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Original Article

Distress Mediates the Relationship Between Cognitive Appraisal of Medical Care and Benefit Finding/Posttraumatic Growth in Long-Term Cancer Survivors

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BACKGROUND: The objective of this study was to ascertain long-term cancer survivors' (LTCS') appraisal of medical care and how these perceptions may influence their health and well-being, including benefit finding (BF) and posttraumatic growth (PTG). **METHODS:** In total, 6952 LTCS from a multiregional population-based study in Germany completed the Benefit Finding Scale, the Posttraumatic Growth Inventory, the Questionnaire on Stress in Cancer, and self-designed questions on cognitive appraisal of medical care. The authors explored the mediating role of distress between medical care appraisal and BF and PTG and the possible moderation of time since diagnosis in this relationship. **RESULTS:** LTCS' medical care appraisals ("no unresolved/untreated symptoms," "satisfaction with cancer care," and "satisfaction with care for other diseases") were positively associated with BF. PTG was positively associated with "no unresolved/untreated symptoms" and negatively associated with "satisfaction with care for other diseases." Cancer distress partially mediated the associations between appraisals of medical care and BF, between "no unresolved/untreated symptoms" and PTG and between "satisfaction with care for other diseases" and PTG; whereas it totally mediated the association between "satisfaction with cancer care" and PTG. Time was a significant moderator in the model; the negative indirect effect of cognitive appraisal on BF and PTG through cancer distress weakened with longer time since diagnosis. **CONCLUSIONS:** Cancer survivors' medical care appraisal is associated with their perceptions of BF and PTG through distress. Therefore, distress screening could be part of the regular workup to identify distressed cancer survivors who are not satisfied with medical care; these survivors may benefit from interventions to reduce distress and increase BF and PTG. *Cancer* 2021;127:3680-3690. *© 2021 The Authors. Cancer published by Wiley Periodicals LLC on behalf of American Cancer Society. This is an open access article under the terms of the Creative Commons Attribution NonCommercial License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited and is not used for commercial purposes.*.

KEYWORDS: benefit finding, cancer survivors, cognitive appraisal, distress, medical care, moderator-mediator, posttraumatic growth.

INTRODUCTION

With advances in early detection and better treatment, survival rates for cancers are improving in many countries.[1] For example, the 5-year relative survival rates for cancer overall in the United States has increased from 49% in 1975 to almost 70% in 2011.[2] A similar trend was observed in Germany, with the number of 5-year survivors for cancer overall increasing from 1.5 million in 2010 to 1.6 million in 2016.[3] Some long-term (≥5 years postdiagnosis) cancer survivors (LTCS), even if they are cancer-free, still have to cope with long-term effects of treatment after the termination of regular follow-up care. The National Academy of Medicine highlighted the phenomenon of "lost in transition" in its landmark report[4] and indicated that cancer survivors still face numerous barriers to follow-up care, eg, the lack of standards of survivorship care. In view of the increasing number of cancer survivors and the barriers to care, it is necessary to ascertain LTCS' appraisal of their perceptions of medical care and how these perceptions influence their health and well-being.

Benefit finding (BF) and posttraumatic growth (PTG) are conceptualized as positive aspects of coping with cancer. BF refers to a form of cognitive adaptation to adversity in which survivors positively evaluate their circumstance.[5] PTG is defined as the positive changes experienced from a traumatic event.[6] They are considered as "meaning-made constructs" in the Meaning Making Model and have been studied in cancer survivors.[7-9] However, the 2 concepts have differences, eg, BF assesses the broader and less specific positive changes compared with PTG, and the adversity is not necessarily traumatic.[10]

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The Meaning Making Model

The Meaning Making Model is based on the assumption that life-threatening events challenge personal general orienting systems (global meaning) and cognitive appraisal of meaning in the context of a particular environmental encounter (situational meaning). The processes of meaning making include assigning meaning to the event, determining the discrepancies between appraised and global meaning, meaning-making processing, meanings made, and eventual adjustment. According to the model, BF and PTG can be developed from the cognitive appraisal of events through distress. The experience of distress is hypothesized as a perception of discrepancies between global and appraised meaning, and the process of meaning making is triggered by the effort to reduce these discrepancies.[7,8]

Cognitive Appraisal of Medical Care and BF/PTG

The cognitive appraisal of medical care is an example of the appraisal of event meaning. Cancer survivors who are satisfied with their health care may perceive a stronger belief of control.[9] More recent BF and PTG research has focused on the appraisal of care experiences and care needs. For example, greater satisfaction of needs and more positive cognitive appraisal could promote PTG[11]; satisfaction with nursing care was related to more PTG among inpatients.[12] A recent longitudinal study found a relation between BF and improved psychological functioning in cancer survivors (mean time postdiagnosis <5 years) who were receiving psychological care.[13] However, those studies neither focused on LTCS nor considered the role of cancer distress.

