






Illness representations, coping and anxiety among men with localized prostate cancer over an 18-months period: A parallel vs. level-contrast mediation approach

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Abstract

Objective: Men diagnosed with localized prostate cancer (IPCa) are confronted with the decision for a treatment strategy, potentially experiencing treatment side effects and psychological distress. The Common Sense Model proposes that coping with such challenges is related to illness representations: Beliefs regarding consequences, coherence, timeline, and controllability of the illness. We analyzed the interplay of illness representations, coping and anxiety over an 18-month period among men with IPCa undergoing different treatment options (Active Surveillance, curative treatment).

Methods: In this longitudinal study, 183 men (age $M = 66.83$) answered a questionnaire before starting treatment, and 6, 12, and 18 months later. We analyzed time trajectories with growth curve modeling and conducted mediation analyses to evaluate the influence of coping on the association of illness representations and anxiety. Using a novel methodological approach, we compared a classic parallel mediation model with a level-contrast approach for the correlated mediators problem- and emotion-focused coping.

Results: Independent of treatment ($b = 1.31, p = 0.200$) men reported an elevated level of anxiety after diagnosis which declined considerably within the following 6 months ($b = -1.87, p = 0.009$). The perceived seriousness of consequences was significantly associated with greater anxiety, at baseline ($\beta = 0.471$) and over time (all $\beta \geq 0.204$). This association was mediated by coping: Using more emotion-than problem-focused coping was associated with higher anxiety.

Conclusions: Receiving a IPCa diagnosis is associated with a phase of increased anxiety. In order to reduce anxiety, information provision should be accompanied by developing concrete action plans to enable problem-focused coping strategies.

Gertraud Stadler and Friederike Kendel should be considered joint senior authors.

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KEYWORDS

active surveillance, anxiety, common sense model, consequences, coping, curative treatment, illness representations, mediation, oncology, prostate cancer

1 | BACKGROUND

Prostate cancer is the second most common cancer among men, accounting for 13.5% of all cancer diagnoses worldwide.¹ Over the past decades, this number has continuously increased, as a result of an aging population and amplified early detection using prostate-specific antigen (PSA) testing. PSA testing has led to the diagnosis of more early-stage, localized prostate cancer (IPCa). IPCa is characterized by a good prognosis with more than 95 out of every 100 men surviving more than 10 years.² The European Association of Urology Guideline³ recommends three treatment strategies for patients with IPCa, including two curative therapies, Radical Prostatectomy (RP) and Radiotherapy (RT), and one observational strategy, Active Surveillance (AS). AS is a treatment option in which definite therapy is only conducted following defined disease progression, which occurs in about one in three patients. The question of the best treatment strategy has been the subject of much controversy in recent years.⁴ Because RP, RT, and AS do not differ in mortality,^{5,6} interest has increasingly shifted to different aspects of health related quality of life. While after curative treatments physical side effects, such as erectile dysfunction, urinary incontinence, and bowel problems, are frequently observed,^{7,8} psychological side effects may be more common under AS due to uncertainty regarding possible disease progression.

Receiving a cancer diagnosis is accompanied by anxiety⁹⁻¹¹ and psychological consequences can persist for years.^{12,13} The ProtecT study,¹⁴ a RCT with about 1500 men, as well as the PRIAS study,¹⁵ found no significant long-term differences in anxiety levels between men under AS and men after curative treatments, whereas in other studies curative treatment was associated with poorer psychological trajectories.¹⁶ Most studies report that anxiety decreases over time, consistent with an initial elevation effect.¹⁷ Nevertheless, ProtecT and PRIAS showed that 15.2% and 13% of men reported clinically relevant anxiety levels up to 6 and 7 years post-diagnosis, respectively.

However, why do some cancer patients have clinically relevant anxiety levels years after diagnosis, while others report elevated anxiety only around the time of diagnosis? The Common Sense Model of Self-Regulation (CSM) by Leventhal et al.¹⁸ offers an explanation for the variation in patients' perception of and response to illnesses. It proposes that individuals develop cognitive representations of their disease, divided into six dimensions: *identity* (symptoms), *cause*, *timeline* (duration & chronicity), *consequences*, *personal control*, and *treatment control*.

