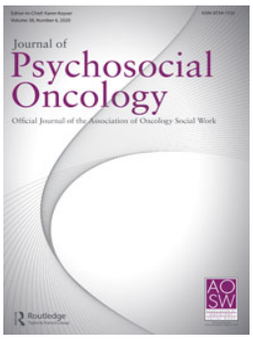

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ARTICLE

Perceived importance of affective forecasting in cancer treatment decision making

Laura M. Perry, MS[a], Michael Hoerger, PhD, MSCR[a,b], Brittany D. Korotkin, MA[a], and Paul R. Duberstein, PhD[c]

[a]Department of Psychology, Tulane University, New Orleans, LA, USA; [b]Tulane Cancer Center, Tulane University, New Orleans, LA, USA; [c]Department of Health Behavior, Society, and Policy, Rutgers School of Public Health, Piscataway, NJ, USA

ABSTRACT

Purpose: To examine whether adults with cancer view affective forecasting as important for treatment decisions, and to examine these perceptions among key subgroups.

Design: Adults with cancer ($N = 376$) completed a cross-sectional survey that included demographic and clinical characteristics, the IPIP five-factor personality measure, and a rating of the perceived importance of affective forecasting for cancer treatment decisions. Descriptive statistics characterized the importance of affective forecasting. Multivariate analyses examined whether health and personality variables were associated with affective forecasting importance.

Findings: Most participants (89.6%) identified affective forecasting as important for treatment decisions. Affective forecasting was more likely to be rated as important among patients with prostate cancer ($p < .001$), patients lower in neuroticism ($p = .02$), and patients higher in agreeableness ($p = .004$).

Conclusions/Implications: Patients believe it is important to understand how treatments will impact their emotional well-being. Oncology clinicians should discuss with patients these consequences during healthcare decision-making.

KEYWORDS
Cancer; decision making; emotions; forecasting; neuroticism; oncology; personality

Understanding the role of emotional processes in cancer treatment decision making warrants more attention. The social psychology literature[1–4] has shown that many life decisions are influenced by affective forecasting, the process of predicting how decisional options will affect emotional well-being. Yet, these predictions are vulnerable to error,[1,2] which can lead people to make decisions they later regret.[5–7] An emerging area of research has found that affective forecasting is also important for medical decisions,[4,8–11] but, to our knowledge, no study has examined whether patients view affective forecasting as important. Additionally, the majority of studies have focused on the role of affective forecasting for screening and other

*CONTACT Laura M. Perry, MS Lperry5@tulane.edu Department of Psychology, Tulane University, 3035 Percival Stern Hall, New Orleans, LA 70118, USA.

prevention-focused behaviors[12–14] rather than preference-sensitive treatment decisions for those who have been diagnosed with cancer. Given the movement toward patient-centered communication in cancer care,[15,16] the present research aims to fill these gaps.

There is a need for identifying subpopulations for whom affective forecasting may be more important for treatment decision making, as this can help with targeting future research studies or interventions to appropriate populations. For example, a recent meta-analysis[8] found that interventions based on affective forecasting theory effectively helped people engage in a variety of health behaviors, but there was considerable heterogeneity with regard to the specific population and health behavior under question. It is possible that these interventions worked better for populations who viewed their future emotions as a more important part of their decision process. Among cancer patients, we hypothesized that affective forecasting would be particularly important in contexts such as prostate cancer, where most cases are low-risk and treatment decisions are often 'preference sensitive.'[17] Decisions may be preference sensitive when there is clinical equipoise among different options with similar effectiveness or when strong personal values come into play. In prostate cancer, available treatments are uncertain[18] and patients often experience regret regarding treatment-associated declines in sexual and urinary function,[19,20] so understanding how a patient will feel in the future is critical to making an informed decision. Furthermore, although individuals with other types of cancer make preference sensitive decisions in specific contexts (e.g., mastectomy vs. lumpectomy in early-stage breast cancer, low anterior resection vs. abdominoperineal resection in colorectal cancer), decision-making in prostate cancer is often preference-sensitive and affectively charged due to the potential impact on future sexual desire and performance.[19–21] Therefore, we hypothesized that individuals with prostate cancer would indicate a greater preference for affective forecasting as an important priority compared to individuals with other cancers.