The Mediating Role of Distress

In line with the Meaning Making Model, studies have shown that distress could be predicted by cognitive appraisal in multiple types of traumatic events.[14,15] Studies have further examined the positive relationship between stressful cognitive appraisal and distress in cancer survivors.[16,17] A study on colorectal cancer survivors explored the stability of the relationship between PTG and psychological distress over time (from diagnosis to 5 years postdiagnosis) and found that PTG and psychological distress were mutual leading factors.[18] Consistent with the Meaning Making Model, increasing cancer distress induced BF and PTG. Conversely, increased BF and PTG, as made meanings, served as resources for reducing the discrepancies between global and appraised meaning and thus for relieving distress.[18] Whether BF and PTG are positively or negatively associated with distress depends on the time since diagnosis.[7,19,20] In newly diagnosed cancer survivors, distress is more likely to act as a booster of BF and PTG.[19,20] Furthermore, in time from diagnosis, BF and PTG could serve as resources for adjusting to the discrepancies between global and situational meaning, thereby decreasing distress.[7,8] For LTCS, distress may act as a mediator between cognitive appraisal and BF or PTG. The association between distress and BF or PTG could be moderated by time since diagnosis. However, previous studies failed to test this model in LTCS.[13,17]

The objectives of the current work in LTCS are: 1) to identify the relationship between cognitive appraisal of medical care and BF and PTG, 2) to examine the mediating role of cancer distress within these relationships, and 3) to examine whether time since diagnosis moderates the association between cancer distress and BF and PTG. Because there could be a potential difference between BF and PTG (eg, PTG may develop years after the cancer diagnosis, whereas BF could be experienced immediately after diagnosis[19]), in this study, we explore BF and PTG separately in the Meaning Making Model. On the basis of the theoretical background, the studied model investigated the following hypotheses: 1) variation in the value of cognitive appraisal of medical care (X) explains variation in BF and PTG (Y); 2) cancer distress (M) mediates the relationship between cognitive appraisal of medical care (X) and BF and PTG (Y), moderated by time since diagnosis (W) (Fig. 1A, conceptual model).[21] To date, there are no published studies on the relationship between cognitive appraisal of medical care and BF and PTG in LTCS. The current study may provide a new theoretical perspective of cognitive appraisal and convey clinical implications for health providers to identify LTCS who may need additional interventions to increase their satisfaction with medical care and foster an increase in BF and PTG.

MATERIALS AND METHODS

Study Participants

Respondents provided written informed consent and completed a mailed questionnaire from the CAESAR+ study (Cancer Survivorship—A Multiregional Population-Based Study) conducted from 2009 to 2011 by the German Cancer Research Center (Deutsches Krebsforschungszentrum) in collaboration with the participating population-based cancer registries.[22] Eligible participants were survivors of breast, prostate, or colorectal cancers diagnosed between 1994 and 2004
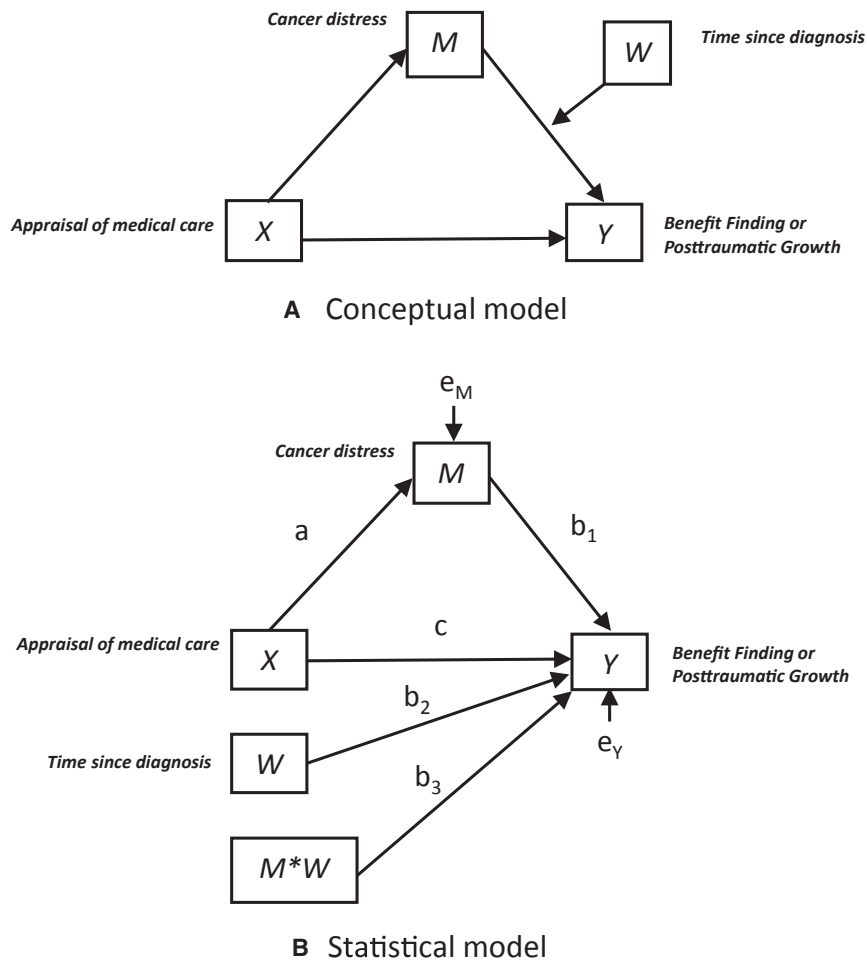
Figure 1. Conceptual and statistical models of this study adapted from Hayes[21] are shown. (A) The conceptual model allows the effect of cancer distress (*M*) on variations in benefit finding and posttraumatic growth (*Y*) in a mediation model to be moderated by time since diagnosis (*W*) while fixing the effect of the value of cognitive appraisal of medical care (*X*) on *M* with no moderation. (B) In the related statistical model, *a*, b_1, b_2, b_3, and *c* are estimated regression coefficients, i_M and i_Y are regression intercepts, and e_M and e_Y are errors in estimation.

