areas ($n = 757$), siblings of participants from the RDD sample ($n = 950$), and a national RDD sample of twin pairs ($n = 1,914$). For the main RDD sample, a random member of each household between the ages of 25 and 74 was selected. Participation in the survey involved a telephone

interview and self-administered questionnaire. The participation rate for the telephone interview was 70%. Of those completing the telephone interview, 89% also completed self-administered questionnaires. At Wave 2, 4,963 participants completed a second telephone interview (mortality-adjusted response rate of 75%), and, of these, 81% also completed self-administered questionnaires.

Participants

Two subsets of participants were identified from MIDUS. Participants with a *cancer diagnosis* were defined as those who responded negatively to the question “Have you ever had cancer?” at Wave 1 and who responded affirmatively to the same question at Wave 2. Follow-up questions asked participants to identify the type(s) of cancer diagnosed and their age at diagnosis. As in prior studies, we excluded participants who reported a diagnosis of skin cancer only (Costanzo et al., 2009). Also, we excluded participants if their reported age of diagnosis was prior to their age at participation in Wave 1 of the survey, even if they did not report a cancer diagnosis at Wave 1. This method of identifying cancer survivors allowed us to examine cancer survivors’ well-being prior to and following a cancer diagnosis. Participants without a cancer diagnosis were defined as those reporting no personal history of cancer at Wave 1, and also no personal history of cancer at Wave 2.

Measures

Subjective well-being. Subjective well-being was assessed in terms of *affect* and *life satisfaction* (Luhmann et al., 2012). Measures were taken at Wave 1 and Wave 2 of the survey. Affect was measured as the frequency with which participants reported experiencing various positive and negative affective states during the past 30 days (from 1 = *none of the time* to 5 = *all the time*). Positive affective states were feeling cheerful, in good spirits, extremely happy, calm and peaceful, satisfied, and full of life. Negative affective states were feeling nervous, restless or fidgety, hopeless, that everything was an effort, worthless, and so sad nothing could cheer you up. A composite measure was created by averaging across positive and negative affective states, with negative items reverse-scored. Cronbach’s alpha for the composite measure was high at Wave 1 and Wave 2 (.92 and .91, respectively).

As in previous research, life satisfaction was measured as participants’ “evaluation of life overall . . . as well as of specific life domains (e.g., job satisfaction or marital satisfaction)” (Luhmann et al., 2012, p. 593). Specifically, participants rated their quality of life in five domains, including their life overall, work, health, their relationship with their spouse or partner, and their relationship with their children. Ratings were made on a scale from 1 (*the worst possible*) to 10 (*the best possible*). Participants’ ratings of their relationship with their spouse or partner and their relationship with their children were first averaged to create a single item, and this was then averaged with the remaining three items to create a final composite. For participants with missing items (e.g., no spouse or partner), a composite was created using the remaining items. This composite measure was calculated by MIDUS researchers (Brim et al., 2011) and has been used successfully as an assessment of overall life satisfaction in studies using MIDUS data (Fleeson,

2004; Prenda & Lachman, 2001). Cronbach’s alpha for the composite was .65 and .66 at Waves 1 and 2, respectively.²

Perceived cancer risk. Perceptions of cancer risk were assessed using a two-step process. First, participants were asked: “Do you think your risk of getting cancer is higher, lower, or about the same as other (men/women) your age?” Next, participants who indicated a “higher” perceived risk were asked, “Would you say a lot higher, somewhat higher, or only a little higher?” Participants who indicated a “lower” perceived risk were asked, “Would you say a lot lower, somewhat lower, or only a little lower?” Responses to these two questions were used to construct a 7-point scale ranging from 0 = *lowest risk* to 6 = *highest risk*. Comparative measures have been found to be a valid method of eliciting perceived risk (Dillard et al., 2011; Klein, 2002; Lipkus, Klein, Skinner, & Rimer, 2005). Perceptions of cancer risk were measured at Wave 1.

