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Dispositional Optimism and Therapeutic Expectations in Early Phase Oncology Trials

Lynn A. Jansen, PhD,

Madeline Brill Nelson Chair in Ethics Education-Oregon Health & Science University

Daruka Mahadevan, MD, PhD,

Director, New Therapeutics Program and Associate Director of Research – University of Tennessee and West Clinic

Paul S. Appelbaum, MD,

Dollard Professor of Psychiatry, Medicine, & Law/Director, Division of Law, Ethics, and Psychiatry/Columbia University College of Physicians & Surgeons

William MP Klein, PhD,

Associate Director: Behavioral Research Program-National Institutes of Health/National Cancer Institute

Neil D. Weinstein, PhD,

Distinguished Professor Emeritus-Department of Human Ecology-Rutgers University

Motomi Mori, PhD,

Walter & Clara Brownfield Professor of Cancer Biostatistics, School of Public Health and Medicine, Oregon Health & Science University/Knight Cancer Institute

Racky Daffé, MS, and

Senior Research Assistant-Oregon Health & Science University

Daniel P. Sulmasy, MD, PhD

Kilbride-Clinton Professor Professor of Medicine and Ethics in the Department of Medicine and the Divinity School, University of Chicago

Lynn A. Jansen: jansen@ohsu.edu; Daruka Mahadevan: dmahadevan@WESTCLINIC.com; Paul S. Appelbaum: psa21@columbia.edu; William MP Klein: kleinwm@mail.nih.gov; Neil D. Weinstein: neilw@AESOP.Rutgers.edu; Motomi Mori: morim@ohsu.edu; Racky Daffé: daffe@ohsu.edu; Daniel P. Sulmasy: dsulmasy@uchicago.edu

Abstract

Corresponding Author: Lynn A. Jansen, PhD, 3181 S.W. Sam Jackson Park Rd, Portland, OR 97239, Phone: 503-494-6906.

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Author Contributions: **Lynn A. Jansen:** Conceptualization, methodology, software, investigation, resources, writing – original draft, writing – review and editing, visualization, supervision, project administration, and funding acquisition. **Daruka Mahadevan:** Conceptualization, formal analysis, investigation, writing – original draft, writing – review and editing, supervision, project administration, and funding acquisition. **Paul S. Appelbaum:** Methodology and writing – review and editing. **William MP Klein:** Conceptualization, methodology, writing – original draft, writing – review and editing, and supervision. **Neil D. Weinstein:** Conceptualization, methodology, validation, resources, writing – original draft, and writing – review and editing. **Motomi Mori:** Methodology, formal analysis, writing – review and editing, visualization, and supervision. **Racky Daffé:** Methodology, software, validation, formal analysis, investigation, data curation, writing – original draft, writing – review and editing, and visualization. **Daniel P. Sulmasy:** Conceptualization, methodology, validation, resources, writing – original draft, and writing – review and editing.

Purpose—Prior research has identified unrealistic optimism as a bias that might impair informed consent among patient-subjects in early phase oncology trials. Optimism, however, is not a unitary construct – it can also be defined as a general disposition, or what is called dispositional optimism. We assessed whether dispositional optimism would be related to high expectations for personal therapeutic benefit reported by patient-subjects in these trials but not to the therapeutic misconception. We also assessed how dispositional optimism related to unrealistic optimism.

Methods—Patient-subjects completed questionnaires designed to measure expectations for therapeutic benefit, dispositional optimism, unrealistic optimism, and the therapeutic misconception.

Results—Dispositional optimism was significantly associated with higher expectations for personal therapeutic benefit (Spearman $r=0.333$, $p<0.0001$), but was not associated with the therapeutic misconception. (Spearman $r=-0.075$, $p=0.329$). Dispositional optimism was weakly associated with unrealistic optimism (Spearman $r=0.215$, $p=0.005$). In multivariate analysis, both dispositional optimism ($p=0.02$) and unrealistic optimism ($p<0.0001$) were independently associated with high expectations for personal therapeutic benefit. Unrealistic optimism ($p=.0001$), but not dispositional optimism, was independently associated with the therapeutic misconception.

Conclusion—High expectations for therapeutic benefit among patient-subjects in early phase oncology trials should not be assumed to result from misunderstanding of specific information about the trials. Our data reveal that these expectations are associated with either a dispositionally positive outlook on life or biased expectations about specific aspects of trial participation. Not all manifestations of optimism are the same, and different types of optimism likely have different consequences for informed consent in early phase oncology research.