who were registered in 1 of 6 population-based cancer registries in Germany (Bremen, Hamburg, North Rhine-Westphalia, Rhineland-Palatinate, Saarland, and Schleswig-Holstein). The Ethics Committee of the University of Heidelberg and the local ethics committees of the participating cancer registries approved the study.

Outcomes and Measurements
Demographic and clinical characteristics

Characteristics assessed in the CAESAR+ questionnaire included age at survey, sex, education, current marital status, having children, employment status, treatment, comorbidity, and disease recurrence. Information provided by the cancer registries included cancer type, age

at diagnosis, and cancer stage. Time since diagnosis was defined as the year of survey minus the year of diagnosis of the study cancer.

BF and PTG measurements

The German short form of the Benefit Finding Scale (BFS) was used to measure BF.[23] The 10-item BFS is scored on a 5-point Likert scale ranging from 1 ("not at all") to 5 ("extremely"). The original and German BFS versions are valid and reliable,[23,24] and the German version has been used previously in long-term cancer survivors.[25] Three subscales (appreciation of life, spiritual change, and new possibilities) of the Posttraumatic Growth Inventory (PTGI) were adopted to assess PTG.[26] The 3 scales consist of 10 items, which are scored on a 6-point Likert scale
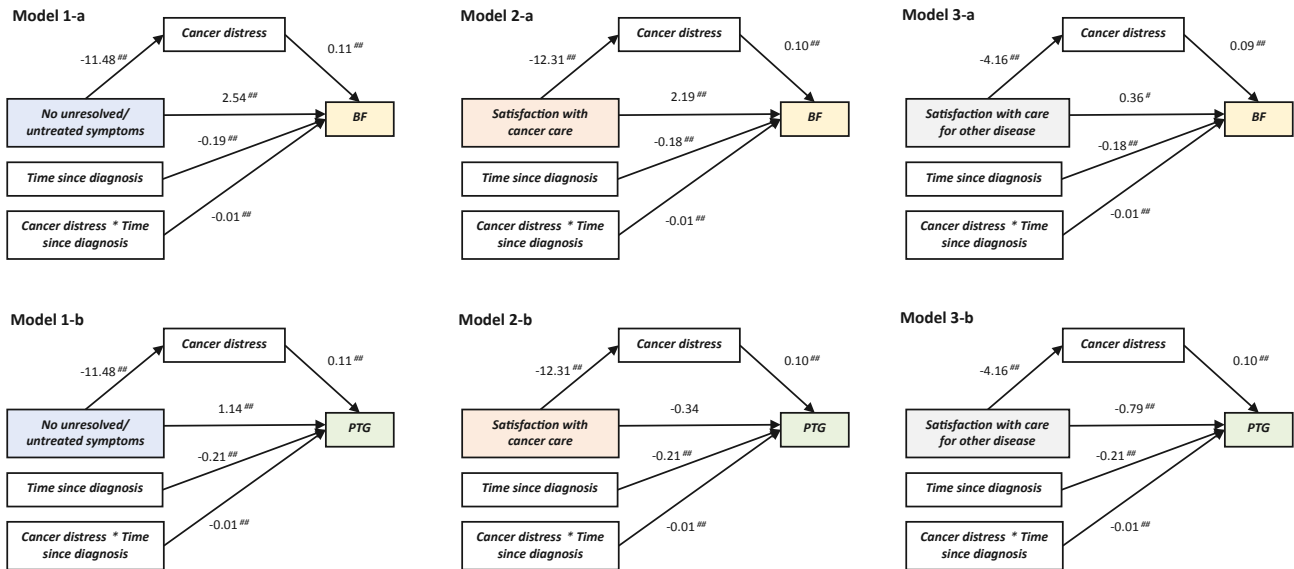
Figure 2. Statistical models of the relationship appraisal of medical care and benefit finding (BF) (models 1-a, 2-a, and 3-a) and posttraumatic growth (PTG) (models 1-b, 2-b, and 3-b) through cancer distress are illustrated. Model 1-a: $R^2 = 0.03$; F = 478.90; $P <$ .001; model 1-b: $R^2 = 0.04$; F = 586.12; $P <$ .001; model 2-a: $R^2 = 0.03$; F = 448.90; $P <$ .001; model 2-b: $R^2 = 0.04$; F = 577.86; $P <$ .001; model 3-a: $R^2 = 0.03$; F = 444.16; $P <$ .001; model 3-b: $R^2 = 0.04$; F = 581.16; $P <$ .001. $^{\#}P <$ .05. $^{\#\#}P <$ .001.