Several meta-analyses and systematic reviews elucidate the relationship of illness representations and psychological outcomes.¹⁹⁻²² The more *consequences* patients assume, the higher their anxiety levels are,²¹ the more distress they report, and the lower their well-being is.¹⁹ By contrast, assuming a greater sense of *control*

over the illness, is accompanied by less anxiety,²¹ less distress and better well-being.¹⁹

Illness representations motivate self-regulation processes to cope with the threat of an illness.¹⁸ Whereas the CSM does not distinguish between specific coping strategies, the Transactional Model of Stress and Coping by Lazarus et al.²³ differentiates problem- and emotion-focused coping. Problem-focused coping strategies center on changing the stressful situation itself, while emotion-focused strategies focus on regulating the negative emotional state accompanying the situation. So far, research¹⁹ has confirmed that a higher sense of *control* over the illness is associated with more problem-focused coping, while assuming greater *consequences* is associated with both emotion- and problem-focused coping. Furthermore, emotion-focused coping is associated with elevated distress levels whereas problem-focused coping is associated with lowered distress levels.

To our knowledge, no longitudinal study to date has examined the relationships between illness representations, coping strategies, and anxiety in men with IPCa. The little PCa-specific evidence^{24,25} on the CSM is in line with the described above meta-analyses.

This article has two aims: First, we examine anxiety levels of men with IPCa under different treatment strategies. Applying the framework of the CSM we explore how illness representations, coping strategies, and anxiety associate and develop over time. In particular, we hypothesize that (1) anxiety is elevated at baseline and declines over time, that (2) the illness representation *consequences* is positively associated with anxiety, whereas *personal control* is negatively associated with anxiety, and that (3) the association of illness representations and anxiety is mediated by coping. The second aim is to introduce a new methodological approach: In addition to classic parallel mediation models in which each mediator represents one coping strategy (Model 1a, 1b, 1c), we explore with a level-contrast approach whether the mean level and predominance of one coping strategy over the other has an influence on anxiety (Models 2a, 2b, 2c) (Figure 1).

2 | MATERIALS AND METHODS

2.1 | Design and participants

We adopted a longitudinal design including patients across 33 centers from October 2015 to June 2017.⁴¹ At four measurement points (T0 = baseline; T1 = 6 months; T2 = 12 months; T3 = 18 months) participants filled out paper & pencil questionnaires. Clinical information was obtained through physicians at baseline. Inclusion criteria follow the German Association of Urology²⁶: 0–12 months after diagnosis, age <80 years, diagnosis of low/early intermediate risk (tumor category: ≤T2a; PSA value: ≤10 ng/ml; Gleason Score ≤ 7a).