Perceived heart attack risk, trait optimism, and depression. Perceptions of heart attack risk were assessed using the same two-step procedure used for eliciting perceptions of cancer risk, allowing for the creation of a 7-point measure (0 = *lowest risk* to 6 = *highest risk*). Trait optimism was assessed by asking participants whether the word *optimistic* describes them “a lot, somewhat, a little, or not at all.”³ Depression was measured using a multistep procedure from the World Health Organization Composite International Diagnostic Interview Short Form (Kessler, Andrews, Mroczek, Ustun, & Wittchen, 1998). First, a series of stem questions identified the subset of participants reporting experiencing a 2-week period during the past 12 months during which they felt sad, blue, or depressed every day or almost every day and for at least most of the day, or during which they lost interest in most things like hobbies, work, or activities that usually give pleasure. Participants meeting these criteria were then asked whether or not, during those 2 weeks, they had experienced any of a series of symptoms of depressed affect and anhedonia (e.g., “Did you lose your appetite?,” “Did you have a lot more trouble concentrating than usual?,” “Did you think a lot about death?”). A measure of depression was created which reflected the number of symptoms of depressed affect and anhedonia (0–7). Participants received a score of 0 if they reported that they had not experienced a 2-week period during the past 12 months during which they felt sad, blue, or depressed every day or almost every day and for at least most of the day, or during which they lost interest in most things like hobbies, work, or activities that usually give pleasure. Measures of perceived heart attack risk, trait optimism, and depression were administered at Wave 1.

Demographics. Participants reported their gender, age, highest level of education, race, and marital status at Wave 1 of the survey.

Control variables. Family history of cancer was assessed by asking participants, “Who in your immediate biological family—

² We also conducted analyses using the single-item measure of quality of life overall. These analyses yielded results identical to those using the composite measure. For consistency with previously published research examining MIDUS data, we report results using the composite measure.

³ All analyses concerning trait optimism were also conducted using the optimism subscale of the Life Orientation Test—Revised (LOT-R), which was administered at Wave 2 of MIDUS (Scheier et al., 1994). Using this alternate measure, all results were consistent with what is reported here.

that is, your biological parents, brothers, sisters, or children—have ever had cancer?” Respondents indicating *no one* were coded as 0, and those indicating *mother, father, brother, sister, or child* were coded as 1. This measure was taken only at Wave 2 of MIDUS. Participants’ functional status was measured by asking, “How much does your health limit you in doing each of the following?” (from 1 = *a lot* to 4 = *not at all*). A measure of limitations on *basic* daily activities was created by averaging responses to two items: “bathing or dressing yourself” and “walking one block.” A measure of limitations on *instrumental* daily activities was created by averaging responses to seven items, such as “lifting or carrying groceries,” “bending, kneeling, or stooping,” and “moderate activities (e.g., bowling, vacuuming).” These measures were taken at Wave 2. Lastly, participants reporting a cancer diagnosis were asked at Wave 2 whether they were “currently using any type of treatment or therapy for cancer” (0 = *no*; 1 = *yes*). For those responding affirmatively, a follow-up question asked, “What type of treatment or therapy are you currently using?” The response was open-ended.

Statistical Analysis

The analytic sample for this study included participants with available data on all main predictor and outcome variables (i.e., demographics, perceived cancer risk, affective well-being, and life satisfaction). Effects on affective well-being and life satisfaction were assessed using separate linear regressions with three steps. In Step 1, affective well-being (or life satisfaction) at Wave 2 was regressed on affective well-being (or life satisfaction) at Wave 1, a dummy variable for *cancer diagnosis*, cancer risk perceptions at Wave 1, and demographic variables including gender, age, education, race, and marital status. In Step 2, the interaction between the *cancer diagnosis* dummy variable and cancer risk perceptions was added. In Step 3, the main effects of heart attack risk perceptions, trait optimism, and depressive symptoms, as well as the interaction of each of these variables with the *cancer diagnosis* dummy variable, were added.

A set of follow-up analyses in the subset of participants reporting a cancer diagnosis examined whether the association between cancer risk perceptions and well-being depended on the number of years since diagnosis. Separate linear regressions with three steps were analyzed. First, affective well-being (or life satisfaction) at Wave 2 was regressed on affective well-being (or life satisfaction) at Wave 1, years since cancer diagnosis, cancer risk perceptions, and demographic variables. Next, the interaction between years since cancer diagnosis and cancer risk perceptions was added. Lastly, the main effects of heart attack risk perceptions, trait optimism, and depressive symptoms, as well as the interaction of each of these variables with years since diagnosis, were added.⁴