ranging from 0 ("I did not experience this change as a result of my cancer") to 5 ("I experienced this change to a very great degree as a result of my cancer"). The original and German PTGI versions are valid and reliable.[27,28]

Cognitive appraisal of medical care

Cognitive appraisal of medical care was assessed using 3 single items on the appraisal of treatment and care—the item "Do you currently have physical complaints that have not yet been resolved (diagnosed) or satisfactorily treated (unresolved/untreated symptoms)?" was modified from the Integral Multidisciplinary Assessment of Health Care[29]; the other 2 items, "Overall, do you feel well cared for your cancer (satisfaction with cancer care)?" and "Overall, do you feel well cared for other diseases (satisfaction with care for other diseases)?" were self-designed. Answers were either yes or no. The "unresolved/untreated symptoms" item was analyzed in reverse and thus was named "no unresolved/untreated symptoms." The 3 variables on cognitive appraisal of medical care were included in the model separately.

Cancer distress

Cancer distress was measured by the valid and reliable 10-item Questionnaire on Stress in Cancer-Revised Version (QSC-R10).[30] It contains 10 items pertaining to fears, psychosomatic complaints, social strains, information

deficits, and everyday life restrictions. Each item was first answered with "applicable" or "not applicable," indicating the area in which individuals experienced distress in daily life. If "applicable" was chosen, distress could be indicated on a 5-point scale ranging from 1 ("a slight problem") to 5 ("a very serious problem").

Statistical Analysis

Descriptive statistics, including means and standard deviations (SDs) for subsamples, were computed for the variables included in the model. The total raw scores of BFS, PTGI, and QSC-R10 were transformed to scales from 0 to 100. Multiple imputation using the Monte Carlo method with 25 repetitions was used to handle missing values. Distress and BF/PTG were mean-centered. A second-stage moderated mediation model was established in this study (see Fig. 2A). It was modeled separately with 2 equations, 1 for cancer distress ($M = i_M + aX + e_M$) and 1 for BF/PTG ($Y = i_Y + cX + b_1M + b_2W + b_3MW + e_Y$). This system of equations is represented visually in the form of a path diagram in Figure 1B. Assuming no interaction between X and M, the direct effect of X on Y is c. The indirect effect of X on Y is the product of the effect of X on M (a) and the conditional effect of M on Y ($b_1 + b_3W$), which is a linear function of W ($ab_1 + ab_3W$). The weight of W (ab_3) quantifies the relationship between moderator W and the size of the indirect effect of

X on Y through M, and is known as the index of moderated mediation (IMM) effect.[21]

After controlling for potential confounders (age at diagnosis, sex, education, cancer type, cancer stage, comorbidity, and recurrence), unstandardized ordinary least squares regression was applied to test the model using the macro program PROCESS 3.4 model 14 (SPSS version 21.0).[31] The effect of M (cancer distress) on Y (BF/PTG) is linearly moderated by W (time since diagnosis) if the regression coefficient for MW (b_3) is different from zero by confidence interval.[21] Additional indirect effects were examined by plotting the simple regression slopes of BF/PTG on distress and time since diagnosis (shorter, 1 SD below the mean; longer, 1 SD above the mean) and testing whether these simple slopes differed significantly from zero.[32] A bootstrap sample repeated 5000 times was generated to estimate the related regression coefficients (R^2) and calculate the IMM. The 95% bootstrap confidence interval was defined by the 2 values of the index in the distribution of 5000 values between the 2.5th and 97.5th percentiles. If the bootstrap confidence interval does not include zero, the hypothesis of moderated mediation can be maintained. A 2-tailed P value < .05 was considered statistically significant.

RESULTS
Sample Characteristics
In total, 6952 cancer survivors completed the questionnaire used for the current analysis. Of these survivors, 3045 were breast cancer survivors (43.8%), 1504 were colorectal cancer survivors (21.6%), and 2403 were prostate cancer survivors (34.6%). Overall, 47.2% of all participants were men. The mean age at diagnosis of the sample was 61.0 ± 8.9 years, and the mean time since diagnosis was 8.0 ± 2.2 years. Approximately 74% of participants were initially diagnosed with stage I or stage II disease according to the Union for International Cancer Control TNM Classification of Malignant Tumours 7th edition. Disease recurrence or second cancer occurred in 12.9% of the survivors. Of the cancer survivors, 67.1% reported "no unresolved/untreated symptoms," 95.9% reported "satisfaction with cancer care," and 79.4% reported "satisfaction with care for other diseases." Means and standard deviations of overall BF and PTG are listed in Table 1.