In addition to cancer type, there may be circumstances when other physical factors, such as illness severity, increase the importance of affective forecasting. Affective forecasting may be more important when treatment decision making is more complex and consequential,[22] such as when patients have greater symptom burden,[23] other comorbid conditions,[24] or metastatic disease;[25] patients may care more about the emotional consequences when the stakes are higher and they are more likely to make decisions that will impact their quality of life. Therefore, we hypothesized that those who had greater illness severity would be more likely to view affective forecasting as an important priority for their treatment decision making. This hypothesis is consistent with the literature showing that as people's

perceived lifespan shortens, people place greater emphasis on emotional well-being.[26,27]

There may also be circumstances when personality factors, such as being lower in neuroticism, impact affective forecasting. The Five Factor Model[28] summarizes personality into five comprehensive domains: openness to experience, conscientiousness, extroversion, agreeableness, and neuroticism. These traits can help explain variability in the perceived importance of affective forecasting. For example, neuroticism is a trait characterized by anxiety, depression, and impulsiveness, and those higher in neuroticism often engage in emotional avoidance during stressful situations.[29,30] Therefore, we hypothesized that individuals lower in neuroticism (i.e., emotionally stable),[28] would be more comfortable discussing emotions, and thus perceive affective forecasting as more important for the decision-making process.

Rather than completing standard affective forecasting tasks,[1,13] participants in this study reported on how important it was for them to consider future emotional well-being when making treatment decisions. The primary goal of the present investigation was to understand the extent to which affective forecasting was perceived as an important priority to cancer patients, and to identify predictors of perceived priority. We hypothesized that the process of affective forecasting would be viewed as more important among patients with prostate cancer, greater illness severity, and lower neuroticism.

Method

Participants and procedure

Participants were patients with cancer ($N = 376$) who were recruited for an NIMH-funded Internet-mediated survey study. Participants were recruited using the NIH ResearchMatch recruitment tool,[31] which allows investigators at 169 research institutions to recruit participants from a pool of over 140,000 volunteers with varying health histories. Recruitment proceeded in two waves, first targeting patients with prostate cancer, and then opening the study to patients with other cancer diagnoses. We wanted to ensure we had a large enough sample of patients with prostate cancer to examine our hypothesis about perceived importance of affective forecasting. Eligibility criteria included being age 18 or over, being able to read/understand English, having a cancer diagnosis, and being in active oncologic care. Volunteers meeting eligibility criteria were provided with a link to the study website, which included an online consent form, contact information for project personnel, and the study survey. As an incentive to participate, each participant was provided with an automated individually-tailored

personality feedback report upon completing the study, based on their responses to the personality survey. All study procedures adhered to technical and ethical guidelines for Internet studies[32] and were approved by the Institutional Review Board (ethical approval #RSRB00037941).

Measures

Demographic and clinical characteristics

Participants provided basic sociodemographic and diagnostic information, including cancer site, time since diagnosis, and current/planned treatments. Three indicators of illness severity were assessed, including physical symptom burden, presence of metastatic disease, and presence of comorbid health conditions. Physical symptom burden was assessed with the FACT-G[33] Physical Well-being subscale (Cronbach's alpha = .86). Metastatic status was measured by self-report of advanced cancer, which was described as cancer metastasized to other regions. Comorbidity was measured as the presence of any of 13 common health conditions (e.g., diabetes, arthritis, congestive heart failure) on a validated 13-item health history checklist.[34]

Personality

Participants completed the 20-item International Personality Item Pool (IPIP)[35] measure of the five-factor model of personality, which assesses neuroticism (Cronbach's $\alpha = .77$), extraversion ($\alpha = .82$), openness to experience ($\alpha = .67$), agreeableness ($\alpha = .72$), and conscientiousness ($\alpha = .64$). Sample items included "I get upset easily" (neuroticism) and "I sympathize with others' feelings" (agreeableness). The measure has been validated in cancer samples.[36]

