Is patient participation in multidisciplinary tumor conferences associated with their fear of progression?

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Abstract

\textbf{Purpose:} Previous studies found that some breast cancer patients in Germany are invited to participate in a multidisciplinary tumor conference (MTC) during the discussion of their own case. MTCs are regular meetings of a treatment team in which the diagnosis and treatment plan of cancer patients are discussed. Psychological consequences concerning the patients’ participation in an MTC have not been examined yet. This study examines the association between patients’ participation in MTC and patients’ fear of progression (FoP).

\textbf{Methods:} This analysis is part of a larger project named “Patient participation in multidisciplinary tumor conferences in Breast Cancer Care” (PINTU) which is a multicenter observational mixed-methods study. The study was conducted in six breast and gynecological cancer centers in North Rhine-Westphalia, Germany. Data were collected from 2018 to 2020 by patient survey at three time points. Patients with \((n = 81)\) and without \((n = 120)\) MTC participation were compared. FoP was measured with a 12-item short form of the FoP Questionnaire (FoP-Q-SF) at all three measurement time points. Data analysis included descriptive statistics, a one-way repeated variance analysis (ANOVA), and a one-way repeated ANCOVA using the propensity score as a covariate.

\textbf{Results:} Data of \(n = 201\) patients were included in the analysis. In general, FoP scores decreased in both groups from T0 to T2 \((F = 36.539, p < 0.001, \eta^2 = 0.155)\). Non-participating patients did not differ with regard to their FoP from patients who participated in an MTC before and after participation. The results of AN(C)OVA revealed no significant effects concerning the influence of patient participation in an MTC on FoP \((F = 0.014, p = 0.907, \eta^2 = <0.001)\) and \((F = 0.013, p = 0.909, \eta^2 = <0.001)\).

\textbf{Conclusion:} Since the FoP is not influenced by participation, the findings do not support recommendations for or against patient participation in an MTC. Further research should focus on the question of which patient groups might benefit from participation in an MTC with regard to which outcome variables.
1 | BACKGROUND

Multidisciplinary tumor conferences (MTCs) are regular meetings of a treatment team composed of different healthcare providers who are involved in cancer care; in these meetings, the diagnosis and treatment plan of cancer patients are discussed.\(^1\)\(^-\)\(^4\) MTCs are internationally established and are a requirement for the certification of breast cancer centers in Germany.\(^5\) They exist to implement multidisciplinary care for optimal coordination among healthcare professionals.\(^6\) The treatment recommendations made in the MTC are required to be patient centered and include patient preferences.\(^7\) The consideration of patient preferences in MTCs can lead to better patient outcomes like treatment satisfaction, lower decisional conflict, and higher quality of life.\(^8\)\(^,\)\(^9\) As a strategy to include patient centeredness in MTC, the patient participation in MTCs is one possibility.\(^1\)\(^,\)\(^10\) According to a patient survey in breast cancer centers in the German federal state of North Rhine-Westphalia, some patients are invited to participate in an MTC during the discussion of their own case.\(^1\)\(^,\)\(^2\) However, few breast cancer patients (5%–7%) in Germany actually participate in an MTC.\(^1\)\(^,\)\(^2\)\(^,\)\(^10\) So far, evidence concerning the prevalence, risks, and benefits of patient participation in MTCs is scarce, and little is known about the emotional experiences of patients during participation.\(^1\)\(^,\)\(^2\)\(^,\)\(^10\) Our prior research found a mixed picture of positive and negative cognitive and emotional experiences of participating breast cancer patients.\(^3\) A study by Choy and colleagues investigated the impact of involving breast cancer patients in MTCs and found the intervention to be highly valued by most participating patients as well as accepted and welcomed by most providers of the treatment team. Changes in anxiety scores were not affected by participation. However, these data came from a pilot study with a small sample size.\(^11\)