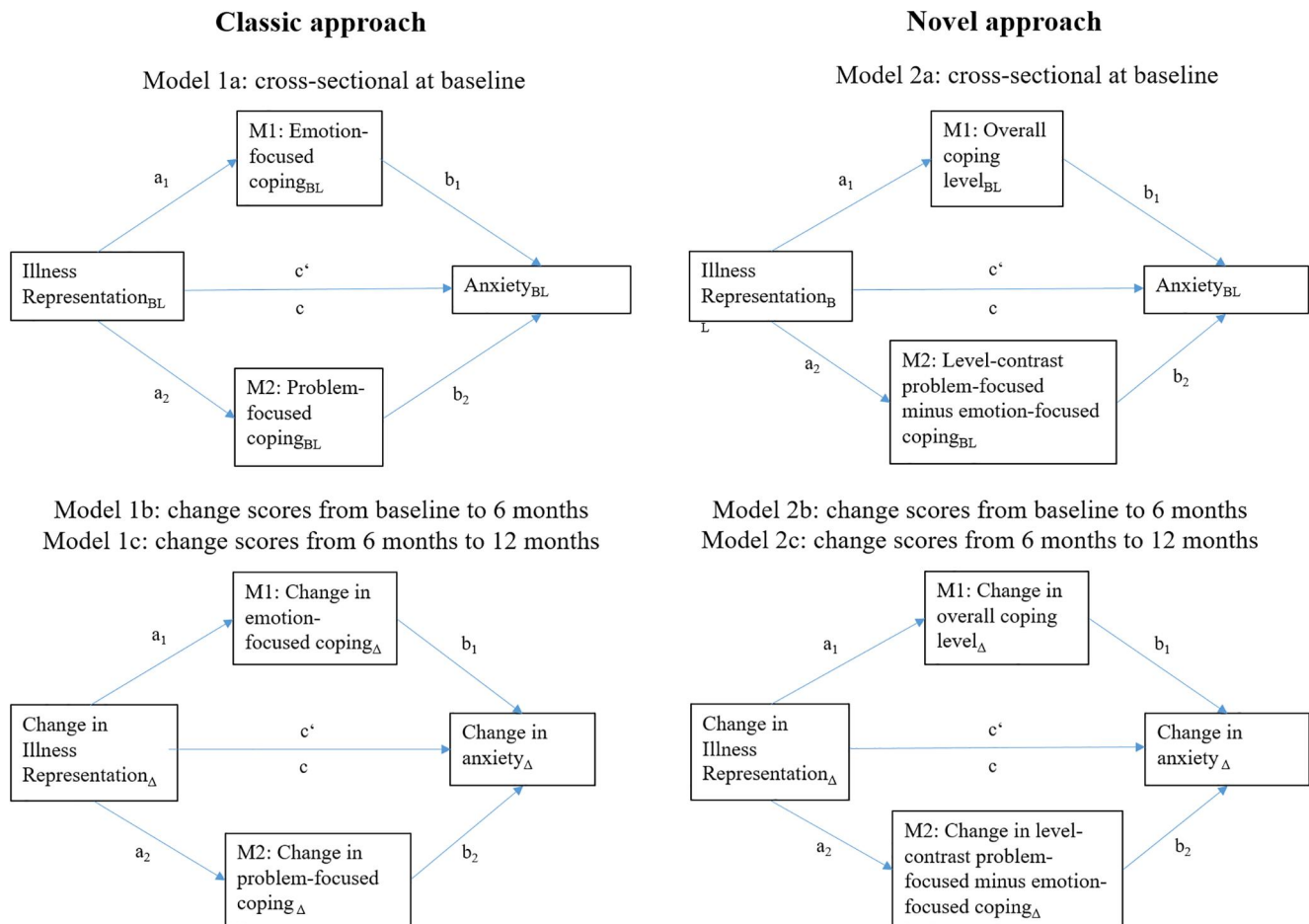


FIGURE 1 Hypothesized mediation models (a, b, and c' = standardized regression coefficients): indirect effect = $a*b$; direct effect = c' ; total effect c = sum of indirect and direct effect = $a*b + c'$. Models 1a and 2a include baseline scores. Models 1b and 2b include change scores from baseline to 6 months and models 1c and 2c include change scores from 6 to 12 months. Models differ in their mediators: model 1 includes both coping strategies, each as one mediator (problem- & emotion-focused), and model 2 includes one overall coping level mediator and one mediator representing a level-contrast of problem-minus emotion-focused coping

The first questionnaire had to be answered before treatment initiation. All patients provided written informed consent. The local ethical review board at the Charité - Universitätsmedizin Berlin approved the study (number: EA1/003/14).

2.2 | Measures

Illness representations were measured using the Brief Illness Perception Questionnaire (B-IPQ) with PCa specific adaptations.²⁷ Since men with IPCa usually do not experience symptoms until treatment, the dimension *identity* was omitted. We further excluded the emotional illness representations dimensions *concern* and *emotion* to avoid an overlap with the outcome anxiety. Results regarding *causes* are not reported as they are outside the scope of this paper. Each illness representation was assessed by one item, for example, *consequences*: “How much does prostate cancer affect your life?”. The B-IPQ has shown good psychometric properties in previous studies.²¹

Coping was assessed via the Brief COPE.^{28,29} Previous meta-analyses^{19,30} on the CSM as well as our own preliminary study³¹ guided us in the selection of coping strategies: distraction coping, active coping, and planning, assessed with two items each. The coping dimensions were significantly correlated at all measurement points (all $r \geq 0.36$). A Principal Component Analysis revealed two factors which we used in further analyses, (a) problem-focused coping based on active coping and planning, and (b) emotion-focused coping based on distraction (Supplement 1). Internal consistencies for baseline and change scores at follow-ups was acceptable to good (emotion-focused: baseline = 0.86, T1 α = 0.71, T2 α = 0.73, problem-focused: baseline α = 0.83, T1 α = 0.79, T2 α = 0.81).