Importance of affective forecasting

Participants were asked, "If you were facing a difficult decision between two medical treatments, would it be an important priority to know how the treatments would impact your emotional well-being?" The response scale ranged from 1 (Disagree) to 6 (Agree). The question operationalizes affective forecasting similarly to how it has been described in the literature on medical decision making.[9]

Statistical analyses

All analyses were conducted using SPSS software, version 22.0 (SPSS, Chicago, IL). All tests conducted were two-tailed ($\alpha = .05$). Descriptive statistics were used to summarize sample characteristics and the sample's rating of affective forecasting importance. Responses were rationally

dichotomized at the scale's midpoint for univariate and multivariate analyses, thus comparing those who disagree (responses 1-3 coded as "0") with those who agree (responses 4-6 coded as "1") that affective forecasting is important. Logistic regression was used to analyze whether demographic, health, and personality variables (independent variables) were associated with affective forecasting importance (dependent variable). Univariate analyses examined each independent variable individually. Then, multivariate analyses examined multiple independent variables simultaneously in hierarchical fashion. In those analyses, demographics (age, gender, education level) were entered into the model in the first step, followed by health-related variables in the second step (cancer site (prostate vs. other), FACT-G symptom burden, presence of metastases, presence of a comorbid condition), and personality variables in the final step. Variables were added into the second and thirds steps if they were relevant to our *a priori* hypotheses, or if they had significant ($p < .05$) univariate associations with affective forecasting importance. To facilitate meaningful interpretation of odds ratios, age was coded in decade units (i.e., odds ratios reflect the expected change associated with 10 years increased age), and personality scores and FACT-G scores were coded in standard deviation units (i.e., odds ratios reflect the expected change associated with a 1-*SD* increase in personality or FACT-G symptom scores). Sensitivity analyses examined whether our choice of cut scores on the dichotomized measures artificially diminished any of the associations relative to using ordinal scales or different cut scores, but that was not found to be the case. Additional sensitivity analyses examined the robustness of findings when adjusting for additional covariates, and these analyses are noted only briefly, as the pattern of findings was comparable. In all multivariate analyses, models were screened for and found not to have substantial collinearity (i.e., all variance inflation factors were <3, well below the recommended maximum of 10).

Results

Sample characteristics

Descriptive statistics for the sample of 376 patients with cancer are shown in Table 1. Participants ranged in age from 21 to 84, with 17.8% below age 50 and 13.3% over age 70. Most of the participants were White, educated, married, and insured. By design, approximately half the sample (56.4%) had prostate cancer. The non-prostate cancer diagnoses included breast cancer (15.2%), colon/rectal cancer (13.6%), hematologic cancers (7.4%), and other cancers (7.4%, most commonly cancer of the skin, bladder, lung, or kidney). Owing to their diagnoses, about 2/3 of the sample was male: 100% male for prostate cancer (by definition), 96.5% female for breast cancer, and 63.6% female for all other cancers. They varied in time since diagnosis

Table 1. Sample characteristics.

Variable		*M* (*SD*) or *N* (%)
Age, years	58.3	(10.4)
Gender: Female	123	(32.7%)
Education: Bachelors or higher	253	(67.3%)
Race/Ethnicity: White, non-Latino/a	354	(94.1%)
Marital Status: Married	294	(78.2%)
Health Insurance Status: None or Medicaid	30	(8.1%)
Census Geographic Region		
North	52	(13.8%)
Midwest	71	(18.9%)
South	109	(29.0%)
West	72	(19.1%)
International	72	(19.1%)
Cancer Site		
Prostate	212	(56.4%)
Non-Prostate	164	(43.6%)
Breast	57	(15.2%)
Colon/Rectal	51	(13.6%)
Hematologic	28	(7.4%)
Other	28	(7.4%)
Time Since Diagnosis		
−3 months	49	(13.0%)
3.1-12.0 months	128	(34.0%)
1.1-5.0 years	147	(39.1%)
> 5.0 years	52	(13.8%)
Cancer Treatments		
Radiation only	42	(11.2%)
Chemotherapy only	38	(10.1%)
Surgery only	48	(12.8%)
Combination therapy	62	(16.5%)
Biologic/targeted therapy	49	(13.0%)
Uncertain/other/none	137	(36.4%)
FACT-G Symptom Burden	1.2	(0.9)
Metastases Present	116	(30.9%)
Presence of Comorbidity	232	(61.7%)
Neuroticism	52.6	(11.2)
Extraversion	47.1	(10.6)
Openness to Experience	53.1	(9.6)
Agreeableness	50.6	(9.6)
Conscientiousness	52.7	(9.7)
Total Sample	376	(100%)

Note. FACT-G = Functional Assessment of Cancer Therapy-General.