Results

Demographics and Cancer Diagnosis Information

Table 1 shows the characteristics (at Wave 1) of respondents who did and did not develop cancer before Wave 2. Participants who were diagnosed with cancer tended to be older and were less likely to have an educational level of *some college* compared with those who were not diagnosed with cancer. Also, people who

developed cancer tended to have worse affect at Wave 1. Participants with and without a cancer diagnosis were similarly distributed across the four subsamples of MIDUS: Among participants with no cancer diagnosis, 44.4% were from the main RDD sample, 15.3% were from the sibling sample, 30.8% were from the twin sample, and 9.4% were from the metropolitan oversamples. Corresponding percentages among participants with a cancer diagnosis were 46.8%, 15.8%, 26.6%, and 10.8%, respectively.

Table 2 shows the distribution of cancer types diagnosed. The most commonly reported types of cancer were breast (25.7%), prostate (25.1%), and other (23.4%). Average time since diagnosis was 3.37 years ($SD = 2.48$). Approximately 18% of participants with a cancer diagnosis reported currently receiving any treatment or therapy for cancer, with four participants currently receiving radiation, three receiving chemotherapy, one receiving surgery, one using meditation or relaxation, and 22 using another type of therapy.

Main Effects of Cancer Diagnosis, Perceived Cancer Risk, and Demographics

As shown in Table 3, being diagnosed with cancer was associated with a significant reduction in life satisfaction from Wave 1 to Wave 2. Higher perceived risk of cancer was associated with reductions in both life satisfaction and affective well-being. Life satisfaction and affective well-being tended to increase in participants with a college education compared with those with lower levels of education, and in the two middle-aged groups (45–54 and 55–64) compared with people under age 35. Being married was also associated with increased life satisfaction. Finally, affective well-being and life satisfaction at Wave 1 were powerful predictors of Wave 2 affective well-being and life satisfaction, respectively.

Interaction of Cancer Diagnosis and Perceived Cancer Risk

The impact of being diagnosed with cancer on affective well-being depended on whether, prior to being diagnosed, people judged themselves to be at low or high risk of cancer, $B = -0.09$, $p = .003$, $d = .24$. A simple slopes analysis was conducted to explore this interaction (Aiken & West, 1991). Specifically, we reran the full regression model after centering perceived cancer risk at one standard deviation above (and 1 standard deviation below) the mean (and recalculating the interaction term), which allowed us to examine the effect of a cancer diagnosis on well-being at high and low levels of perceived cancer risk (Aiken & West, 1991). As shown in Figure 1, when cancer risk perceptions were 1 SD below the mean, there was no significant effect of cancer diagnosis on changes in affective well-being ($B = 0.05$,

⁴ As mentioned, the MIDUS study included twin and sibling pairs in its sample. Nesting of participants within families may result in clustering of data, which violates the statistical assumption that observations are independent and identically distributed (IID). To test whether our analyses were affected by correlated data among family members, all analyses reported here were also conducted using linear mixed models, specifying an unstructured covariance matrix. In all cases, the results of these analyses controlling for potential clustering within families were consistent with the results reported here.

Table 1
Wave 1 Characteristics of Respondents With and Without a Cancer Diagnosis Prior to Wave 2: Percentages and Means (SDs)

Characteristic	Cancer diagnosis		OR	p value
	Yes (n = 158)	No (n = 3,243)		
Gender				
Female	53.8	54.8	—	
Male	46.2	45.2	1.01	.949
Age				
20–34	7.6	19.5	—	
35–44	13.3	28.4	1.23	.580
45–54	24.1	27.0	2.34	.012
55–64	29.1	16.9	4.98	<.001
64	25.9	8.2	8.88	<.001
Education				
Some high school or less	12.7	7.1	0.96	.881
High school graduate	28.5	26.9	0.73	.160
Some college	20.3	29.5	0.55	.011
College graduate	38.6	36.6	—	
Race				
White	94.9	93.2	—	
Black or African American	3.8	4.0	1.01	.980
Other	1.3	2.7	0.56	.427
Marital status				
Not married	29.7	28.0	—	
Married	70.3	72.0	0.97	.866
Life satisfaction	7.76 (1.50)	7.80 (1.18)	1.00	.977
Affective well-being	3.83 (0.73)	3.96 (0.58)	0.57	.002
Perceived cancer risk	2.97 (1.34)	2.99 (1.40)	1.06	.419
Trait optimism	3.27 (0.85)	3.30 (0.74)	1.03	.826
Depressive symptoms	0.75 (1.92)	0.72 (1.84)	0.99	.779
Perceived heart attack risk	2.66 (1.53)	2.57 (1.53)	1.02	.727

Note. Odds ratios and p values are from a logistic regression predicting cancer diagnosis.