The Memorial Anxiety Scale for Prostate Cancer (MAX-PC),³² including 18 items, was used to assess prostate cancer specific anxiety. A cumulative anxiety score can be calculated (with a cut-off for clinically relevant anxiety ≥ 27 points) (Supplement 5).³³ Internal consistency at baseline was good (α = 0.94), as well as for change scores at follow-ups (T1 α = 0.83, T2 α = 0.80, T3 α = 0.77).

2.3 | Data analysis

Differences in sociodemographic characteristics between treatment groups were tested with *t*-tests for continuous variables or χ^2 tests for categorical data. To analyze the relationship between illness representations as predictor variables and anxiety as outcome variables, we conducted regression analyses.

A detailed description of the statistical methods to assess change over time and mediation models is provided in Supplement 2. Due to nonlinear changes over time, we added a dummy coded variable which modeled the initial elevation to the linear time slope.¹⁷ The resulting growth curve model with two time variables (initial elevation and linear slope) assessed change over time in anxiety, illness representations, and coping. Since 37 men changed treatments over the course of the study, treatment was included as a time varying covariate. With an interaction term, treatment by time, we examined the difference in trajectories between treatment groups. Growth curve modeling was conducted with restricted maximum likelihood estimation using IBM SPSS Statistics, Version 27 (IBM Corporation, 2020).

We compared two mediation models each at baseline (Model 1a and 2a) and four subsequent change scores (Model 1b and 2b: 6 months minus baseline; Model 1c and 2c: 12 minus 6 months). To test Mediation Model 1a, 1b, and 1c, we conducted classic parallel mediation analyses (problem- and emotion-focused coping). As problem- and emotion-focused coping were highly correlated ($r = 0.44$ at baseline, T1 $r = 0.57$, T2 $r = 0.67$), we adapted a novel level-contrast approach as suggested by Iida et al.³⁴: In Mediation Model 2a, 2b, and 2c, we included the overall coping level (i.e., the mean of all coping variables) and the contrast (i.e., the difference of problem-focused minus emotion-focused coping). For all models we followed recommendations by Hayes.³⁵

3 | RESULTS

Of 229 invited men, 183 met the inclusion criteria and agreed to participate in the study. Over time, 9.29% of the participants dropped out (study flowchart in Supplement 3). In terms of sociodemographic and clinical parameters, men under curative treatments differed from men under AS only with regard to Gleason Score (indicating tumor aggressiveness); a higher Gleason Score was associated with curative treatments (Table 1).

Participants reported a moderate level of anxiety at baseline ($M = 16.30$; Table 1). In line with Hypothesis 1, participants showed higher anxiety at baseline and lower levels of anxiety in subsequent measurement points. Men under AS showed initially elevated anxiety at baseline and then significantly lower anxiety at 6 months ($b = 15.82$ and $b = -1.87$, $p < 0.05$) and maintained the same lower level from 6 to 18 months ($b = 0.162$, ns). Men with curative treatments did not significantly differ from men under AS at baseline ($b = 1.31$, ns) and showed an additional decrease from 6 to 18 months ($b = -1.25$, $p < 0.05$; Figure 2, Supplements 4 and 5).

Men with curative treatments reported significantly more emotion-focused coping as well as problem-focused coping at baseline than men under AS ($b = 0.482$ and $b = 0.325$, $p < 0.01$). Over time, coping did not significantly change and treatment did not interact with coping strategies (Supplement 4).

Regarding illness representations, men with curative treatments expected a significantly shorter duration of their illness (*timeline*) ($b = -2.27$, $p < 0.01$) and expected more *consequences* ($b = 0.606$, $p < 0.05$) at baseline than men under AS. With respect to *treatment control*, *personal control* and *coherence* no significant differences between treatment groups occurred. Illness representations did not change significantly over time and no interaction effects of treatment*time were found (Supplement 4).