Direct Effects
The models in Figure 2 present the estimated regression coefficients controlled for the effects of medical and demographic covariates on BF and PTG. Cancer survivors who reported "no unresolved/untreated symptoms" (path c in Fig. 2, model 1-a; also see Supporting Table 1) (β = 2.54; 95% CI, 2.28-2.79), "satisfaction with cancer care" (path c in Fig. 2, model 2-a, and Supporting Table 1) (β = 2.19; 95% CI, 1.63-2.76), or "satisfaction with care for other diseases" (path c in Fig. 2, model 3-a, and Supporting Table 1) (β = 0.36; 95% CI, 0.08-0.64) reported higher BF. However, the test of a direct association between "satisfaction with cancer care" and PTG yielded a nonsignificant result (path c in Fig. 2, model 2-b, and Supporting Table 1) (β = −0.34; 95% CI, −0.86, 0.19). A positive association between PTG and "no unresolved/untreated symptoms" (path c in Fig. 2, model 1-b, and Supporting Table 1) (β = 1.14; 95% CI, 0.91-1.38) and a negative association with "satisfaction with care for other diseases" (path c in Fig. 2, model 3-b, and Supporting Table 1) (β = −0.79; 95% CI, −1.05, −0.53) were found.

After adjusting for medical and demographic covariates (age at diagnosis, sex, education, cancer type, cancer stage, comorbidity, recurrence), cancer survivors' appraisal of "no unresolved/untreated symptoms" was negatively related to distress, the mediator variable (path a in Fig. 2 and Supporting Table 1) (β = −11.48; 95% CI, −11.66, −11.30). Cancer distress was positively related to BF and PTG (all paths b_1 > 0 in Fig. 2 and Supporting Table 1). Furthermore, time since diagnosis was negatively related to BF and PTG (all paths b_2 < 0 in Fig. 2 and Supporting Table 1), and the interaction of distress and time since diagnosis was identified as negative for the relationship between cognitive appraisal of medical care (paths b_3 for "no unresolved/untreated symptoms," "satisfaction with cancer care," and "satisfaction with care for other diseases" in Fig. 2 and Supporting Table 1) were β = −0.01 (95% CI, −0.01, 0.00) toward both BF and PTG. When it was included in the models used in Figure 2 and Supporting Table 1, cancer distress partially mediated the associations between appraisals of medical care and BF (all R^2 = 0.03; P < .001), between "no unresolved/untreated symptoms" and PTG (R^2 = 0.04; P < .001), and between "satisfaction with care for other diseases" and PTG (R^2 = 0.04; P < .001); whereas it totally mediated the association between "satisfaction with cancer care" and PTG (R^2 = 0.04; P < .001).

Indirect Effects
The negative moderation effects of time since diagnosis (at levels of 1 SD below and above the mean) in the association of cancer distress with BF and PTG, as illustrated in Figure 3, were statistically significant (all paths b_3 ≠ 0

TABLE 1. Sample Characteristics and Descriptive Statistics After Multiple Imputation of Missing Values, N = 6952[a]

		Overall Benefit-Finding Score, Mean ± SD	Overall Posttraumatic Growth Score, Mean ± SD
Demographic characteristics			
Sex			
Men	47.2	55.1 ± 24.30	36.5 ± 21.8
Women	52.8	60.1 ± 23.44	43.3 ± 22.3
Age at cancer diagnosis, y			
26-59	35.6	59.1 ± 22.7	42.8 ± 22.1
60-69	48.2	57.5 ± 24.5	39.2 ± 22.5
70-76	16.2	55.6 ± 24.8	36.5 ± 21.7
Education, y			
≤9	55.0	59.3 ± 24.0	40.4 ± 22.1
10-11	23.4	58.2 ± 23.5	41.0 ± 21.8
≥12	21.6	53.2 ± 23.9	38.2 ± 23.1
Clinical characteristics			
Cancer type			
Breast	43.8	60.1 ± 23.3	43.5 ± 22.3
Colorectal	21.6	58.1 ± 23.7	39.6 ± 21.8
Prostate	34.6	54.6 ± 24.5	36.1 ± 21.9
UICC stage at diagnosis			
I-II	73.9	57.7 ± 24.2	40.5 ± 22.4
III-IV	26.1	57.8 ± 23.5	38.7 ± 21.9
Time since diagnosis			
Range (Mean ± SD), y	5-16 (8.0 ± 2.2)		
<10 y	78.4	57.4 ± 23.9	39.6 ± 22.2
≥10 y	21.6	58.7 ± 24.2	41.6 ± 22.7
No. of comorbidities[b]			
None	28.2	58.0 ± 25.0	39.7 ± 22.6
1	26.8	57.4 ± 24.4	40.6 ± 22.5
≥2	45.0	57.8 ± 23.1	39.9 ± 22.0
Disease recurrence or metastases[c]			
Yes (any)	12.9	57.4 ± 24.2	41.5 ± 21.6
No	87.1	60.0 ± 22.5	39.8 ± 22.4
Appraisal of medical care			
No unresolved/untreated symptoms			
Yes	67.1	58.1 ± 24.6	39.9 ± 22.4
No	32.9	57.1 ± 22.7	40.5 ± 22.1
Satisfaction with cancer care			
Yes	95.9	57.4 ± 24.1	42.5 ± 23.2
No	4.1	57.7 ± 24.0	40.0 ± 22.3
Satisfaction with care for other diseases			
Yes	79.4	57.6 ± 23.9	39.8 ± 22.2
No	20.6	58.1 ± 24.3	41.2 ± 22.7