$p = .423$, $d = .07$). However, when cancer risk perceptions were 1 SD above the mean, a cancer diagnosis was associated with decrements in affect ($B = -0.20$, $p < .001$, $d = .28$). For life satisfaction, the same pattern emerged, with perceived risk of cancer moderating the effect of cancer diagnosis on life satisfaction, $B = -0.16$, $p = .010$, $d = .21$. As before, cancer was associated with a reduction in life satisfaction when precancer risk perceptions were high ($B = -0.54$, $p < .001$, $d = .36$) but not low ($B = -0.09$, $p = .454$, $d = .06$; see Figure 1).

Table 2
New Cancer Diagnoses Between MIDUS Waves 1 and 2

Cancer type	n	%
Breast	43	25.7
Cervical	4	2.4
Colon	15	9.0
Lung	6	3.6
Lymphoma/leukemia	11	6.6
Ovarian	3	1.8
Prostate	42	25.1
Uterine	4	2.4
Other ¹	39	23.4

Note. MIDUS = National Survey of Midlife Development in the U.S. Wave 1 data were collected in 1995–1996; Wave 2 data in 2004–2006.
¹ Examples of cancers reported in the “Other” category included those of the bladder, blood, brain, ear, esophagus, female reproductive system, kidney, lymph nodes, mouth, muscles, pancreas, testicles, and thyroid.

Perceived Heart Attack Risk, Trait Optimism, and Depression

Perceived cancer risk correlated weakly with trait optimism ($r = -0.10$, $p < .001$) and depression ($r = .12$, $p < .001$) and moderately with perceived heart attack risk ($r = .30$, $p < .001$). Unlike cancer risk perceptions, these other variables failed to moderate the effects of a cancer diagnosis on subjective well-being when added to the regression models. For life satisfaction, there was no significant interaction between cancer diagnosis and perceived heart attack risk ($B = 0.01$, $p = .916$, $d = .01$), trait optimism ($B = 0.17$, $p = .089$, $d = .14$), or depression ($B = 0.03$, $p = .503$, $d = .05$). The interaction between cancer diagnosis and perceived cancer risk, on the other hand, remained significant, $B = -0.20$, $p = .002$, $d = .25$. For affective well-being, there was also no significant interaction between cancer diagnosis and trait optimism ($B = 0.06$, $p = .209$, $d = .10$) depression ($B = -0.00$, $p = .848$, $d = .02$), or heart attack risk perceptions ($B = -0.05$, $p = .097$, $d = .14$). As before, the interaction between cancer diagnosis and perceived cancer risk remained significant ($B = -0.08$, $p = .015$, $d = .20$).

Years Since Diagnosis

Among the subset of participants reporting a cancer diagnosis, life satisfaction and affective well-being were not significantly related to years since diagnosis ($p = .180$ and $p = .209$, respectively). There was also no evidence that the effect of cancer risk

Table 3
Wave 1 Predictors of Affective Well-Being and Life Satisfaction at Wave 2

Variable	Affective well-being		Life satisfaction	
	<i>B</i>	<i>p</i> value	<i>B</i>	<i>p</i> value
Gender				
Male	0.01	.492	−0.11	.003
Female	—	—	—	—
Age				
20–34	—	—	—	—
35–44	0.02	.536	−0.04	.478
45–54	0.09	<.001	0.18	.001
55–64	0.16	<.001	0.37	<.001
64	0.05	.122	0.10	.159
Education				
Some high school or less	−0.14	<.001	−0.38	<.001
High school graduate	−0.07	.002	−0.23	<.001
Some college	−0.03	.216	−0.15	.001
College graduate	—	—	—	—
Race				
White	—	—	—	—
Black or African American	−0.02	.665	−0.07	.440
Other	−0.04	.446	0.04	.742
Marital status				
Not married	—	—	—	—
Married	−0.02	.267	0.16	<.001
Cancer diagnosis				
No	—	—	—	—
Yes	−0.07	.059	−0.31	<.001
Perceived cancer risk	−0.02	.011	−0.03	.012
Wave 1 affective well-being	0.51	<.001	—	—
Wave 1 life satisfaction	—	—	0.52	<.001