A series of regression analyses revealed that *consequences* was significantly associated with anxiety at baseline and at follow-ups with change scores (from $\beta = 0.204$ to $\beta = 0.471$, see c paths in Table 2). The other illness representations were not consistently associated with anxiety (Supplement 6). Therefore, in the following mediation analyses we focused on the link between *consequences* and anxiety. We can partly confirm hypothesis 2 for *consequences*, but not for *personal control*.

Parallel mediation models (1a, 1b, 1c, Figure 1) with *consequences* as predictor, problem-focused and emotion-focused coping as parallel mediators, and anxiety as outcome were calculated (Table 2). Mediation Model 1a revealed that the association of *consequences* and anxiety was mediated by emotion- as well as problem-focused coping. Mediation Models 1b (change scores: 6 months minus baseline) and 1c (12 minus 6 months) showed that the associations of change in *consequences* and change in anxiety were not mediated by change in coping.

3.1 | A novel methodological approach to the consequences–anxiety association

Because the two coping strategies were significantly correlated at all measurement points (all $r \geq 0.44$), we reevaluated the mediation models using a novel methodological approach (Models 2a, 2b, 2c) (Table 2). Instead of including both coping strategies individually, we included the overall coping level as Mediator 1 and a level-contrast of problem-minus emotion-focused coping as Mediator 2. At baseline, the association of *consequences* and anxiety was mediated by both mediators, showing that overall coping level was associated with higher anxiety while the contrast between problem-focused and emotion-focused coping was associated with lower levels of anxiety. In Model 2b (6 months minus baseline), the association between *consequences* and anxiety was not mediated by either coping mediator. In Model 2c (12 minus 6 months), the association of *consequences* and anxiety was mediated by the overall coping level but not the contrast between problem- and emotion-focused coping. The comparison of Model 1a and 2a indicates that the contrast between problem- and emotion-focused coping

TABLE 1 Sociodemographic data at baseline

	Range	Total N = 183	AS n = 100	Curative treatment n = 83
Age Mean (SD)		65.8 (7.4)	66.7 (7.0)	64.8 (7.7)
Family status n (%)				
Living with partner		159 (87.4)	89 (88.9)	70 (86.7)
Occupation n (%)				
Retired		120 (65.9)	70 (70.7)	50 (60.3)
Working		58 (31.9)	28 (28.3)	30 (36.1)
Unemployed		4 (2.2)	1 (1.0)	3 (3.6)
School education n (%)				
Low		84 (46.7)	43 (43.4)	41 (50.6)
Clinical parameters				
PSA-value at baseline Mean (SD)		5.9 (2.6)	5.9 (2.3)	5.8 (3.0)
Tumor stadium at baseline n (%)				
T1a–T1c		170 (93.4)	93 (93.9)	77 (92.8)
T2a		12 (6.6)	6 (6.1)	6 (7.2)
Gleason score n (%)				
≤6		138 (75.8)	91 (91.9)	47 (56.6)
7a (3 + 4)		44 (24.2)	8 (8.1)	36 (43.4)
Charleston Comorbidity Index n (%)				
0		138 (78.4)	78 (81.3)	60 (75.0)
≥1		38 (21.6)	18 (18.7)	20 (25.0)
Time since diagnosis in weeks Mean (SD)		9.4 (9.1)	9.0 (8.9)	9.9 (9.4)
Central study variables				
Illness representations Mean (SD)				
Timeline	0–10	6.4 (3.2)	7.7 (2.6)	4.8 (3.0)
Consequences	0–10	3.3 (2.7)	3.0 (2.7)	3.7 (2.6)
Personal control	0–10	4.0 (2.9)	4.1 (3.0)	3.9 (2.9)
Treatment control	0–10	7.8 (1.9)	7.9 (1.9)	7.8 (2.0)
Coherence	0–10	7.4 (2.2)	7.3 (2.1)	7.5 (2.3)
Coping Mean (SD)				
Emotion-focused	1–4	2.1 (0.9)	1.8 (0.8)	2.3 (1.0)
Problem-focused	1–4	2.4 (0.9)	2.2 (0.8)	2.5 (0.9)
Anxiety Mean (SD)	0–54	16.3 (11.2)	15.7 (10.2)	17.0 (12.3)
Clinically relevant anxiety n (%)		29 (16.8)	14 (15.1)	15 (18.8)

Abbreviations: AS, active surveillance; M, mean; PSA, prostate specific antigen; SD, Standard deviation.

matters: Men reported higher anxiety levels when they coped more emotion-than problem-focused compared to men with a balanced use of both coping strategies or a predominant use of problem-focused coping. Thus, the findings partly support Hypothesis 3 that coping mediates the association of illness representations and anxiety.