Keywords

Dispositional Optimism; Therapeutic Misconception; Therapeutic Optimism; Informed Consent; Cancer Research

Patient-subjects in early phase oncology trials often report high expectations for personal therapeutic benefit. Although it is true that some participants may benefit, these trials are not designed to provide participants with therapeutic benefit.¹ The ethical significance of this optimism therefore has been an on-going concern among researchers and ethicists.^{1–7} Although some have claimed that expressions of optimism alone are never problematic in clinical research³, prior studies have documented the potential for optimism to impair informed consent.^{5,6} This apparent contradiction may be explained by the fact that optimism is not a unitary psychological construct.⁸ Failure to distinguish the different types of optimism can lead researchers and ethicists to disagree when debating its ethical significance for informed consent.

One type of optimism, unrealistic optimism, is an event-specific bias that has been associated with distortions in risk/benefit assessment in a range of health-related contexts including early phase oncology trials.^{5,9–11} People possessing this bias tend to engage in defensive processing of information, overestimating their prospects for benefit and/or underestimating their susceptibility to risks associated with the event in question. However, a different type of optimism is an enduring personality characteristic referred to as

dispositional optimism. People high in dispositional optimism tend to expect positive future outcomes, in the aggregate. Dispositional optimism has not been associated with defensive processing of information, and instead has been found to be positively related to how people attend to and process risk/benefit information, as well as effective coping and well-being.^{11–14} No research has attempted to determine the extent to which expectations for personal therapeutic benefit reported by patient-subjects in early phase oncology trials are associated with the generally adaptive dispositional optimism rather than the problematic unrealistic optimism. It is also not known how dispositional optimism relates to other factors commonly associated with these high expectations, such as the therapeutic misconception (i.e., the failure to grasp the differences between clinical research and beneficent medical care).¹⁵

We conducted a multicenter study to examine these issues. We investigated the relationship between dispositional optimism and expectations of personal therapeutic benefit reported by patient-subjects enrolled in early phase oncology trials. Given the prevalence of dispositional optimism in the general population, we predicted that it would be present among the participants in our study. We hypothesized that dispositional optimism would predict high expectations for personal therapeutic benefit expressed by patient-subjects enrolled in early phase oncology trials, but that it would *not* be positively correlated with either the therapeutic misconception or unrealistic optimism. Past research has found that dispositional optimists “are more flexible and adaptive in their consideration of information about potential problems and stressors.”¹³ Improved information processing, we conjectured, could make dispositionally optimistic patient-subjects less susceptible to the therapeutic misconception. Further, past research has found that dispositional optimism is not generally correlated with unrealistic optimism, although it may have independent (and possibly interactive) effects with it.^{10,16}

METHODS

Participants

Participants were patient-subjects enrolled in early phase oncology trials (phase I, I/II or II) at two major cancer centers in the United States. They were 18 years of age or older, and able to speak and read English. The Institutional Review Boards at both sites approved the study.

Definitions, Procedures and Measures

Participants gave written informed consent and participated in a structured face-to-face interview with a research associate who had been trained to administer the questionnaires.

Dispositional Optimism—Dispositional optimism refers to “the generalized positive expectancy that one will experience good outcomes.”¹¹ People who score high in dispositional optimism tend generally to accentuate the positive and downplay the negative. Consistent with established practice, we used the Revised Life Orientation Test (LOT-R) to measure dispositional optimism. The LOT-R was developed by Carver and Scheier and has demonstrated discriminant validity and reliability in numerous studies.¹⁷ This instrument

consists of ten self-report items, four of which are filler items. The self-report items ask patient-subjects to respond to statements such as “In uncertain times, I usually expect the best” and “Overall, I expect more good things to happen to me than bad.” Each item is rated on a 5-point scale ranging from 0 (strongly disagree) to 4 (strongly agree). We analyzed the six dispositional optimism questions individually, as well as the mean score on all items combined. To calculate LOT-R scores, we dropped the four filler questions, reverse-coded the negatively worded questions (e.g., “I hardly ever expect things to go my way”), and added them to the positively worded questions (e.g., “I am always optimistic about my future”). The total LOT-R score was used as a measure of dispositional optimism (DO score). In addition, the optimism and pessimism sub-scales (obtained from the 3 items each with positive and negative wording respectively) were analyzed separately.

