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Trajectories of personal control in cancer patients receiving psychological care

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Abstract

***Objective*: This study aimed to (1) identify subgroups of cancer patients with distinct personal control trajectories during psychological care, (2) examine whether socio-demographic, clinical, and psychological care characteristics could distinguish trajectories, and (3) examine differential patterns of psychological symptoms between trajectories.**

***Methods*: This naturalistic study focused on 241 cancer patients receiving psychological care at psycho-oncology institutions. Data were collected before the initiation of psychological care, and 3 and 9 months thereafter. Latent class growth analysis was applied to identify personal control trajectories.**

***Results*: Three personal control trajectories were identified: enduring improvement (41%), temporary improvement (50%), and deterioration (9%). Education and baseline physical symptoms distinguished these trajectories. In the whole group, improvements in personal control were associated with improvements in psychological symptoms. Patients at distinct trajectories reported different levels of psychological symptoms, but did not differ in their courses of psychological symptoms. Patients in the enduring and temporary control improvement groups experienced significant psychological symptoms reductions over time, whereas patients in the control deterioration group maintained high psychological symptoms.**

***Conclusions*: Improvements in personal control seem to depend on initial control level: those who start with the highest control levels show subsequent improvements, whereas those with the lowest control levels show subsequent deterioration.**

Introduction

In recent psycho-oncology research, there is an increased interest in examining trajectories of psychological outcomes (e.g., distress, depression) [1–8]. For example, four distress trajectories were identified in breast cancer patients over time: no distress, chronic distress, recovery, and late recovery [1,2,6]. Hitherto, the focus is on trajectories of psychological outcomes, with little attention for factors promoting adjustment. Further insight into trajectories of these factors, including personal control, may enhance understanding of the mechanisms underlying psychological adjustment. Personal control refers to beliefs that one can control important life events; it is important in promoting cancer patients' psychological functioning [9–11] and is amenable to change [12–14]. Therefore, this study focused on cancer patients to identify distinct personal control trajectories over time, their predictors, and relationships with psychological symptoms.

Cognitive adaptation theory suggests that stressful life events can undermine one's personal control; therefore, regaining control is a key theme during subsequent adjustment [12]. Loss of control following cancer seems to be temporary and may be recovered. Two studies found temporary worsening, followed by recovery, in personal control after cancer diagnosis [13,14]. Another study found improved personal control after breast cancer surgery [15]. Besides natural recovery of personal control, intervention studies found that cancer patients reported increased control during psychological care, even for interventions not specifically aimed at enhancing personal control [16–18]. These findings suggest that cancer patients can recover from loss of control through natural adaptation and psychological care. However, whether all patients follow this recovery pattern remains unclear. Given that earlier research found differential changes in personal control (i.e., no change, increases, or decreases) after cancer diagnosis [13], it follows that the course of control differs between subgroups of patients receiving psychological care.

Provided distinct personal control trajectories are identifiable, the next step is to determine which factors distinguish these trajectories. Studies examining predictors of changes in personal control are lacking. To

identify predictors of personal control trajectories, we have to rely on studies examining predictors of personal control levels. Regarding socio-demographic characteristics, young and highly educated people reported higher control than old and low educated people [19–21]. Regarding clinical characteristics, cancer patients treated with chemotherapy reported less control than healthy women, a phenomenon that was absent in patients without chemotherapy, suggesting a link between longer treatment and loss of control [14]. Cancer patients with more physical symptoms reported less control than those with fewer physical symptoms [9,22]. These findings suggest that personal control is shaped by environmental factors, but whether these factors are associated with distinct personal control trajectories remains unclear.

Cognitive adaptation theory indicates that when confronted with life-threatening events, maintaining personal control can promote psychological functioning [12]. Specifically, among cancer patients, those who maintained or improved personal control after diagnosis reported less distress [13–15]. Therefore, we expect changes in psychological symptoms to show similar, opposite patterns to the identified personal control trajectories. For example, a trajectory with improved control will display psychological symptoms improvements.