Anxieties, worries, and fears often arise during and after cancer diagnosis.\(^12\)\(^-\)\(^14\) A quite common issue of breast and gynecological cancer patients is the fear of cancer progression (FoP) describing a fear that the disease will progress with all its consequences.\(^15\)\(^-\)\(^17\) It has been characterized as multidimensional, comprising cognitive, emotional, and behavioral reactions.\(^18\) In literature, the term FoP is often equated with the term “fear of recurrence” (FoR) which is defined as the fear, worry, or concern relating to the possibility that cancer will come back or progress.\(^19\) Due to simplification and in accordance with our measuring instrument, our present study uses the term FoP, although many resources mentioned in this manuscript refer to FoR. Compared to anxiety disorders and other diagnosable mental disorders, FoP can reflect a normal part of adjustment to cancer diagnosis when it is less elevated.\(^17\)\(^,\)\(^20\) However, high levels of FoP can lead to dysfunctionality, resulting in avoidance behavior and hypervigilance for symptoms of progression as well as affecting decision-making, relationships, well-being, and the quality of life.\(^12\)\(^,\)\(^17\)\(^,\)\(^21\)\(^,\)\(^22\) Typical symptoms characterizing clinical FoP are persistently high levels of worry, preoccupation, and hypervigilance to bodily symptoms.\(^23\) Cancer-related concerns about disease progression or recurrence were found in 24%–70% of breast cancer patients and persist over time, even when the objective risk of progression or recurrence is low.\(^12\)\(^,\)\(^14\)\(^,\)\(^21\)\(^,\)\(^24\) Managing FoP is a predominant unmet need reported by cancer survivors.\(^25\)\(^,\)\(^26\) A study by Hilton and colleagues found a positive association between FoP and self-control, problem-solving, and seeking social support.\(^27\) Younger age, the presence of children, higher levels of anxiety and physical symptoms, as well as advanced tumor stage are factors especially associated with higher rates of FoP.\(^28\)\(^,\)\(^29\) Additionally, patients who have less social support, little optimism, low self-esteem, and pronounced family stressors exhibit higher FoP.\(^14\)\(^,\)\(^30\)\(^-\)\(^34\) FoP has been associated with a greater use of medical services and increased medical costs.\(^35\)\(^-\)\(^37\) Patients with higher levels of FoP exhibit a more depressive and problem-oriented coping style leading to rather passive behavior.\(^12\)\(^,\)\(^24\)\(^,\)\(^38\) Thus, to a certain degree, the worry that cancer might progress can serve as a motivating factor that promotes healthy behaviors, but excessive fear might function as an inhibitor such as avoidance of cancer related information and excessive symptom checking behaviors or avoidance of participation in screenings.\(^24\)\(^,\)\(^39\)\(^-\)\(^42\) A study introducing a comprehensive theoretical approach to FoP found that a lack of information about an illness can lead to uncertainty in interpreting physical symptoms and again leads to higher levels of FCR.\(^38\) For some patients, MTC participation might represent another opportunity to control the amount of information they receive as well as their involvement by (not) making use of this additional “medical service” alongside the standard dyadic consultation every patient receives. Nevertheless, it is unknown whether this participation subsequently results in a decrease or increase in FoP in most patients. Participation could conceivably reduce fear through an increased sense of control or increase it because of the intensified confrontation with the topic of cancer. To the best of our knowledge, it has not been investigated whether participating in an MTC is in any way related to the patients’ FoP.

1.1 | Research question

The aim of the study is to find out if participation in an MTC is associated with the patients’ FoP. The study focuses on the following research questions: Do participating patients differ in their FoP from patients who do not participate in an MTC before and after participation? How does FoP change over time in these two groups?
2 | METHODS

2.1 | Study design and sample

This analysis is part of a multicenter, observational mixed-methods project named “Patient participation in multidisciplinary tumor conferences in Breast Cancer Care” (PINTU). PINTU study exhibits a quasi-experimental design since participants were not randomly allocated to the participation and non-participation groups. The goal was to observe the reality of care without manipulating the natural procedure. The project was conducted in six breast and gynecological cancer centers in North Rhine-Westphalia, Germany. The project was funded by the German Cancer Aid and received approval from the ethics committee of the Faculty of Medicine of the University of Cologne, Germany. Further details on the PINTU study design are reported elsewhere.\(^{43}\) Data were collected between November 2018 and February 2020. Patients who were diagnosed with breast cancer or gynecological cancer (ICD codes C50.xx - C58.xx, D05.xx - D07.xx) were recruited by healthcare providers in breast and gynecological cancer centers (Table 3). In all centers, during their hospital inpatient or outpatient stay, patients were invited by the healthcare professionals to participate in the MTC and had free choice whether to take this offer or not. Before being discharged, eligible patients provided written consent to take part in the survey. During the invitation talk, the first survey (T0) was handed out by the healthcare providers to patients with the instruction to fill it out before the MTC occurs. In the three centers where patient participation was offered, the patients were invited by the healthcare providers at T0 to participate in the MTC. The second survey (T1) was used to collect information about the patients’ experiences in the MTC and therefore was handed out only to participating patients by the researchers directly after observing the MTC. The last survey (T2) was sent via post to all patients 4 weeks after MTC. Patients did not receive compensation for completing surveys. In total, \( n = 317 \) patients were recruited for the study, of which \( n = 239 \) patients filled out at least one questionnaire. The patient survey was provided using the Dillman Total Design Method with three contact attempts being made.\(^{44} \) The flow of participants and reasons for non-response are listed in Figure 1.