Expectations for Personal Therapeutic Benefit—Expectations for personal therapeutic benefit refer to patient-subjects’ non-comparative expressions of hope/concern regarding their own participation in the trial in which they are enrolled. Unlike dispositional optimism, expectations for personal therapeutic benefit are event-specific. We used a Personal Therapeutic Benefit Questionnaire to measure these expressions of hope/concern. Patient-subjects rated their expectations of experiencing 7 research-related benefits and their personal concern about experiencing 2 research-related risks (the ratings of the latter questions were reversed). Sample questions include “indicate your own personal hope about having your cancer controlled by the drugs you get in the trial” and “indicate your own personal concern about experiencing a health problem caused by the drugs you get in the trial.” Responses were given on a four-point Likert scale ranging from “I don’t feel at all optimistic/concerned about this happening to me” to (4) “I feel quite optimistic/concerned about this happening to me.” A Personal Therapeutic Benefit score was determined by calculating the mean score of the nine questions. The Personal Therapeutic Benefit Questionnaire was developed by this research team, pilot tested among cancer patients, and demonstrated ample face validity. Cronbach Coefficient Alpha was 0.86, which is considered a good internal consistency.

Therapeutic Misconception—The Therapeutic Misconception occurs when patient-subjects conflate the contexts of research and therapy, thereby inaccurately attributing therapeutic intent to research procedures.² The TM scale was used to determine the presence and magnitude of the therapeutic misconception. The TM scale asks patient-subjects to rate their level of agreement with respect to ten research-related statements.^{18–19} A sample statement is “a researcher’s most important task is to make sure that the research will help the people who participate.” Each item was rated on a 5-point scale ranging from 1 (agree) to 5 (disagree). The ratings were reversed to ease interpretation of results. The scale includes three dimensions associated with TM: perceptions of the degree of individualization of the intervention, benefit from participation, and the purpose of the trial. The TM scale was developed by Appelbaum and Lidz and has demonstrated reliability in several previous studies.^{18–19} A total TM score, as well as a total score per dimension, were determined by calculating the mean score of the ten questions and the mean score of each dimension respectively.

Unrealistic Optimism—Unrealistic optimism is a bias in which a person mistakenly believes that she is more likely to experience positive outcomes with respect to a specific event compared to similar others facing the same event. Unlike dispositional optimism, unrealistic optimism is event-specific; unlike expectations for personal therapeutic benefit it is comparative. We used the Comparative Risk/Benefit Assessment Questionnaire (CRBA) modeled after an instrument developed by Weinstein to measure unrealistic optimism.^{5,20} (The CRBA questionnaire is the standard method for measuring perceived comparative risk.^{9–11}) This questionnaire asks respondents to compare their chances of experiencing 9 research-related events with the chances of similar others experiencing these same events. A sample question is “Compared with other patients invited to participate in the same cancer research trial you are invited to participate in, what are the chances that your life expectancy will be increased by the drugs you get in the trial?” Respondents then answer the question by choosing one response on a seven-point interval scale, with values from –3 (much below average) to +3 (much above average). Comparative risk/benefit judgments are considered unbiased when the *mean* judgment of the group is zero. Each item score, as well as the mean score of all items, was used in the statistical analyses.

Statistical Considerations

Data were entered in a REDCap (<http://project-redcap.org/>) database using a double entry procedure. Discrepancies in data entry were identified and corrected by a third operator. Descriptive statistics (e.g., percent for categorical variables, and mean and standard deviation for continuous variables) were used to summarize demographic and clinical characteristics. Spearman’s correlation coefficient was used to assess the association of dispositional optimism and its two subscales with the other measures and the association of therapeutic misconception with unrealistic optimism and expectations of personal therapeutic benefit. Kruskal-Wallis test or Wilcoxon rank sum test were used to assess the association between the dispositional optimism score and demographic characteristics.