4 | DISCUSSION

Across all treatment groups men experienced a phase of elevated anxiety immediately after diagnosis, which considerably declined in the following six months. The initial higher anxiety levels were still within a subclinical range for most men. This is consistent with

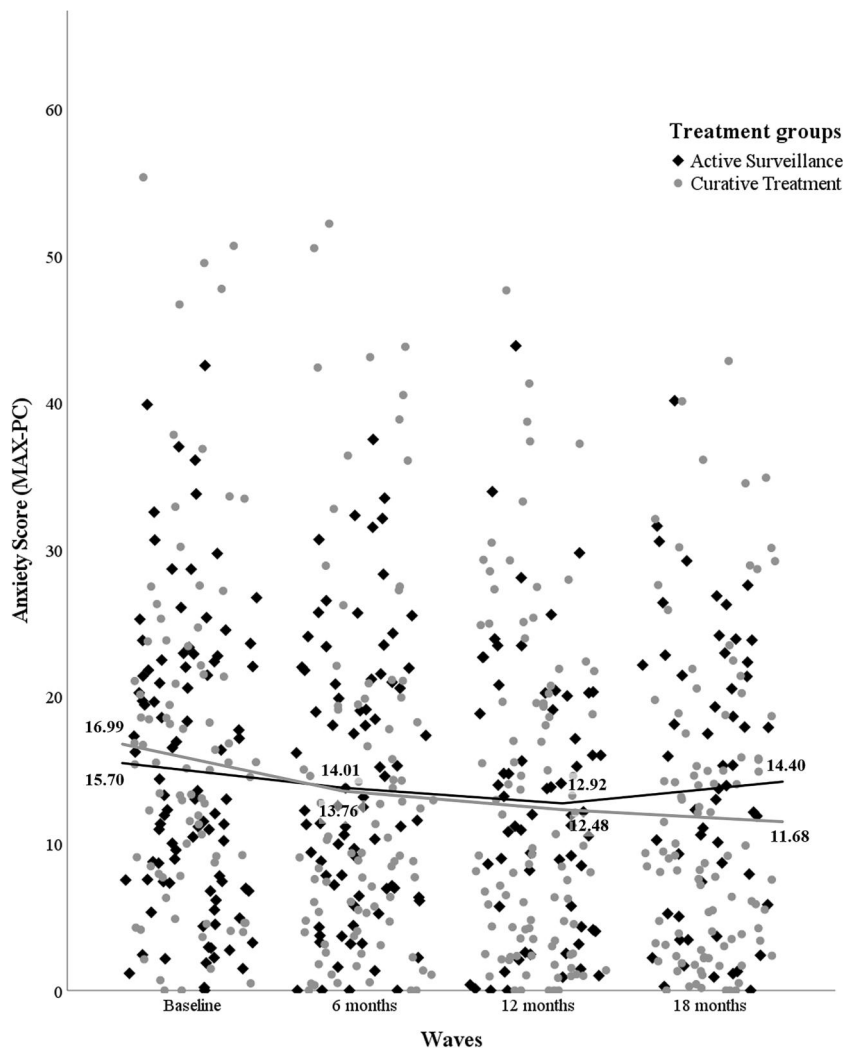


FIGURE 2 Anxiety over time by treatment groups including means for each measurement point

previous research demonstrating that men with PCa have lower anxiety levels than individuals with other cancer diagnoses.³⁶ One reason may be the on-average good prognosis for IPCa. Another reason could be that traditional concepts of masculinity may hinder emotional expression.³⁷ Therefore, even relatively low levels of anxiety deserve attention. Furthermore, we found that one in ten men, independent of the chosen treatment strategy, reported clinically relevant anxiety levels, a finding which is supported by other longitudinal studies.^{14,15}