In summary, this naturalistic longitudinal study first identified personal control trajectories in cancer patients receiving psychological care. We expected personal control improvement in one group and sustained levels in others. Second, we examined whether socio-demographic and clinical characteristics distinguished trajectories. We also examined whether type and duration of psychological care distinguished trajectories. We expected education, age, medical treatment, and baseline physical symptoms to distinguish trajectories. Third, we examined differential patterns of depressive and anxiety symptoms between personal control trajectories over time. We expected patients with improved personal control to report psychological symptoms reductions.

Methods

Setting and participants

In the Netherlands, not all cancer patients are routinely screened for distress or receive psychological care. When patients need psychological care, they visit general practitioners and are referred to private practice or psycho-oncology institutions. We approached cancer patients who sought psychological care at all seven Dutch psycho-oncology institutions between September 2008 and March 2010. Patients were not screened for distress or other psychosocial problems as prerequisites for care or for inclusion in this study. Eligible participants were (1) diagnosed with cancer and seeking psycho-oncological help, (2) ≥18 years, and (3) able to complete questionnaires in Dutch.

In total, 611 people were approached: 524 agreed and provided written informed consent, and 87 declined. Those who agreed and declined did not differ significantly in age or gender. Of the 524 people, 123 withdrew and 401 underwent the first assessment before psychological care (T1). Of these 401, 384 (63% of 611) were included and 17 excluded (eight refused care and nine did not complete baseline assessment). There were no significant differences in age or gender between the 384 participants and the 140 non-participants. After 3 months (T2), 278 (72% of 384) completed the second assessment. After 9 months (T3), 241 (63% of 384) completed the third assessment. From T1 to T3, 143 participants withdrew because of illness or other reasons. Relative to the 241 participants, the 143 drop-outs were less educated, perceived unfavorable prognoses, received less frequent operations, and were more often men ($p < 0.05$). There were no significant differences in baseline personal control or depressive and anxiety symptoms between the 241 participants and 143 drop-outs. Of the 241 participants, 26 lacked the second assessment. As the analysis procedure can handle missing data [23], these people were included.

Measures

Socio-demographic and clinical characteristics were obtained via a self-report questionnaire at T1 (e.g., age, educational level, physical symptoms, cancer type, prognosis). Educational level was classified into low (primary/lower vocational), middle (secondary/middle vocational), and high (university/higher vocational). Patients classified their prognoses as favorable, unfavorable, or uncertain. Physical symptoms were assessed using a 13-item checklist (e.g., pain, nausea), which was part of the 23-item physical symptom subscale of the Rotterdam Symptom Checklist. This subscale has shown good reliability and validity in cancer patients [24]. Questions were answered on a scale from 1 (none) to 4 (very). Total scores ranged from 13 to 52, with higher scores indicating more symptoms. Baseline Cronbach's α was 0.76 in this study.

Psychological care characteristics were obtained via self-report questionnaires at T2 and T3 (i.e., type and duration of psychological care). Various types of psychological care were offered: individual, group, or other therapy (e.g., haptonomy). Participants indicated the therapies they had received. A categorical variable was created: individual, group, individual and group, and other (all with/without other therapy). Patients indicated whether their psychological care was complete at T2 and T3.

Personal control was measured using the seven-item Mastery Scale, which measures general perceptions of control over life [25]. Items (e.g., 'I have little control

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about things that happen to me') were answered on a scale from 1 (strongly agree) to 5 (strongly disagree). Total scores ranged from 7 (low mastery) to 35 (high mastery). This scale has demonstrated good reliability and validity in cancer patients [10,13]. We found Cronbach's αs ranged from 0.72 to 0.78.

Depressive symptoms were measured using the 16-item version of the Center for Epidemiologic Studies Depression Scale [26], which was a more valid measure of depressive symptoms [27]. Items (e.g., 'I felt depressed') were answered on a scale from 0 (<1 day) to 3 (5–7 days). Total scores ranged from 0 to 48, with higher scores indicating higher depression. This scale has shown good reliability and validity in cancer patients [27]. We found Cronbach's αs ranged from 0.88 to 0.91.