Univariate and multivariate linear regression analyses were carried out to further evaluate factors that were independently associated with expectations of personal therapeutic benefit and therapeutic misconception (dependent variables). Factors tested (independent variables) included total unrealistic optimism score, dispositional optimism score, age, gender, study site, ethnicity, education, religion, cancer type, participation in previous research, domestic status, marital status and, interchangeably, therapeutic misconception and expectations for personal therapeutic benefit. Stepwise procedure was performed for variable selection. Standard model diagnostics were performed, testing first for non-linearity of independent variables vs. dependent variable. Additionally, we examined outliers and influential points looking at studentized residuals, Cook’s D and DFITTS. We then tested for normality of residuals using kernel density plot, quantile-quantile plot and the Shapiro-Wilk test. Multicollinearity was inspected using variance inflation factor (VIF). The model diagnostics did not show any significant deviations from the model assumptions. The scatterplots of response and factors variables showed linearity, and there were no detectable influential points or outliers. The residuals were approximately normal, and there was no indication of significant multicollinearity.

A p-value of $< .05$ was considered statistically significant. Data management and analysis were conducted using Statistical Analysis System (SAS) version 9.4.²¹

RESULTS

Patient Characteristics

We approached 233 patient-subjects who were enrolled in early phase oncology trials. Of these, 171 (73%) agreed to be interviewed for our study. Demographic and clinical characteristics of the participants are presented in Table 1. The average age was 59 years old. We interviewed slightly more women than men (51% vs. 49%). The largest race/ethnic group was white (non-Hispanic) (85%). A substantial majority of the participants had completed college (68%); were married (67%); and had not participated in a prior clinical research study (69%).

Magnitude of Dispositional Optimism, Therapeutic Misconception, Expectations for Personal Therapeutic Benefit and Unrealistic Optimism

Descriptive statistics on the LOT-R questionnaire (dispositional optimism), the therapeutic misconception scale, the personal therapeutic benefit questionnaire and CRBA questionnaire are reported in Table 2. Neither dispositional optimism nor unrealistic optimism was significantly associated with study site, age, gender, race/ethnicity, education, religion or type of cancer ($p>.05$). See Table 3.

Association of Dispositional Optimism with Expectations for Personal Therapeutic Benefit

Consistent with our hypotheses, dispositional optimism was significantly associated with higher expectations for personal therapeutic benefit (Spearman $r=0.333$, $p<0.0001$). Regarding the subscales of the LOT-R, expectations for personal therapeutic benefit were strongly positively associated with the optimism subscale (Spearman $r=0.404$, $p<0.0001$), and weakly negatively associated with the pessimism subscale (Spearman $r=-.192$, $p=0.012$).

Association of Dispositional Optimism with Therapeutic Misconception

Consistent with our hypotheses, dispositional optimism was not associated with the therapeutic misconception (Spearman $r=-0.075$, $p=0.329$). The optimism and pessimism subscales were also not associated with the total TM score (respectively: Spearman $r=0.085$, $p=0.267$; Spearman $r=0.136$, $p=0.077$), although the optimism subscale was correlated with perceptions of likelihood of benefit (Spearman $r=0.156$, $p=0.041$).

Association of Dispositional Optimism and Unrealistic Optimism

Dispositional optimism was weakly associated with unrealistic optimism (Spearman $r=0.215$, $p=0.005$). The optimism subscale of the LOT-R held a stronger association with unrealistic optimism (Spearman $r=0.279$, $p=0.0002$); the pessimism subscale was not associated with unrealistic optimism (Spearman $r=-0.127$, $p=0.097$).

Factors Associated with Therapeutic Misconception

In univariate regression analyses, five factors were significantly associated with therapeutic misconception: Male gender ($p=0.004$), an educational level of HS or less ($p<0.0001$), participation in previous research ($p=0.007$), total unrealistic optimism score ($p=0.0003$) and expectation for personal therapeutic benefit ($p=0.007$). In multivariate regression analysis (Table 4), however, expectation for personal benefit and previous research participation dropped out of the model and the factors that were independently associated with therapeutic misconception were male gender ($p=0.004$), lower education level ($p<0.0001$), and unrealistic optimism ($p=0.0001$). Thus, whereas dispositional optimism was not independently associated with therapeutic misconception, unrealistic optimism was.

Factors Associated with Expectations for Personal Therapeutic Benefit

In univariate analyses, high expectations for personal therapeutic benefit were significantly associated with unrealistic optimism ($p<0.0001$), total therapeutic misconception score ($p=0.007$) and dispositional optimism ($p<0.0001$) (Figure 1). In multiple linear regression analysis, however, only dispositional optimism ($p=0.02$) and unrealistic optimism ($p<0.0001$) were found to be independent predictors of high expectations for personal therapeutic benefit (Table 5).