2.2 | Instruments

We used the 12-item short version (FoP-Q-SF)\(^{45} \) of the Fear of Progression Questionnaire (FoP-Q)\(^{17} \) to collect data on FoP at different time points. The 12 items in the questionnaire were answered on a 5-point Likert Scale (1 = "never" to 5 = "very often"). Total sum scores lie within the possible range of 12–60, where higher values indicate higher levels of FoP. According to Hinz et al. and Herschbach and Dinkel, a score equal or above 34 represents dysfunctional FoP.\(^{56,47} \) The questionnaire exhibits high internal consistency (Cronbach’s \( \alpha = 0.87 \)).\(^{14} \)

Sociodemographic and clinical data, such as age, the presence of children, living with a partner, level of education, and the number of comorbidities were assessed using standardized factual questions in the questionnaires at T0. As possible confounder variables for FoP, the following variables were assessed at points of measurement T0 and T2 (in addition to the variables in Table 1): need for participation (concerning decision-making),\(^48\) need for informational education,\(^48\) preference for paternalism,\(^48\) preference for self-help,\(^48\) patient enablement,\(^49\) and need for psychosocial information concerning disease and treatment.\(^49\) Most of the confounder variables were deduced from the literature. Clinical data regarding tumor size, lymph nodes, metastases, and grading were provided by the centers or derived from MTC documentation.

2.3 | Data analysis

Data analyses were conducted in IBM SPSS statistics version 26. In this observational study, potential group differences were taken into account by using the propensity score (PS), which is defined as the probability of being assigned to a particular treatment (in this case MTC participation vs. non-participation) given a set of observed variables.\(^{50} \) All potential confounder variables that may have an impact on the relationship between participation in an MTC (predictor variable) and FoP (outcome variable) were included as predictors in a multivariate logistic regression model to calculate each patient’s PS. For baseline comparison of the participation and non-participation groups, a selection of these variables was examined by means of the t-test, \( X^2 \) test, and Mann–Whitney U-test. The main analysis was a one-way analysis of variance (ANOVA) with repeated measures. Additionally, to control for potential confounding effects, an ANCOVA including the PS was added as a covariate. Psychosocial variables included in PS calculation are listed above. The test requirement of normal distribution was calculated using the Kolmogorov–Smirnov test.

2.4 | Treatment of missing data

Missing values from the FoP-Q-SF as well as metric covariates were replaced with estimated values using the expectation–maximization (EM) algorithm for multiple imputation. The proportion of missing values did not exceed 21% per item. The EM algorithm estimates missing data by using an iterative maximum-likelihood procedure and is especially recommended for preventing biases caused by missing data processes which are not completely random.\(^{51,52} \) Missing values of the categorical covariates were replaced by the respective modus values.

3 | RESULTS

In total, \( n = 201 \) patients were included in the analysis. \( N = 81 \) patients participated (response rate at T0 = 96%; at T2 = 96%) and \( n = 120 \) did not participate in an MTC (response rate at T0 = 78% and at T2 = 80%). Table 1 shows sociodemographic and disease-specific data.
of patients included in the PS calculation, comparing the participation group (MTCp) with the non-participation group (MTCn-p). No significant differences between the two groups could be identified concerning the listed variables in Table 1. The mean FoP score of both groups (MTCp: T0 = 38.369/T2 = 35.620 and MTCn-p: T0 = 37.857/T2 = 35.213) reveals dysfunctional FoP (≥34) at all points of measurement. In total, 73% of all patients exhibit dysfunctional FoP at T0 and 56% at T2. There is no significant difference between the groups concerning the (dys-)functional FoP scores in T0 and T2 (see Figure 2 and Tables 2).