Illness representations in men were found to be stable, whereas, according to the CSM, they are likely to change over the life span.³⁸ Possibly the time span in our study was too short to show any changes as such processes may take more time. In addition, PCa diagnoses affect men who may already have relatively stable assumptions about their disease, because they often witness PCa illnesses in their social group. Considering the intraindividual changes, perceiving an increase of consequences was associated with an increase in anxiety. This is in line with other studies showing that changes in illness representations can be determinants for changes in psychological and behavioral illness outcomes.^{39,40}

The CSM proposes that severe consequences signal threat and lead individuals to manage negative feelings using coping strategies. In line with a recent meta-analysis,¹⁹ we found that assuming more severe consequences is associated with higher use of both emotion- and problem-focused coping. Another finding from this meta-analysis is that problem-focused coping is related to less distress, whereas emotion-focused coping is related to more distress.¹⁹ Our results support this latter association—but only partially: when analyzed as individual mediators, *both* coping strategies were associated with an increase in anxiety. However, by using a new methodological approach which allows to model the overall level of coping in addition to the contrast between problem- and emotion-focused coping, we were able to get a more nuanced understanding: Participants with higher emotion-than problem-focused coping showed higher anxiety levels, while participants with a balanced combination of emotion- and problem-focused coping or a predominantly problem-focused coping style showed lower anxiety levels. Thus, too much emotion-focused coping in the absence of problem-focused coping seems to be problematic in our population. It remains to be seen

TABLE 2 Mediation of the consequences—anxiety link by coping with a classic parallel mediation and a novel level-contrast approach (SE)

Paths	Mediator 1: Emotion-focused coping		Mediator 1: Overall coping level	
	Mediator 2: Problem-focused coping β (SE)	Unmediated Model at Baseline	Mediator 2: Level-contrast (problem- minus emotion-focused coping) β (SE)	Unmediated Model at Baseline
C	Consequences to anxiety	0.471 (0.070)**	0.471 (0.070)**	
	Covariate treatment ^a on anxiety	-0.008 (0.070)	-0.008 (0.070)	
Mediation Model 1a at Baseline				
c'	Consequences to anxiety	0.321 (0.066)**	0.321 (0.066)**	
a ₁	Consequences to Mediator 1	0.325 (0.072)**	0.288 (0.073)**	
a ₂	Consequences to Mediator 2	0.205 (0.075)*	-0.139 (0.076)	
b ₁	Mediator 1 to anxiety	0.329 (0.073)**	0.451 (0.067)**	
b ₂	Mediator 2 to anxiety	0.209 (0.071)*	-0.144 (0.065)*	
Covariate	Treatment ^a on Mediator 1	0.237 (0.072)**	0.240 (0.072)**	
	Treatment ^a on Mediator 2	0.190 (0.074)*	-0.065 (0.075)	
	Treatment ^a on anxiety	-0.126 (0.064)	-0.126 (0.064)	
	Total indirect effect	0.150 (0.043)*	0.145 (0.042)*	
Mediation Model 2a at Baseline				
	Indirect effect via Mediator 1	0.107 (0.036)*	0.130 (0.039)*	
	Indirect effect via Mediator 2	0.043 (0.208)*	0.020 (0.014)*	
Mediation Model 1b at Baseline				
C	Consequences to anxiety	0.327 (0.082)**	0.204 (0.082)*	0.204 (0.082)*
	Covariate treatment ^a on anxiety	-0.050 (0.081)	-0.091 (0.081)	-0.091 (0.081)
Mediation Model 1c at Baseline				
c'	Consequences to anxiety	0.308 (0.079)**	0.161 (0.082)	0.161 (0.082)
a ₁	Consequences to Mediator 1	0.031 (0.084)	0.158 (0.085)	0.196 (0.082)*
a ₂	Consequences to Mediator 2	0.097 (0.083)	0.182 (0.083)*	0.057 (0.087)

(Continues)

TABLE 2 (Continued)