Anxiety symptoms were measured using the six-item version of the State-Trait Anxiety Inventory [28,29]. Items (e.g., 'I am confused') were answered on a scale from 1 (not at all) to 4 (very much). Total scores ranged from 6 to 24, with higher scores indicating higher anxiety. This inventory has demonstrated good reliability and validity [29]. Cronbach's αs ranged from 0.85 to 0.86.

Statistical analysis

To examine changes in personal control and psychological symptoms, general linear modeling (GLM) was conducted in SPSS 20.0 (IBM Corp., Armonk, NY, USA). Cohen's *d* was calculated to measure magnitude of change. Pearson's correlations were computed to examine associations between changes in personal control and psychological symptoms.

Latent class growth analysis (LCGA) with robust maximum likelihood estimation was used to identify personal control trajectories in Mplus 7.1 [30]. LCGA can identify unobserved differences in growth trajectories over time [31]. We tested models with 1–4 classes. Several criteria were used to select the best model [32,33]. First, we inspected the Bayesian information criterion (BIC) and Akaike information criterion (AIC), which measure relative fit of different models, with lower values indicating better models. Second, the Bootstrapped Likelihood Ratio Test (BLRT) and Vuong-Lo-Mendell-Rubin Likelihood Ratio Test (VLMR) were used to compare K- and K-1-class models. Significant BLRT and VLMR suggest that the K-class model was superior to the K-1-class model [32,33]. Third, entropy was used to examine latent class separation, with higher entropy (>0.6) indicating better separation [34]. Fourth, one extra class of substantial size (>5%) should be conceptually meaningful and represent a trajectory differing from trajectories with fewer classes [6,33]. To examine whether missing data influenced model selection, we repeated the LCGA on 203 participants with complete data.

On the basis of the latent class posterior distribution, each participant was assigned to one class, which represented personal control trajectories in the following analyses in SPSS. Chi-square tests and ANOVAs were used to examine whether patients' characteristics distinguished personal control trajectories. Significant predictors related to changes in psychological symptoms were controlled as covariates in GLMs. To identify different psychological symptom patterns between trajectories, interaction effects between trajectories and time on psychological symptoms were examined in GLMs. ANOVAs were performed to examine whether trajectories were related to psychological symptoms levels across time. GLMs were conducted within each trajectory to examine courses of personal control and psychological symptoms.

Results

Variable changes in the total sample

Table 1 shows characteristics of the sample. Most were women, with breast cancer, and middle-aged. As shown in Table 2, personal control showed significant T1–T3 increases, with small T1–T2 increases. Depressive and anxiety symptoms showed significant T1–T3 decreases, with large T1–T2 decreases. From T1 to T3, increases in personal control were associated with decreases in depressive ($r = -0.39$, $p < 0.01$) and anxiety symptoms ($r = -0.36$, $p < 0.01$).

Model selection

As shown in Table 3, the four-class model, with the lowest BIC and AIC, highest entropy, and significant BLRT and VLMR, was the best model. However, this model's smallest group (2%) did not contain a substantial number of patients, and was rejected. We then compared the three-class and two-class models. BIC, AIC, entropy, and BLRT all favored the three-class model, although the VLMR was non-significant. Moreover, the three-class model's smallest group contained a substantial number of participants (9%). Therefore, a three-class model was chosen. Table 3 shows the parameter estimates of this model.

We repeated the same analyses in those with complete data. The three-class model was the best and reflected the same trajectories examined in the full sample. Class size (52%, 39%, 9%) was comparable with the full-sample model (50%, 41%, 9%). Therefore, missing data did not affect model selection.

As seen in Table 2 and Figure 1(a), Group 1 (enduring control improvement: 41%) showed high baseline personal control, moderate-sized T1–T2 improvements in personal control, and relative stability until T3. Group 2 (temporary control improvement: 50%) showed moderate baseline personal control, moderate-sized T1–T2 improvements in control, and moderate decreases until T3. Group 3 (control deterioration: 9%) showed low baseline personal control, moderate-sized T1–T2 decreases in control, and no change until T3.