(*Mdn* = 12.0 months, *IQR* = 6.0 months to 3 years) and cancer treatments (radiation: 29.3%; chemotherapy: 29.0%; surgery: 27.4%; biologic/targeted therapy: 13.0%; other treatment: 18.4%; unknown treatment: 6.9%; no treatment: 19.7%). About 30% reported metastatic disease. Over 60% reported at least one comorbid health condition, most commonly hypertension. On average, personality scale scores were comparable to those observed in the published scale development sample (i.e., *T*-scores near 50).

Importance of affective forecasting

As shown in Figure 1, most participants agreed that affective forecasting was an important priority for their treatment decision making. In total,

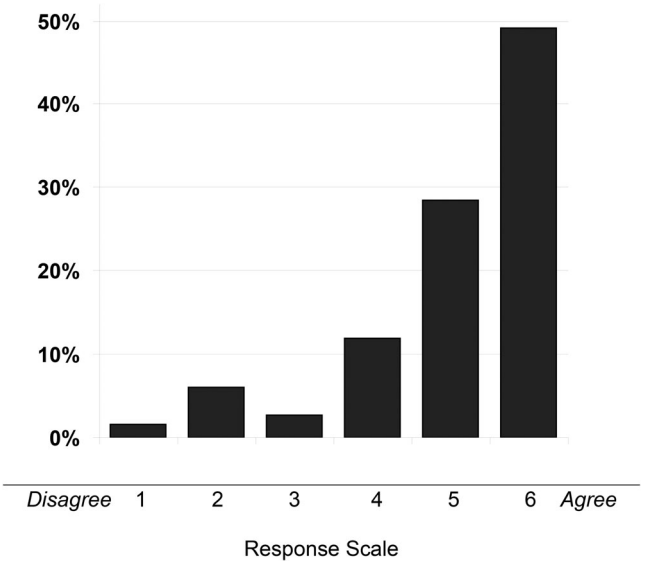

Figure 1. Perceived importance of affective forecasting to cancer decision making. Patients with cancer ($N = 376$) were asked, "If you were facing a difficult decision between two medical treatments, would it be an important priority to know how the treatments would impact your emotional well-being?" The majority (89.6%) showed some level of agreement, selecting responses 4, 5, or 6 on the six-point rating scale.

89.6% of participants selected one of the 'agree' options on the response scale, with about half (49.2%) selecting the most extreme response.

Demographic associations

Within each of the demographic subgroups we examined, > 80% of participants agreed that affective forecasting was important, with only age accounting for significant variation. Specifically, in the univariate analysis increasing age was associated with a greater odds of agreement that affective forecasting was important, odds ratio (OR) = 1.47, $p = .02$. For example, 80.6% of participants under age 50 agreed affective forecasting was important, compared to 91.6% of those 50 years and over. Percentages were comparable ($ps > .30$) across subgroups based on education level (less than a Bachelor's degree: 91.9%, Bachelor's degree and higher: 88.5%), race/ethnicity (White non-Latino: 89.6%, others races/ethnicities: 90.9%), marital status (married: 90.5%, unmarried: 86.6%), health insurance status (no insurance/Medicaid: 93.4%, private/Medicare/other insurance: 89.2%), and geographic location (North: 88.5%, Midwest: 90.1%, South: 92.3%, West: 90.2%, International: 84.7%).