Abbreviations: SD, standard deviation; UICC, the Union for International Cancer Control.
[a]Multiple imputation using the Monte Carlo method with 25 repetitions was used to handle missing values.
[b]Comorbidities include stroke, heart attack, coronary heart disease, heart failure, arthrosis, rheumatism, osteoporosis, diabetes, depression, and other diseases.
[c]Disease recurrence is defined as any recurrence, metastases, or new cancer after the index cancer.

by confidence interval in Fig. 2 and Supporting Table 1). The positive association between cancer distress and BF or PTG weakened with longer time since diagnosis (mean +1 SD). In Table 2, the negative mediation effects of distress were stronger with a shorter time since diagnosis than at a longer time since diagnosis (the higher absolute index values), ie, the negative indirect effect of cognitive appraisal on BF and PTG through cancer distress weakened with longer time since diagnosis. The results of the IMM were identified as positive and significant ($P < .05$) (Table 2).

DISCUSSION

Little attention has been paid to understanding the association between cognitive appraisal of medical care and BF and PTG among LTCS. In this study, we assessed the direct relationship between appraisal of medical care ("no unresolved/untreated symptoms," "satisfaction with cancer care," and "satisfaction with care for other diseases") and BF and PTG while taking into account the moderated mediation effect by cancer distress in LTCS. A major finding of our study is that cancer distress acts as a mediator in the association
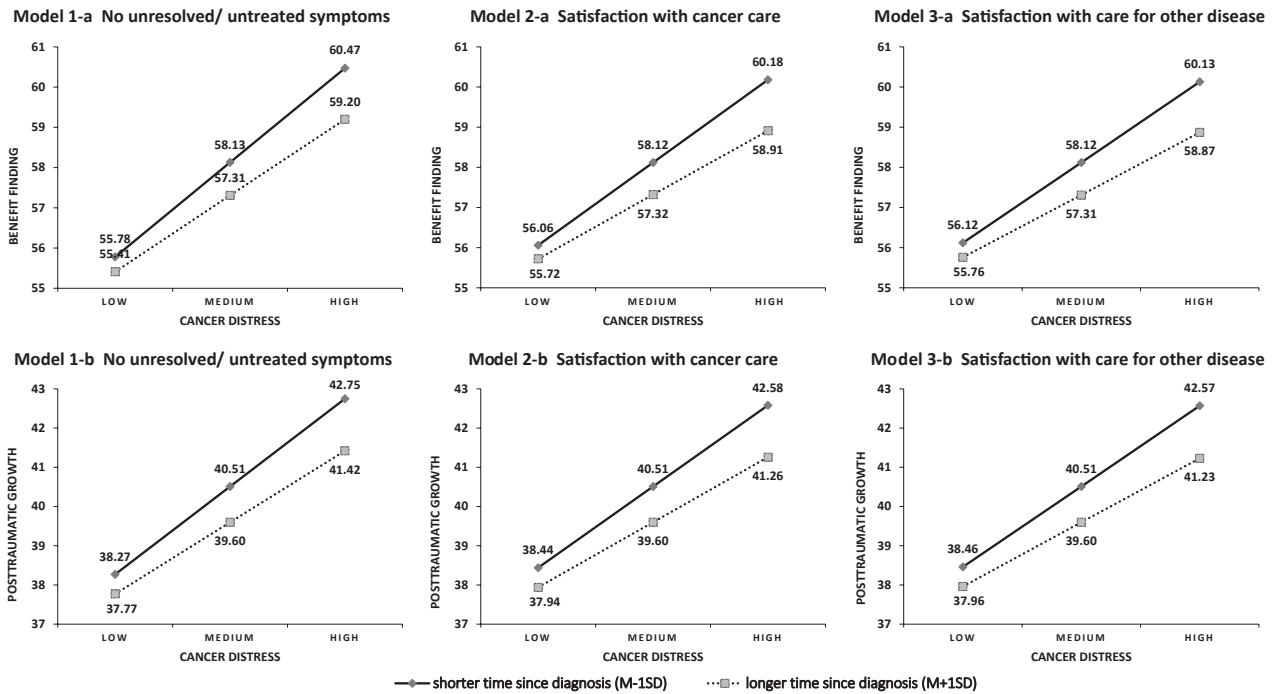
Figure 3. The indirect effects of cancer distress on benefit finding (BF) (models 1-a, 2-a, and 3-a) and posttraumatic growth (PTG) (models 1-b, 2-b, and 3-b) at levels of the moderator time since diagnosis are illustrated. The mean (M) of time since diagnosis was 8.00 years. The standard deviation (SD) of time since diagnosis was 2.19 years. Cancer distress was grouped into 3 categories according to the mean cancer distress score ± 1 SD (24.01 ± 19.22).

between cognitive appraisal of medical care and BF and PTG but that the negative indirect effect of cognitive appraisal of medical care on BF and PTG through perceived cancer distress weakens with longer time since diagnosis.