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Table 1. Characteristics of the total sample and each trajectory

Predictor	Total sample	Enduring improvement	Temporary improvement	Deterioration	ANOVA/χ^2
M(SD)					
Age	51.39(10.61)	51.37(10.04)	51.82(11.08)	48.50(10.48)	*n.s.*
Years after diagnosis	3.29(5.72)	3.10(5.89)	3.00(5.05)	6.28(8.06)	*n.s.*
Physical symptoms (T1)	9.18(5.15)	7.95(4.72)	9.63(5.12)	13.00(5.47)	$F(2, 235) = 8.81$, $p < 0.001$
%					
Gender (woman)	80.1	83.2	78.7	72.2	*n.s.*
Educational level					
Low	17.7	10.0	21.0	38.9	$\chi^2 = 12.68$, $p < 0.01$
Middle	32.5	31.0	33.6	33.3	
High	49.8	59.0	45.4	27.8	
Relationship (yes)	80.7	81.0	80.0	83.3	*n.s.*
Cancer type					
Breast	46.0	49.5	46.7	22.2	*n.s.*
Digestive system	7.1	6.9	7.5	5.6	
Lung	2.9	4.0	1.7	5.6	
Hematologic	8.8	9.9	7.5	11.1	
Head and neck	6.3	4.0	6.7	16.7	
Gynecological	5.9	5.9	6.7	0.0	
Multiple malignant	7.9	5.0	9.2	16.7	
Others	15.1	14.9	14.2	22.2	
Metastases (no)	68.1	69.0	66.9	70.6	*n.s.*
Co-morbid diseases (no)	74.8	72.0	78.3	66.7	*n.s.*
Perceived prognosis					
Favorable	50.8	53.8	49.6	46.7	*n.s.*
Unfavorable	12.1	7.7	12.6	23.3	
Uncertain	37.1	38.5	37.8	30.0	
Recurrence (no)	85.9	88.1	86.1	72.2	*n.s.*
Under medical					
Treatment (yes)	49.8	47.8	48.7	68.8	*n.s.*
Type of medical treatment					
Operation	15.8	17.8	13.1	22.2	*n.s.*
Chemotherapy	8.3	8.9	8.2	5.6	
Radiotherapy	2.1	1.0	3.3	0.0	
Operation + Chemotherapy	20.7	25.7	18.9	5.6	
Operation + Radiotherapy	17.0	11.9	18.9	33.3	
Chemotherapy + Radiotherapy	5.4	5.0	5.7	5.6	
Operation + Chemotherapy + Radiotherapy	24.5	21.8	27.0	22.2	
Others	6.2	7.9	4.9	5.6	
Type of psychological care (T1–T2)					
Individual	58.5	60.4	56.6	61.1	*n.s.*
Group	8.3	5.9	10.7	5.6	
Individual + Group	14.5	15.8	13.9	11.1	
Other	2.1	1.1	3.2	0.0	
Missing	16.6	16.8	15.6	22.2	
Psychological care finished at T2 (yes)	22.4	24.8	20.5	22.2	*n.s.*
Type of psychological care (T2–T3:$n = 187$)					
Individual	52.1	46.8	55.7	57.1	*n.s.*
Group	4.3	5.2	4.1	0.0	
Individual + Group	23.9	26.0	22.6	21.5	
Other	1.6	1.2	2.1	0.0	
Missing	18.1	20.8	15.5	21.4	
Psychological care finished at T3 (yes)	46.5	48.5	47.5	27.8	*n.s.*

Predictors of trajectories

As shown in Table 1, educational level ($p < 0.01$) and baseline physical symptoms ($p < 0.001$) significantly differentiated trajectories, whereas all other variables could not. Compared with lower educated people, highly educated people were more likely to be assigned into the

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Table 2. Changes in personal control and psychological symptoms over time