Health associations

Affective forecasting was important to most participants (>80%) within each of the health-related subgroups we examined, with only cancer site

accounting for significant variation. As hypothesized, participants with prostate cancer (94.8%) were more likely than participants with non-prostate cancers (82.9%) to agree that affective forecasting was important, OR = 3.76, $p < .001$. The percentages were comparable across the non-prostate diagnostic groups represented in our study (breast cancer: 86.0%, colon/rectal cancers: 80.4%, hematologic cancers: 82.1%, other cancers: 82.1%). There were no differences based on indicators of illness severity, such as FACT-G symptom burden, the presence of metastatic disease, or the presence of comorbid health conditions, nor for other health characteristics, such as treatment type and recency of diagnosis (all ps $> .28$).

Personality associations

As hypothesized, participants who were less neurotic were more likely to agree that affective forecasting was important, OR = 0.66, $p = .02$. For example, 94.9% of those participants in the lowest quartile of neuroticism agreed that affective forecasting was important, relative to 87.9% of participants in the highest quartile. Although not hypothesized, participants who were more agreeable also rated affective forecasting as more important, OR = 1.59, $p = .004$, namely 94.1% among those in the top quartile and 85.7% of those in the bottom quartile.

Multivariate associations

Multivariate analyses examined the role of demographics, health characteristics, and personality in explaining the perceived importance of affective forecasting (see Table 2). As hypothesized (see Model 3), participants with prostate cancer continued to be more likely than those with non-prostate cancers to agree that affective forecasting was important (OR = 12.60, $p < .001$), even after we adjusted for demographics, illness severity, and personality. Hypotheses concerning illness severity were partially supported. Specifically, participants with greater symptom burden on the FACT-G were more likely to agree that affective forecasting was important (OR = 1.63, $p = .03$), though this effect should be interpreted with caution as it only emerged in the fully adjusted model. As hypothesized, personality continued to have significant effects in the multivariate model (neuroticism: OR = 0.54, $p = .005$; agreeableness: OR = 1.82, $p = .001$), over and above demographics and health characteristics. Finally, although unanticipated, in the fully adjusted model female gender was associated with an increased likelihood of agreeing that affective forecasting was important, OR = 2.77, $p = .048$. Examining gender and cancer diagnosis simultaneously showed that 94.8% of men with prostate cancer rated affective forecasting as

Table 2. Multivariate analysis of factors associated with identifying affective forecasting as an important priority for cancer decision making.

	Model 1		Model 2		Model 3	
Predictor	Odds Ratio	*p*	Odds Ratio	*p*	Odds Ratio	*p*
Step 1: Demographics						
Age, decades[a]	1.41 (1.00–1.98)	.052	1.30 (0.90–1.88)	.158	1.11 (0.76–1.61)	.599
Gender, female	0.81 (0.38–1.70)	.577	2.27 (0.92–5.58)	.075	2.77 (1.01–7.58)	.048
Education, Bachelor's degree	0.69 (0.32–1.47)	.335	0.63 (0.29–1.40)	.261	0.54 (0.23–1.25)	.151
Step 2: Health Characteristics						
Cancer site, prostate			6.26 (2.30–17.03)	<.001	12.60 (4.01–39.56)	<.001
FACT-G symptom burden[a]			1.29 (0.89–1.86)	.178	1.63 (1.06–2.52)	.026
Metastases present			0.72 (0.34–1.51)	.379	0.57 (0.26–1.25)	.161
Comorbidity present			0.70 (0.33–1.50)	.357	0.80 (0.35–1.80)	.584
Step 3: Personality						
Neuroticism[a]					0.54 (0.35–0.83)	.005
Agreeableness[a]					1.82 (1.26–2.61)	.001

Note. $N = 376$ patients with cancer. Models were tested using logistic regression, with the dependent variable coded as 1 (agree affective forecasting is important) versus 0 (disagree). FACT-G = Functional Assessment of Cancer Therapy.

[a]To facilitate model interpretation, age is reported in decade units, and scores have been standardized for FACT-G symptom burden, Neuroticism, and Agreeableness.

important, followed by women (86.2%), then men with non-prostate cancers (73.2%).

Sensitivity analyses

Adding the six other demographic and health variables to the model (race/ethnicity, marital status, geographic region, insurance status, cancer treatments, and time since diagnosis) produced comparable results. Associations for gender (OR = 3.92, $p = .02$), prostate cancer (OR = 17.87, $p < .001$), FACT-G symptom burden (OR = 1.63, $p = .04$), neuroticism (OR = 0.45, $p = .001$), and agreeableness (OR = 1.71, $p = .005$) remained significant.