Note. Adjusted R^2 was .31 for the model predicting affective well-being and .32 for the model predicting life satisfaction.

perceptions was moderated by years since diagnosis, either for affective well-being ($p = .335$) or life satisfaction ($p = .830$). Similarly, the effects of trait optimism, depression, and heart attack risk perceptions on life satisfaction and affective well-being did not appear to be moderated by years since diagnosis (all $ps \geq .200$).

Supplemental Analyses

Follow-up analyses were conducted to control for various factors potentially related to perceived risk and subjective well-being. First, analyses controlled for whether or not participants reported any family history of cancer. None of the survey results reported here changed when statistical analyses controlled for this risk factor. Second, analyses were conducted to control for the effects of functional status. Participants with a cancer diagnosis tended to report significantly more limitations on their basic ($B = -0.11$, $p = .016$, $d = .20$) and instrumental activities ($B = -0.24$, $p < .001$, $d = .31$) than did other participants. However, analyses controlling for these variables yielded results consistent with those reported here. Lastly, follow-up analyses were conducted to control for current treatment status in participants with a cancer diagnosis. Controlling for whether respondents reported currently receiving any treatment or therapy for cancer⁵ did not attenuate the associations between perceived cancer risk and affective well-being and life satisfaction in the sample of cancer survivors.

Discussion

Recent studies have uncovered striking health benefits of low rather than high perceived risk concerning various diseases (Barefoot et al., 2011; Gramling et al., 2008; Partridge et al., 2008; Waters et al., 2010). However, such studies have not assessed risk beliefs and outcomes longitudinally, prior to and following disease diagnosis, which is an important omission because, in theory, low predisease risk perceptions may leave people poorly prepared to deal with disease once it develops. The present study examined such effects of predisease expectations on postdisease subjective well-being, focusing on effects in the important domain of cancer. The study found that, rather than harming well-being, low perceived risk of getting cancer was associated with a buffering effect in the years following cancer diagnosis. For people who judged themselves to be at high risk of cancer, a cancer diagnosis was associated with persistent—although small—reductions in affective well-being and life satisfaction in the long-term. On the other hand, no reductions in affective well-being and life satisfaction were found in cancer survivors who, prior to being diagnosed, judged themselves to be at low risk of cancer.

These results add to the literature on psychosocial oncology, which has demonstrated people's challenges and resilience in terms of long-term recovery from cancer diagnoses and treatment (Bradley et al., 2006; Holland, 2003; Holland et al., 2010; Tope, Ahles, & Silberfarb, 1993). A robust literature has documented a range of factors that provide a buffer against lasting negative effects of cancer on quality of life, such as social support, socioeconomic factors, older age, personality factors, and coping style (Costanzo et al., 2009; Holland et al., 2010; Koopman, Hermanson, Diamond, Angell, & Spiegel, 1998). This study identifies low predisease risk perceptions concerning cancer risk as a potential protective factor, and the study calls for further research to uncover the mechanisms of this effect.

It may be that people with low perceived cancer risk tend to have higher preventability beliefs and greater perceived control over cancer. Preventability and control beliefs may become particularly important for subjective well-being following diagnosis and treatment, as the threat of cancer recurrence can generate anxiety and depression and interfere with quality of life in survivors (Custers et al., in press; Partridge et al., 2008; Waters et al., 2010). This explanation, although tentative, would suggest preventability and control beliefs as important potential targets of intervention. Just as changes in public discourse concerning the survivability of cancer may have altered the subjective experience and meaning of cancer (Pudrovskaya, 2010), encouraging a public discourse that portrays cancer as preventable and controllable may also benefit subjective well-being among survivors (e.g., see related efforts to influence disease and controllability beliefs among cardiac disease patients; Petrie, Cameron, Ellis, Buick, & Weinman, 2002; Broadbent, Ellis, Thomas, Gamble, & Petrie, 2009). Follow-up studies are needed to replicate the present results and examine this interesting possibility.