	T1	T2	T3	T1–T2		T2–T3		T1–T3	
Personal control	*M*(SD)	*M*(SD)	*M*(SD)	*F*-value[a]	*d*	*F*-value[a]	*d*	*F*-value[a]	*d*
Total sample	21.13(4.36)	22.61(4.81)	21.90(4.71)	26.59***	0.32	6.46*	0.15	14.08***	0.17
Enduring improvement	24.66(3.23)	26.37(3.60)	26.27(2.66)	14.69***	0.50	0.05	0.03	10.20***	0.54
Temporary improvement	19.21(3.05)	21.01(2.86)	19.69(2.67)	22.33***	0.61	10.44**	0.48	11.39***	0.17
Deterioration	15.69(3.18)	14.01(3.20)	14.01(2.19)	2.06	0.53	0.00	0.00	2.03	0.62
Depressive symptoms									
Total sample	14.91(7.78)	11.78(7.76)	10.29(7.82)	38.85***	0.40	11.51**	0.19	44.52***	0.59
Enduring improvement	11.45(6.95)	8.18(5.63)	6.08(4.95)	22.17***	0.52	13.57***	0.39	31.73**	0.89
Temporary improvement	16.97(7.12)	13.42(7.61)	12.33(7.24)	21.49***	0.48	2.53	0.15	20.23**	0.65
Deterioration	19.44(9.27)	19.82(9.04)	18.81(11.34)	0.04	0.04	0.37	0.10	0.18	0.06
Anxiety symptoms									
Total sample	14.29(3.58)	12.66(3.45)	12.35(3.44)	51.48***	0.46	2.35	0.09	41.48***	0.55
Enduring improvement	12.96(3.22)	11.09(3.14)	10.36(2.72)	28.58***	0.59	6.33*	0.25	29.52**	0.87
Temporary improvement	15.05(3.29)	13.48(3.18)	13.53(2.86)	24.27***	0.49	0.03	0.02	16.18**	0.49
Deterioration	16.44(4.79)	15.69(2.96)	15.25(4.71)	0.75	0.19	0.21	0.11	0.74	0.25

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.
[a]Education and baseline physical symptoms were not controlled, because they were unrelated to symptom changes.

Table 3. Model selection and parameter estimates for the selected model

Models	BIC	AIC	Entropy	BLRT (*df*)	VLMR (*df*)	Size (%)			
						1	2	3	4
1-class	4061.64	4040.74	n/a	n/a	n/a	100			
2-class	3913.32	3878.48	0.73	170.26***(4)	170.26***(4)	52	48		
3-class	3898.70	3849.92	0.75	36.56***(4)	36.56(4)	50	41	9	
4-class	3885.42	3822.70	0.82	35.22***(4)	35.22*(4)	46	43	9	2
Parameter estimates for the three-class model									
	Intercept	Slope	Quadratic						
	M(SE)	*M*(SE)	*M*(SE)						
Enduring improvement	24.44(0.77)***	0.81(0.25)**	−0.07(0.03)*						
Temporary improvement	19.27(0.88)***	0.92(0.24)***	−0.09(0.03)**						
Deterioration	15.67(0.84)***	−0.15(1.13)	0.01(0.11)						

BIC, Bayesian information criterion; AIC, Akaike information criterion; BLRT, Bootstrapped Likelihood Ratio Test; VLMR, Vuong-Lo-Mendell-Rubin Likelihood Ratio Test.
*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

enduring improvement group. The highest physical symptoms were reported by the deterioration group, whereas the lowest physical symptoms were found in the enduring improvement group.

Differential patterns of psychological symptoms between trajectories

As shown in Table 2 and Figure 1(b–c), the enduring improvement group reported relatively low depressive and anxiety symptoms at T1 and large decreases in these symptoms over time, with moderate T1–T2 decreases and small decreases until T3. The temporary improvement group reported moderate depressive and anxiety symptoms at T1 and moderate decreases over time, with mainly T1–T2 decreases. The control deterioration group reported high depressive and anxiety symptoms at T1 and remained stable until T3.