	Mediation Model 1b Change score 6 months minus baseline	Mediation Model 1c Change score 12 months minus 6 months	Mediation Model 2b Change score 6 months minus baseline	Mediation Model 2c Change score 12 months minus 6 months
b ₁	0.205 (0.090)*	0.198 (0.090)*	0.296 (0.083)**	0.254 (0.092)**
b ₂	0.125 (0.090)	0.060 (0.092)	-0.118 (0.089)	-0.136 (0.087)
Covariate				
Treatment ^a on Mediator 1	0.026 (0.083)	-0.098 (0.084)	0.015 (0.084)	-0.143 (0.081)
Treatment ^a on Mediator 2	0.008 (0.082)	-0.140 (0.082)	-0.015 (0.078)	-0.063 (0.086)
Treatment ^a on anxiety	-0.057 (0.078)	-0.063 (0.080)	-0.057 (0.078)	-0.063 (0.080)
Total indirect effect	0.19 (0.030)	0.042 (0.030)	0.019 (0.030)	0.042 (0.030)
Indirect effect via Mediator 1	0.006 (0.020)	0.031 (0.028)	0.026 (0.032)	0.050 (0.030)*
Indirect effect via Mediator 2	0.012 (0.017)	0.011 (0.020)	-0.008 (0.013)	-0.008 (0.017)

Note: Classic parallel mediation models = Model 1a, 1b, 1c. Novel level-contrast approach = Model 2a, 2b, 2c. All path coefficients, standard errors and mediations are standardized.

Abbreviation: SE, Standard Error.

^aTreatment was included as a covariate, coded as 0 = AS, 1 = curative treatment.

* $p < 0.05$; ** $p < 0.01$.

whether other studies using level-contrast models will replicate this effect.

Longitudinally, an increase in the perception of consequences was associated with an increase in anxiety over time. This effect was not mediated by changes in coping, possibly due to small changes over time in general and in the coping dimensions especially.

Men under AS reported significantly less use of emotion- and problem-focused coping than men with curative treatments. One possible explanation is that men undergoing curative treatment are more embedded in an institutional care system and receive more information from various sources, while men under AS have less contact to health care providers. Another reason could be that men undergoing curative treatments may perceive their treatment itself as an active coping strategy in contrast to men under AS who deliberately decide against quick and immediate action.

4.1 | Study limitations

One limitation is that observational studies do not allow causal inferences. Nevertheless, the longitudinal design with an exceptionally low drop-out rate is appropriate to describe the relationships over time. Further, although this is one of the larger studies with men under AS, the sample sizes of the different treatment groups were still limited. We therefore grouped RT and RP under curative treatments to explore moderation effects.

4.2 | Clinical implications

Because anticipation of severe consequences seems to increase anxiety, physicians need to inform IPCa patients as comprehensively as possible about treatment strategies and possible side effects so that men have a realistic idea of their alternatives without creating too much anxiety. We also demonstrated that the level of anxiety is associated with the balance of emotion- and problem focused coping. A shift towards more problem-focused but, at the same time, less emotion-focused coping may enhance emotional well-being. To explore associations of coping patterns with emotional well-being, methods like the level-contrast approach should be used to obtain a differentiated picture.

5 | CONCLUSION

Our study adds to the growing evidence that men who decide for AS do not suffer from higher anxiety levels than men who opt for curative treatment. Thus, AS is a viable treatment strategy that can postpone or even avoid the physical side effects of curative

treatments without causing too much psychological distress. Nevertheless, on average and independent from the treatment strategy, the time shortly after the diagnosis is a period of increased psychological stress, and for some men this stress persists for a long time.

The perception of severe consequences is associated with increased anxiety. By adapting a novel methodological approach to explore this relation within the Common Sense Model framework, we can show that engaging in more emotion-than problem-focused coping is associated with higher anxiety. Whether a combination of disease-related information and support for developing problem-focused coping strategies improves well-being should be explored with intervention studies.

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CONFLICT OF INTEREST

The authors declare no potential conflict of interest.

AUTHOR CONTRIBUTIONS

Friederike Kendel designed the study and acquired the funding. Caren Hilger, Friederike Kendel, Ahmed Magheli, and Isabella Otto implemented the study. Friederike Kendel, Isabella Otto, and Gertraud Stadler conducted the data analysis. Isabella Otto drafted the paper under supervision of Friederike Kendel and Gertraud Stadler. All authors read, revised and approved the final version of the manuscript.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the Open Science Framework website, without sociodemographic and clinical parameter which could lead to an identification of the participants. URL: https://osf.io/yj5ca/?view_only=8058c916b28c4afc98c15f47aebc9e39.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of this article.

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