DISCUSSION

Discussions of optimism in clinical research elicit mixed opinions. Some contend that optimism among trial participants is never ethically problematic.³ Others express concern that optimism in this context reveals a failure of informed consent.⁵⁻⁶ Our study addresses part of this disagreement by exploring two distinct phenomena represented by the term “optimism,” each of which may have different ethical implications.

We investigated whether dispositional optimism could help to explain, in part, the expectations for personal therapeutic benefit expressed by patient-subjects in early phase oncology trials, without entailing commonly studied problems in informed consent. We confirmed our expectation that dispositional optimism among the patient-subjects we studied would be associated with high expectations for personal therapeutic benefit. In fact, dispositional optimism predicted high expectations for personal therapeutic benefit independently of other variables. These findings are not unexpected, as dispositional optimism is commonly defined in terms of generalized positive outcome expectancies.²² Given that dispositional optimism is regarded as a trait and not a product of misunderstanding or irrationality, it should not provoke ethical concern among researchers unless it is associated with other factors that have been found to impair informed decision making. Indeed, expectations for therapeutic benefit that result from a dispositionally optimistic orientation and are not associated with either misunderstanding or bias may reflect hopeful feelings rather than any failure to appreciate relevant information.

Importantly, we found that dispositional optimism was *not* significantly associated with the therapeutic misconception. Although a substantial number of the patient-subjects we interviewed manifested the therapeutic misconception, dispositional optimism did not appear

to be a factor that accounted for it. Research on dispositional optimism in other contexts has found that dispositionally optimistic people, when confronted with a stressful life event, are more likely than people not dispositionally optimistic to process and retain the full range of information provided to them, including negative or unwelcome information.^{12–14, 22} On this basis, we conjectured that dispositional optimism would not be associated with the therapeutic misconception. In contrast to some recent suggestions in the literature,^{23–24} the fact that the dispositionally optimistic participants in our study were neither more or less likely to suffer from the therapeutic misconception suggests that therapeutic misconception does not merely reflect participants' hopeful expressions about the results of their participation in a study.

We found an association between dispositional optimism and unrealistic optimism, but the association was weak. This finding is consistent with past work that shows that dispositional optimism and unrealistic optimism are not strongly associated and represent different types of optimism.¹¹

Past research has found a link between unrealistic optimism and deficits in informed consent.^{5,6} In our study, whereas dispositional optimism and unrealistic optimism both predicted high expectations for personal therapeutic benefit, only unrealistic optimism predicted the therapeutic misconception. Thus, dispositional optimism appeared to account for some of the high expectations for personal benefit reported by the patient-subjects we studied without being strongly associated with either unrealistic optimism or the therapeutic misconception.

Our study provides clinicians and researchers with a more complete and balanced understanding of how optimism relates to the therapeutic expectations of patient-subjects enrolled in early phase cancer trials. Its findings reveal the ethical complexity of optimism for informed consent in early phase oncology trials. Although one type of optimism can be an ethically benign, and possibly adaptive, dispositional orientation to stressful events, another type of optimism appears to be a bias that has the potential to compromise informed consent. Without carefully distinguishing dispositional optimism from unrealistic optimism, no single conclusion can be drawn about the ethical significance of optimistic expectations for therapeutic benefit in this context.

Our study was subject to some limitations. First, the sample was predominantly White (non-Hispanic); it remains unclear whether our findings are generalizable to other demographic groups. Our study included only adult patient-subjects, mostly of middle-age, enrolled in early phase oncology trials. We do not know whether our findings are generalizable to other research populations, for example patient-subjects of other ages, including children and adolescents, or patient-subjects enrolled in later phase cancer trials or in other clinical research. Second, our study did not investigate other potentially adaptive consequences of dispositional optimism, such as its association with psychological adjustment or improved coping, or potential negative outcomes. A complete picture of the ethical significance of dispositional optimism for patient-subjects enrolled in early phase oncology trials would need to take into account these further potential benefits and harms.

CONCLUSION

High expectations for therapeutic benefit among patient-subjects in early phase oncology trials should not be assumed to result only from misunderstanding of specific information about the trials. Instead our data reveal that these expectations may be associated with either a general, dispositionally positive outlook on life or biased expectations about specific aspects of trial participation.