The non-significant interaction terms suggested that personal control trajectories were not related to patterns of depressive ($F_{\text{time}\times\text{group}}(3.78,\ 383.27) = 1.87$, *n.s.*) or anxiety symptoms ($F_{\text{time}\times\text{group}}(3.75,\ 379.15) = 1.75$, *n.s.*). Psychological symptom levels differed between personal control trajectories at T1 (depression: $F(2,\ 233) = 22.64$, $p < 0.001$; anxiety: $F(2,\ 234) = 16.13$, $p < 0.001$), T2 (depression: $F(2,\ 2\ 10) = 24.59$, $p < 0.001$; anxiety: $F(2,\ 208) = 22.27$, $p < 0.001$), and T3 (depression: $F(2,\ 235) = 32.35$, $p < 0.001$; anxiety: $F(2,\ 235) = 40.37$, $p < 0.001$).

Discussion

Three personal control trajectories were identified in cancer patients receiving psychological care: enduring improvement (41%), temporary improvement (50%), and deterioration (9%). Education and baseline physical symptoms distinguished these trajectories. In the entire sample, increases in personal control were associated with decreases in psychological symptoms over time. Personal control trajectories were related to psychological symptoms levels, but not to the course of psychological symptoms over time.

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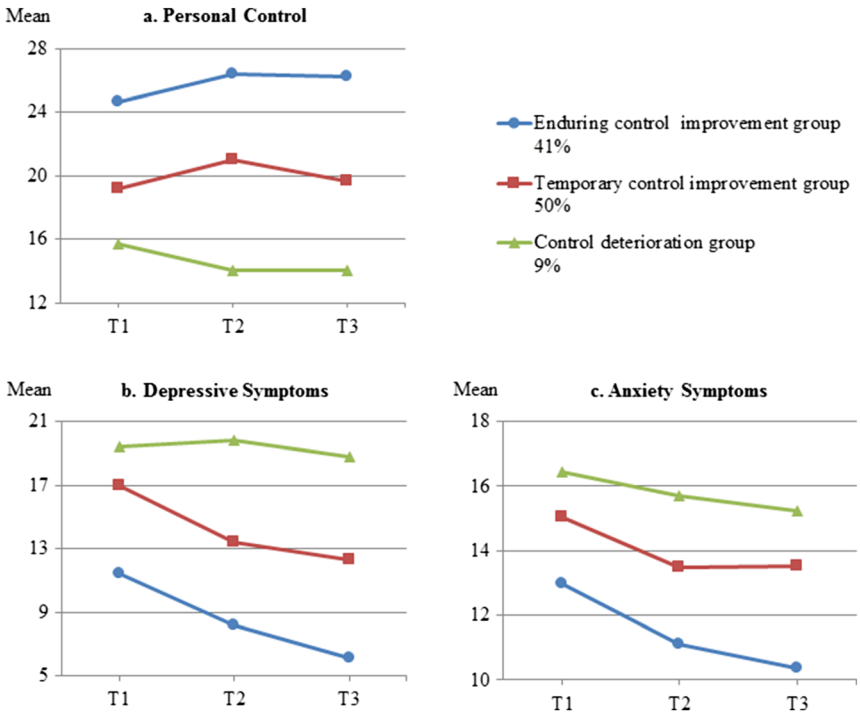

Figure 1. Patterns of personal control (a), depressive symptoms (b), and anxiety symptoms (c) at each personal control trajectory

Three trajectories differed at baseline in absolute personal control levels and in the course of personal control over time. People in the enduring control improvement group reported high levels at baseline similar to those of healthy populations [13,14] and sustained control improvement in the subsequent 9 months, with higher levels after 9 months than those of general populations [13,14]. This enduring improvement resembled increases observed in cancer patients receiving psychological care in other studies [16–18]. Patients in the temporary control improvement group reported moderate baseline control levels, comparable with those of cancer patients in other studies but lower than those of healthy populations [13,14]. At follow-up, these patients reported initial improvements followed by reductions in control, to almost baseline levels. A small but substantial number of patients reported initially low control that deteriorated further over time, suggesting that some patients were unable to regain control during adaptation. The findings suggest that improvements in personal control depend on initial control level: those who start with the highest control levels show subsequent improvements, whereas those with the lowest control levels show subsequent deteriorations.