The relationship between appraisal of medical care and BF in LTCS was confirmed in a larger sample with several cancer sites. We identified a positive direct relationship between appraisal of medical care ("no unresolved/untreated symptoms," "satisfaction with cancer care," and "satisfaction with care for other diseases") and BF. These findings are in line with those of a previous study,[13] demonstrating that receiving satisfactory medical care was related to more BF, as we had proposed in the Meaning Making Model. The differential results for PTG are more striking than those for BF.

For PTG, the direct association was positive for "no unresolved/untreated symptoms," negative for "satisfaction with care for other diseases," and there was no effect for "satisfaction with cancer care." These findings are different from a previous study,[12] which found that satisfaction with nursing care was related to higher PTG. One possible explanation for this discrepancy is that the previous study specifically focused on nursing care, but

our study assessed medical care in general. Furthermore, the sample in that study consisted of inpatients with acute mental disorders, whose disease trajectory might not be comparable to that of LTCS. Another possible explanation for discrepancies could be that our study only included 3 of 5 subscales from the PTGI. The PTGI scale *personal growth* was excluded because the factor structure was not replicable in the German version of the PTGI,[28] and the scale *relationship to others* was not included in consideration of the total length of the questionnaire.[26] Our overall estimates regarding PTG thus may not be comparable to those found in studies using all PTGI scales. In addition, the PTGI is not specifically designed for assessing cancer-specific PTG. We believe future studies that use the complete PTGI in LTCS could help to better understand the relationship of PTG and BF with appraisal of medical care. Nevertheless, we did find correlations between appraisal of medical care and PTG and BF.

A previous study indicated that posttraumatic distress predicted subsequent PTG (but not vice versa) and that individuals with distress reported higher PTG.[33] In our sample, we found that cancer distress, in addition to being associated with BF and PTG, also mediated

TABLE 2. Indirect Effects of Appraisal of Medical Care on Benefit Finding/Posttraumatic Growth Through Cancer Distress, Moderated by Time Since Diagnosis

	Dependent Variable					
	Benefit Finding			Posttraumatic Growth		
Independent Variable[a]	Effect (BootSE)[b]	Index (BootSE)[c]	95% BootCI[d]	Effect (BootSE)[b]	Index (BootSE)[c]	95% BootCI[d]
No unresolved/untreated symptoms		Model 1-a			Model 1-b	
Shorter time since diagnosis: −1 SD	−1.40 (0.05)		−1.50, −1.30	−1.34 (0.05)		−1.43, −1.24
Longer time since diagnosis: +1 SD	−1.13 (0.05)		−1.23, −1.03	−1.09 (0.05)		−1.19, −0.99
Index of moderated mediation effect		0.06 (0.02)	0.03, 0.09		0.06 (0.02)	0.03, 0.08
Satisfaction with cancer care		Model 2-a			Model 2-b	
Shorter time since diagnosis: −1 SD	−1.32 (0.06)		−1.44, −1.20	−1.33 (0.06)		−1.44, −1.22
Longer time since diagnosis: +1 SD	−1.02 (0.06)		−1.14, −0.91	−1.06 (0.06)		−1.17, −0.95
Index of moderated mediation effect		0.07 (0.02)	0.04, 0.10		0.06 (0.02)	0.03, 0.09
Satisfaction with care for other disease		Model 3-a			Model 3-b	
Shorter time since diagnosis: −1 SD	−0.43 (0.02)		−0.48, −0.39	−0.44 (0.02)		−0.49, −0.40
Longer time since diagnosis: +1 SD	−0.34 (0.02)		−0.38, −0.30	−0.35 (0.02)		−0.39, −0.32
Index of moderated mediation effect		0.02 (0.01)	0.01, 0.03		0.02 (0.01)	0.01, 0.03

Abbreviations: 95% BootCI, 95% bootstrap confidence interval; BootSE, bootstrap standard error; SD, standard deviation.
[a]Values indicate 1 SD below (−1 SD) or above (+1 SD) the mean time since diagnosis, which equals ± 2.19.
[b]Effect indicates the indirect effect of the appraisal of medical care on benefit finding and posttraumatic growth through cancer distress.
[c]Index indicates the index of moderated mediation, which is the slope of the indirect effect in the model.
[d]The number of bootstrap samples for percentile bootstrap CIs was 5000.

the relationship between appraisal of medical care and BF and PTG. From a theoretical perspective, our findings advance the knowledge of meaning-making processing of life-threatening events in terms of medical care. Cancer survivors who perceive that they are being medically well cared for may experience less cancer distress. Providers of cancer care should screen for distress and include cancer survivors' subjective appraisal of medical care as a part of quality management. In terms of distress, clinicians may discuss with survivors and their families whether psychological consultation is needed. Health care providers should pay attention to survivors' concerns regarding their medical care. A common reflection process of unmet needs may already help survivors to feel better and to understand and accept the possibility that some symptoms may persist indefinitely.