One criticism of research reporting a link between health expectations and self-reported measures of psychological adjustment

⁵ One respondent who reported using only meditation or relaxation was included in the nontreatment group. Including this person in the treatment group did not alter the results.

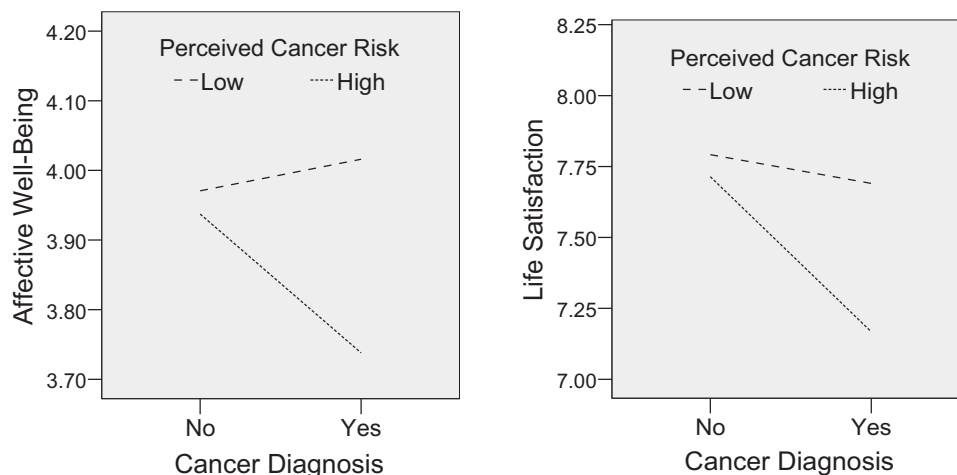


Figure 1. The effect of a cancer diagnosis on affective well-being and life satisfaction depended on whether predisease risk perceptions for cancer were low or high (1 SD below or above the mean, respectively).

(as in the present study) is that low perceived risk and high subjective well-being may both be products of positively inflated self-assessments (Aspinwall & MacNamara, 2005; Shedler, Mayman, & Manis, 1993; Robins & Beer, 2001). Thus, some people may simply provide more rosy estimates across a wide range of measures, without any real differences in psychological adjustment. Such an explanation is unlikely to account for the effects of cancer risk perceptions observed in the present study, as similar effects were not observed either for heart attack risk perceptions or trait optimism. Similarly, a second alternative explanation for the observed health benefits of low perceived risk is that it may be a marker for a lack of depression (cf. Gramling & Epstein, 2011), which may in turn be associated with poor health outcomes. However, the present study found no evidence that depression moderated the impact of cancer on subjective well-being, or that controlling for the effect of depression attenuated the psychological benefits associated with low cancer risk perceptions.

Future Research: Time-Frame, Objective Risk, and Controllability

Further research is needed to address several questions raised by the present research. First, studies are needed to uncover potential moderators of the influence of perceived cancer risk on psychological well-being following a cancer diagnosis, as prior studies suggest that, at least under some circumstances, forewarning people about an impending negative event can reduce its aversiveness (Shepperd & McNulty, 2002; Weisenberg et al., 1996). One possibility is that the benefits of forewarning may occur for immediate, short-term reactions to a diagnosis (e.g., helping people “brace themselves”), whereas the underlying stress-buffering and motivational benefits of low perceived risk may prevail during long-term recovery. Additionally, recent research suggests that even people who are optimistic about a particular outcome tend to shift their expectations downward at key times, such as prior to receiving important feedback such as a test result, which may help to manage potential disappointment and motivate care-seeking (Sweeny, Carroll, & Shepperd, 2006). Future research might examine whether

predisease expectations predict long- and short-term outcomes differentially, depending on when the expectations are measured. It is possible that, among those diagnosed with cancer, expectations immediately preceding the diagnosis may predict immediate affective outcomes (i.e., in the hours, days, or weeks following diagnosis), whereas perceived risk measured under “everyday” circumstances may predict long-term subjective well-being, as in the present study.