Education and baseline physical symptoms distinguished the trajectories. Highly educated people were more likely to belong to the enduring improvement group. This reflects the positive association between education and personal control found in previous studies, given the differences in baseline personal control between trajectories [19,21]. Patients with more physical symptoms were more likely to be in the deterioration group. This extends previous findings that cancer patients with more physical symptoms reported less control [9,22], and further suggested that physical symptoms may impede patients' personal control recovery. Age did not distinguish trajectories. This may be because most participants were middle-aged, which may reduce power to find significant relationships. Medical treatment could not distinguish personal control trajectories, which contradict previous findings that patients with extensive treatment report less control [14]. Moreover, although not significant, perhaps because of the small sample size, the deterioration group tended to be further along the adaptation trajectory, less likely to have breast cancer, and report unfavorable prognoses.

Personal control trajectories were not significantly associated with different courses of depressive and anxiety symptom over time. The enduring and temporary control improvement groups exhibited similar downward trends in psychological symptoms, which differed from the stable pattern reported by the control deterioration group. Specifically, the enduring and temporary improvement groups showed large psychological symptom reductions over the first 3 months, but differed over the following 6 months; only the enduring improvement group showed further symptom reduction. The deterioration group reported decreased personal control in the first 3 months and consistently high psychological symptoms over 9 months. Notably, the deterioration group appeared to be further forward in adaptation relative to the other

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groups. As adaptation to cancer tends to occur gradually [35], the course of psychological symptoms in deterioration group might not be comparable with those of the other groups.

Additionally, patients who improved and maintained personal control reported the lowest psychological symptom levels during psychological care, whereas patients with low control reported the highest symptoms over time. This finding supports previous studies and extends literature on personal control, highlighting the importance of maintaining personal control for cancer patients' psychological functioning [13].

This study identified a small but substantial number of cancer patients reporting low personal control and high psychological symptoms during psychological care. Previous trajectory studies also identified a small group of cancer patients with elevated psychological symptoms throughout the illness trajectory [1,2,6,8]. These findings, together with ours, suggest that a vulnerable group of cancer patients may have difficulty coping during natural adaptation and psychological care. Future research should determine whether this group can be identified earlier and which type of psychological care will benefit them most.

As personal control trajectories and the course of psychological symptoms were examined concurrently in a naturalistic setting, it is premature to conclude that personal control should be targeted in psychological care. Nevertheless, our findings suggest that psychologists may focus on cancer patients with a higher risk of continued low personal control (e.g., with less education and/or more physical symptoms), as they may not regain personal control, even while receiving psychological care, and risk remaining depressed and anxious over time.

This study has several limitations. First, a control group was lacking and patients received various types of psychological care; therefore, no firm conclusions can be drawn regarding how much of the changes in control are attributable to care received or other factors (e.g., natural adaptation). Future randomized controlled trials could determine whether psychological interventions targeting personal control confirm our findings and how much intervention and control groups differ. Second, the sample size was relatively small. This may reduce power to find relevant predictors of trajectories. Third, causality between personal control trajectories and courses of psychological symptoms cannot be inferred, as they were measured simultaneously. Finally, the majority of our sample was women, middle-aged, with breast cancer, and seeking psychological care. Our sample was representative of cancer patients seeking psycho-oncological help [36], but not of the general Dutch cancer population [37]. Therefore, our findings cannot be generalized to the broader cancer population.

Despite these limitations, this study is the first to identify cancer patients' personal control trajectories. Our findings expand literature on trajectories of cancer patients' psychological outcomes and confirm the existence of distinct trajectories for factors promoting adjustment. These results warrant further trajectory analysis of factors promoting cancer adaptation. The naturalistic setting and use of a clinical population render our conclusions clinically relevant [38,39]. Our findings indicate that loss of control after cancer can be recovered during psychological care, but not for everyone. Clinicians should focus on patients with a higher risk of continued low personal control, as they may not regain loss of control and need specific care to enhance personal control.

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