Most notably and to our knowledge, this is the first study that investigated the possible moderating function of time since diagnosis on the association between cognitive appraisal of medical care and BF and PTG through cancer distress. Previous research indicated that time since diagnosis might be an important moderator,[34] and higher PTG was related to higher distress shortly after diagnosis; whereas the opposite association was observed as time since diagnosis increased.[35,36] Our results indicate that the negative indirect association between cognitive appraisal of medical care and BF and PTG through perceived cancer distress weakens with longer time since diagnosis. One study in ovarian cancer survivors indicated that a shorter time since diagnosis is a risk factor for psychological distress.[37] In our study of LTCS, psychological distress could be related to the "lost in transition" phenomenon after termination of regular follow-up care (usually within 5 years postdiagnosis).[38] Over time, cancer survivors may also gain more knowledge and experience and thus a greater sense of control, resulting in an increased perception of BF and PTG. Another explanation could be that, after the completion of cancer treatment, cancer survivors' memory of the illness severity may decay over time and thus lower the level of reported cancer distress.[39] Because our analysis on time since diagnosis was based on cross-sectional data, the associations identified have to be interpreted with caution.

Clinical Implications
Our findings have clinical implications. Because better cognitive appraisal of medical care could increase BF of LTCS through distress, health care providers

could include screening for distress as part of the regular workup to identify at-risk survivors and refer to relevant specialists for detailed assessment and treatment, according to clinical guidelines.[40-42] The QSC-R10 is shorter and more specific compared with the German Distress Thermometer.[43] Furthermore, within the distress-screening procedures at comprehensive cancer centers in Germany, the implementation of the QSC-R10 showed high acceptance among professionals and patients.[30] There is a cutoff score of >14 to make it easier for clinicians to determine whether individuals should be referred for psychological help.[30] A previous study revealed that, during cancer treatment, the relationship between patients' satisfaction with medical care and distress is more sensitive to the care intervention.[44] Medical care providers could evaluate whether distressed survivors were unsatisfied with the medical care they had received and what other needs were not met during cancer treatment. Better communication between health care providers and survivors could be conducive to encourage survivors to talk about potential unresolved/untreated symptoms and unmet needs they want to be addressed. Interventions such as distress screening and referral to psychological services may reduce distress of cancer survivors and thus improve BF and PTG.

Strengths and Limitations
Strengths of our study are the population-based study design, the large study population, and a wide range of variables (cancer distress, BF, and PTG) measured with validated instruments. The questions on cognitive appraisal of medical care still may be useful for clinicians to include in medical communication, although they were self-designed. Future studies could assess the psychometric properties of these items.

However, the following limitations should also be taken into consideration. One caveat is the cross-sectional study design and the restriction to 3 of the 5 subscales of the PTGI. Another caveat to be considered when interpreting the results is that the question on care for cancer or other diseases is very general and might include treatment, supportive, rehabilitative, and/or survivorship care. Therefore, the answers are subject to survivors' interpretation, recollection, and perception. It is also important to consider that the factors tested may be correlated with unobserved prognostic variables that may affect outcomes. Also, the time of diagnosis of the index cancer can be up to 15 years ago, and treatments have improved with time. Last but not least, this study was conducted in

a German-speaking sample, as all study material was in German. The study sample consisted of breast, colorectal, and prostate cancer survivors whose mean age at diagnosis was >60 years. However, these are the 3 most prevalent cancer types, and older cancer survivors make up the largest group of survivors.

Conclusions

Cognitive appraisal of medical care by cancer survivors is associated with their perception of BF and PTG through cancer distress. Considering the limitations mentioned above, we cannot draw conclusions concerning the causal relationships in our proposed model. Nevertheless, our results have theoretical implications regarding the relationship between cognitive appraisal of medical care and BF and PTG and related clinical implications. Cancer survivors who are distressed and not satisfied with medical care may benefit from interventions (eg, education and follow-up medical care programs) to reduce distress and increase BF and PTG. Future studies could review our model by using well established and psychometrically tested measurements to assess cognitive appraisal of medical care and explore the role of specific clinical manifestations of distress (eg, anxiety and depression). A multilanguage longitudinal study conducted in various cancers with a wider range of age groups is recommended for future research projects.

CONFLICT OF INTEREST DISCLOSURES
The authors made no disclosures.

AUTHOR CONTRIBUTIONS
Zhunzhun Liu: Analyzed the data and wrote the initial draft. **Daniela Doege** and **Melissa S. Y. Thong:** Reviewed and edited the article. **Lena Koch-Gallenkamp:** Managed the CAESAR study. **Heike Bertram**, **Andrea Eberle**, **Bernd Holleczek**, **Alice Nennecke**, **Annika Waldmann**, **Sylke Ruth Zeißig**, and **Ron Pritzkuleit**: Contributed to the recruitment of study participants and data collection. **Volker Arndt:** Principal investigator of the CAESAR study. All authors read and approved the final version.

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