Although unrealistic optimism may impair informed consent, dispositional optimism likely does not. As dispositional optimism is a stable personality characteristic, there is little reason to think that it would be dampened by interventions to combat misunderstanding and bias about clinical trials. Thus our findings suggest that those who have claimed that optimism is not a problem for informed consent in early phase oncology trials are partly correct and partly incorrect. Investigators need to know that all forms of optimism are not the same, and that different types of optimism likely have different consequences for informed consent.

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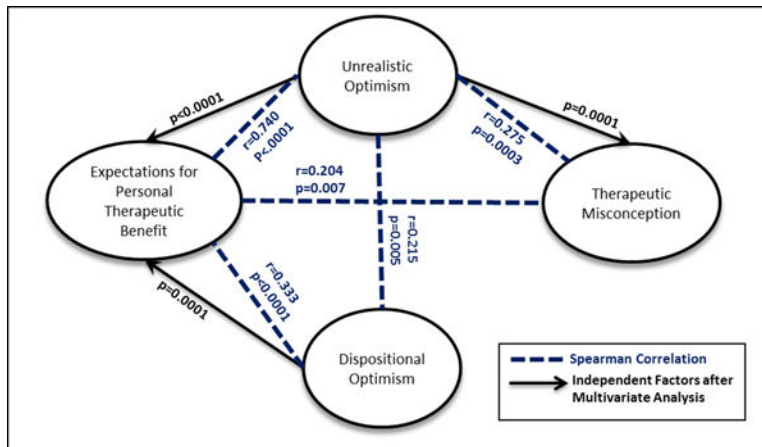


Figure 1.
Factors Associated with Expectations for Personal Therapeutic Benefit

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Table 1

Demographic Characteristics

Characteristics	No. of patients (N=171)	%	Mean	Min	Max	SD
Age			58.64	18	85	12.78
	(18–49)	18.13				
	(50–64)	42.69				
	(65–74)	33.33				
	(75 +)	5.85				
Study Site						
	Site 1	49.71				
	Site 2	50.29				
Gender						
	Male	49.12				
	Female	50.88				
Race						
	White (non-Hispanic)	85.38				
	African American/or Black of US origin	9.94				
	Other	4.68				
Education						
	Grade school/High school	31.58				
	College	47.37				
	Graduate/Prof. School	21.05				
Religion						
	Protestant	38.01				
	Catholic	15.2				
	Agnostic	7.02				
	Other †	39.77				
Cancer Problem						
	Blood cancer	31.58				
	Lung Cancer	15.2				
	Breast cancer	13.45				
	Other	39.77				
Domestic Status (Do you live alone)						
	Yes	18.13				

Characteristics	No. of patients (N=171)	%	Mean	Min	Max	SD
	140	81.87				
	No					
Marital Status						
Single	28	16.47				
Married	115	67.65				
Divorced	17	10				
Widowed	10	5.88				
Participation in Previous Research Study						
Yes	53	30.99				
No	118	69.01				
Phase of Clinical Trial						
Phase I	89	52.05				
Phase II	63	36.84				
Phase I/II	19	11.11				

[†]Includes Baptist, Christian, Methodist, Buddhist, Spiritual, none, no response etc.

Dispositional Optimism, Therapeutic Misconception, Expected Therapeutic Benefit and Unrealistic Optimism Descriptive Statistics

Table 2

Variables	Theoretical range	Mean Scores	Std. Dev.	25th Percentile	75th Percentile
Dispositional Optimism	(1.67 – 5)	4.07	0.24	3.67	4.67
Therapeutic Misconception	(1.30 – 5)	3.79	0.77	3.4	4.4
Expected Therapeutic Benefit	(1.66 – 4)	3.16	0.59	2.67	3.67
Unrealistic Optimism	(–1.77 – 3)	1	0.97	0.33	1.67