Conclusions

The present study shows that adults with cancer believe affective forecasting is an important priority in making treatment decisions. Most participants (89.6%) agreed that affective forecasting was important to them and about half (49.2%) selected the most extreme response. Percentages were also high among key demographic groups, suggesting that there are not significant differences in the importance of affective forecasting across socioeconomic status, racial and ethnic groups, or health insurance status. These findings reinforce calls for clinicians to increase dialogue with patients about their emotions.[15,37]

Although most patients believed affective forecasting was important, the present study also sheds light on some subgroup differences based on health characteristics and personality factors that have implications for cancer decision making. As hypothesized, patients with prostate cancer (94.8%) were more likely than patients with other cancer diagnoses (82.9%) to believe affective forecasting was important. In prostate cancer, treatments involve different tradeoffs and the decision regarding treatment can have emotional consequences, given the potential for urinary incontinence and sexual side effects.[18–20] While prostate cancer is an apparent exemplar of challenges in affective forecasting, we suspect future researchers will find affective forecasting to be important in other illness contexts if they zoom-in on key treatment decisions that are marked by uncertainty and strong emotions. Examples include decisions about whether to have reconstruction surgery following mastectomy in breast cancer,[38] whether to have prophylactic cranial irradiation in small-cell lung cancer, whether to have a permanent colostomy in rectal cancer,[38] or whether to utilize palliative care in advanced illness.[39]

In addition to health-related characteristics, we found that psychological characteristics, such as being less neurotic and more agreeable, were

associated with rating affective forecasting as important. Individuals with cancer who are more neurotic experience more emotional distress[36] and may have a desire to avoid discussing emotions. In addition, more neurotic individuals may assume that they will continue to feel chronically distressed regardless of their treatment decision or other life circumstances, leading them to rate affective forecasting as less important. In contrast, people who are lower in neuroticism or higher in agreeableness may be more inclined to think affective forecasting is important because they are well-adjusted and more emotionally perceptive, leading them to be more comfortable discussing emotions and more aware of the potential impact that decisional choices could have on context-dependent changes in their emotional experience.[30,40]

Clinical implications

Our findings are consistent with prior research showing that patients value discussions of emotions during clinical encounters,[15,41] and support recent paradigm shifts in oncology care suggesting that oncology clinicians should discuss the emotional consequences of treatment decisions with patients.[37,42] Furthermore, patients, who are lower in neuroticism and higher in agreeableness, may be more comfortable and interested in discussing emotions early on, whereas, other patients may wish to discuss the potential emotional consequences of their illness after first discussing other health information. Adding to recent calls for personality-informed cancer care,[36] future research should examine whether decision interventions informed by affective forecasting theory can be tailored to personality to improve patients' perceptions of the decision-making process.[16]

Study limitations

This study had both strengths and limitations. By design, the study targeted participants with prostate cancer before opening up the study to other cancers. There are opportunities for future studies involving larges samples of people with other cancers. The sample was also predominantly White and well educated. Thus, future studies could examine these questions in racially diverse samples and with patients with lower levels of education. Additionally, we measured the importance of affective forecasting with a single-item with unknown psychometric properties and in the context of any type of medical decision rather than in a cancer-specific context. Future studies could develop longer and more detailed measures specific to decision-making about cancer treatments. Nonetheless, this limitation is qualified by the fact that although previous studies have used measures to

examine the perceived importance of the event or decision under question during an affective forecasting task,[43–45] there are no other existing measures addressing the perceived importance of the affective forecasting process for decision making. Therefore, the present study is novel and addresses an important topic that has not been previously examined.

In conclusion, we identified affective forecasting as important to patients in making cancer treatment decisions. Oncology clinicians should discuss with patients how healthcare options may impact patients' emotional well-being.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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ORCID

Laura M. Perry http://orcid.org/0000-0001-6144-6266
Brittany D. Korotkin http://orcid.org/0000-0001-9967-4360
Paul R. Duberstein http://orcid.org/0000-0001-6882-0898

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