A second question raised by the present study is whether or not perceived risk was grounded in objective risk. Perceiving oneself to be at low risk for a given outcome may be associated with different health outcomes depending on whether the person is at objectively low or high risk (Klein & Cooper, 2008). Because there is no single measure of overall, objective risk for cancer, and given that the present study had relatively small samples of survivors of individual cancer types for which objective risk estimates can be calculated (e.g., breast, colorectal, lung), this study was unable to calculate and control for participants’ objective risk level (e.g., Ferrer et al., 2012; Gramling et al., 2008). Further research is needed in these and other domains for which clear formulas exist for predicting objective disease risk, as such studies can examine whether there are differential effects of realistic and unrealistic risk perceptions across various outcomes. For example, it is possible that low perceived risk always has direct benefits in terms of buffering stress (Taylor & Brown, 1988), but that, when unrealistic, it is associated with certain negative health outcomes by inhibiting preventive behaviors (e.g., Dillard, Midboe, & Klein, 2009). The latter, negative effect would be consistent with research suggesting that unrealistic beliefs about personal risk can be associated with less preventive behavior and less effective processing of risk-related information (Klein & Cooper, 2008).

A final consideration for future research is whether perceived risk may have differential effects depending on the predictability or controllability of the focal event. Cancer is related to behavioral risk factors in a highly probabilistic manner, with potential interactions and synergies among genetics, environment, and stochastic biological processes. Thus, there is no single preventive behavior

that will virtually ensure that an individual will not develop cancer, a situation that differs from other risk domains with more controllable outcomes (e.g., acquisition of sexually transmitted infections). In cases of fairly low controllability and predictability, low perceived risk may be particularly helpful in mitigating stress, while carrying a lower risk of damaging health outcomes through the inhibition of preventive behaviors (e.g., Dillard et al., 2009). It is left for future research to explore whether perceived risk is differentially impactful for events that vary in controllability and predictability.

Limitations

Several limitations of the present study warrant mention. First, the study was not experimental, precluding conclusions about the potential value of encouraging lower cancer risk perceptions (e.g., through emphasis on preventability and controllability). Also, as with other research concerning the effects of expectations, it is not clear whether this study uncovered benefits of low perceived risk or harms of high perceived risk. Complicating this issue, cancer may be unique among diseases in that it tends to be associated with a high degree of fatalism. In one nationally representative sample of U.S. adults, nearly half of all respondents agreed with the statement, "It seems like almost everything causes cancer" (Niederdeppe & Levy, 2007). Similarly, approximately 60% of respondents either somewhat or strongly agreed that, when they think of cancer, they automatically think of death (Moser et al., in press). Rather than low perceived risk predicting positive outcomes, it may be that high perceived risk (or related phenomena, such as pessimistic and fatalistic views) predicted poor outcomes. Studies are thus needed to replicate the present results with other illnesses that tend to be viewed differently.

The present study also made the simplifying assumption that cancers, aside from skin cancer, would be associated with similar effects on subjective well-being. Aggregating across different types of cancer was necessary to obtain a sufficiently large sample size in which to conduct statistical tests (e.g., Costanzo et al., 2009). However, it is important to note that the present results may not generalize to all types of cancer. Equally important, this study was limited to an analysis of the effects of cancer on subjective well-being and did not assess other outcomes, such as health behaviors, that may show different associations with perceived risk. Finally, this study assessed perceptions of cancer risk in general rather than perceptions of risk from specific types of cancer (e.g., breast, lung). Thus, participants may have estimated their cancer risk with one type of cancer in mind and subsequently developed a different type of cancer, which may have added noise to the results. These possibilities highlight the importance of replicating the present findings using different illnesses, different health outcomes, and more precise measures of expectations.

Lastly, our results concerning the impact of a cancer diagnosis on long-term affective well-being and life satisfaction must be interpreted with caution given the possibility of selection effects. Cancer survivors who continue to participate in an intensive, time-consuming research study such as MIDUS may tend to be those who are doing well with treatment and survivorship. Studies conducted in contexts with less potential for selection bias are needed to provide a fuller picture of the impact of cancer on long-term subjective well-being.

Conclusion

Low precancer risk perceptions were associated with long-term benefits, rather than harms, for subjective well-being in people who developed cancer. The effect was consistent across well-validated measures of affective well-being and life satisfaction, and the effect was unique to expectations in the domain of cancer risk. The results call for replication with other diseases, and they raise important questions such as whether the relationship is causal, whether perceived risk has similar effects when it is accurate and inaccurate, and whether the effect is best conceptualized in terms of benefits of low perceived risk or harms of high perceived risk.

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