Table 3

Association between Demographic Characteristics and Types of Optimism

Demographic Characteristics	Level	Dispositional Optimism			Unrealistic Optimism			
		N	Mean	SD	P-Value	Mean	SD	P-Value
Study Site	Site 1	85	3.959	0.711	0.054	0.928	0.779	0.195
	Site 2	86	4.184	0.573		1.074	1.127	
Age Group	(18–49)	31	3.919	0.722	0.344	0.853	0.878	0.288
	(50–64)	73	4.071	0.670		1.026	0.967	
	(65–74)	57	4.114	0.611		0.981	1.057	
	(75 +)	10	4.317	0.506		1.400	0.713	
Gender	Male	84	4.030	0.678	0.499	1.089	0.882	0.236
	Female	87	4.113	0.630		0.917	1.046	
Race	White(non-Hispanic)	146	4.078	0.653	0.821	0.994	0.912	0.684
	African American/or Black of US origin	17	4.088	0.693		0.974	1.387	
	Other	8	3.938	0.642		1.194	1.082	
	Grade school/High school	54	3.935	0.626	0.130	0.940	1.072	0.795
Education	College	81	4.111	0.694		1.058	0.917	
	Graduate/Prof. School	36	4.190	0.578		0.966	0.945	
Religion	Agnostic	12	4.111	0.613	0.847	0.630	0.518	0.179
	Protestant	65	4.097	0.639		0.906	0.981	
	Catholic	26	4.109	0.757		1.192	0.882	
	Other	68	4.027	0.643		1.085	1.038	
Cancer Problem	Blood cancer	54	4.065	0.607	0.342	0.961	0.880	0.636
	Breast cancer	23	4.196	0.670		1.184	1.161	
	Lung cancer	26	4.205	0.675		1.158	0.987	
	Other	68	3.985	0.674		0.912	0.968	

Table 4

Univariate Linear Regression Analysis to evaluate the Association with Expectations for Personal Therapeutic Benefit and Therapeutic Misconception (significant association was indicated in bold)

Variable	Comparison	Expectations for Personal Therapeutic Benefit			Therapeutic Misconception		
		Estimate	SE	Overall P-value	Estimate	SE	Overall P-value
Age		-0.002	0.004	0.639	0.006	0.005	0.222
Study Site	Site 1 vs. Site 2	-0.081	0.091	0.376	-0.170	0.117	0.149
Gender	Male vs. Female	0.013	0.091	0.889	0.338	0.115	0.004
Ethnic group	White vs. Other	-0.057	0.217	0.852	-0.538	0.276	0.073
	African American/or Black of US origin vs. Other	-0.131	0.256		0.326	0.326	
Education	Grade School/High School vs. Graduate/Prof. School	0.053	0.128	0.655	0.572	0.157	<.0001
	College vs. Graduate/Prof. School	0.107	0.119		0.029	0.146	
Religion	Agnostic vs. Other	-0.135	0.187	0.887	-0.448	0.237	0.062
	Protestant vs. Other	-0.050	0.104		-0.317	0.132	
	Catholic vs. Other	-0.011	0.138		-0.157	0.175	
Cancer Type	Blood Cancer vs. Other	-0.004	0.108	0.373	-0.070	0.140	0.273
	Breast Cancer vs. Other	0.213	0.143		0.067	0.185	
	Lung Cancer vs. Other	0.131	0.137		0.283	0.177	
Previous Research	Yes vs. No	-0.027	0.098	0.784	-0.342	0.125	0.007
Domestic Status (Do you live alone)	Yes vs. No	-0.117	0.118	0.323	-0.077	0.153	0.615
Marital Status	Single vs. Widowed	0.115	0.219	0.243	-0.035	0.285	0.816
	Married vs. Widowed	0.227	0.196		0.110	0.255	
	Divorced vs. Widowed	0.422	0.236		0.119	0.309	
Total DO		0.274	0.067	<.0001	-0.054	0.090	0.548
Total UO		0.453	0.032	<.0001	0.217	0.059	0.0003

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Variable	Comparison	<u>Expectations for Personal Therapeutic Benefit</u>			<u>Therapeutic Misconception</u>		
		Estimate	SE	Overall P-value	Estimate	SE	Overall P-value
Total TM/Total Expected Therapeutic Benefit		0.158	0.058	0.007	0.264	0.097	0.007

Multivariate Regression Analysis of Factors that are Independently Associated with Personal Therapeutic Benefit and Therapeutic Misconception

Table 5

Variable	Comparison	Estimate	SE	P-value
Gender	Male vs. Female	0.310	0.105	0.004
Independent Factors of Therapeutic Misconception*				
Education	Grade School/High School vs. Graduate/Prof. School	0.601	0.146	<.0001
	College vs. Graduate/Prof. School	0.036	0.136	
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Total UO Score		0.215	0.054	0.0001
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Independent Factors of Expectations for Personal Therapeutic Benefit*				
Total DO		0.112	0.048	0.020
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Total UO		0.434	0.032	<.0001