Table 2 outlines the changes in FoP scores from T0 to T2 for MTCp and MTCn-p. There was no significant difference between the two groups concerning FoP in T0 (t(199) = 0.413, p = 0.680) and T2 (t(199) = 0.290, p = 0.766). Within-subject ANOVA revealed significant differences in FoP scores for both groups between the different points of measurement, indicating a decrease in FoP from the time of diagnosis to 4 weeks after the MTC (F = 36.539, p < 0.001, \( \eta^2 = 0.155 \)) (Table 2).

The ANOVA indicated no significant effects with respect to group or time and no interaction effect between time and group (F = 0.014, p = 0.907, \( \eta^2 = <0.001 \)) (Table 2). The control ANCOVA using the PS as a covariate did not significantly change the results of the ANOVA. Thus, there is no significant relationship between participation in an MTC and FoP, even when controlling for PS (F = 0.013, p = 0.909, \( \eta^2 = <0.001 \)) (Table 2). Figure 2 shows a graphic representation of the changes in FoP scores over time.

### 4 | DISCUSSION

In an observational study, we evaluated the association between patient participation in an MTC and patients’ FoP. Between-subject analysis revealed that both groups show a similar degree of FoP at the different points of measurement. In addition, the baseline data shows that patients with higher FoP do not have a higher or lower probability of taking part in an MTC. Other studies found a higher use of medical services like unscheduled visits to the general practitioner by cancer patients with greater FoP. However, dysfunctional FoP seems to inhibit the use of medical services like formal screening measures such as mammograms and ultrasounds. Our findings reveal that both non-participants as well as participants exhibited dysfunctional levels of FoP which fits on the one hand to avoidance behavior and on the other hand to the greater use of medical services by cancer patients with high levels of FoP. However, one should keep in mind that not every patient had the opportunity to participate because not all centers invite patients to an MTC. Accordingly, our findings are not fully suited for drawing robust conclusions on this topic.
| TABLE 1 Sample characteristics by participation group (MTCp) and non-participation group (MTCn-p) at baseline |
|---------------------------------------------------------------|
| **Age (years)** | **Mean (SD)** | **MTCp (n = 81)** | **MTCn-p (n = 120)** | **t-Test/χ²-test/U-test** |
|-----------------|---------------|-------------------|---------------------|-------------------------|
| T0              | 59.31 (10.84) | 61.21 (11.66)     |                     | t-Test; p = 0.245       |
| T2              | 61.21 (11.66) |                   |                     |                         |
| **Family status** |               |                   |                     |                         |
| Married         | 52 (64.2%)    | 79 (65.8%)        | χ² (2) = 2438; p = 0.487 |
| Widowed         | 8 (9.9%)      | 16 (13.3%)        |                     |                         |
| Single          | 12 (14.8%)    | 10 (8.3%)         |                     |                         |
| Divorced        | 9 (11.1%)     | 15 (12.5%)        |                     |                         |
| **Living with partner** |             |                   |                     |                         |
| Yes             | 56 (69.1%)    | 87 (72.5%)        | χ² (2) = 0.267; p = 0.606 |
| No              | 25 (30.9%)    | 33 (27.5%)        |                     |                         |
| **Having children** |             |                   |                     |                         |
| Yes             | 63 (77.8%)    | 96 (80.0%)        | χ² (2) = 0.144; p = 0.704 |
| No              | 18 (22.2%)    | 24 (20.0%)        |                     |                         |
| **Highest level of school education** |             |                   |                     |                         |
| No lower secondary school education | 1 (1.2%) | 1 (0.8%) | U-test; p = 0.519 |
| Lower secondary school education | 20 (24.7%) | 34 (28.3%) |                     |                         |
| Intermediate secondary school education | 21 (25.9%) | 34 (28.3%) |                     |                         |
| University entrance certificate | 38 (46.9%) | 48 (40.0%) |                     |                         |
| Other           | 1 (1.2%)      | 3 (2.5%)          |                     |                         |
| **Currently employed** |             |                   |                     |                         |
| Yes             | 26 (32.1%)    | 42 (35.0%)        | χ² (2) = 0.182; p = 0.670 |
| No              | 55 (67.9%)    | 78 (65.0%)        |                     |                         |
| **UICC**        |               |                   |                     |                         |
| Stage 0         | 11 (13.6%)    | 11 (9.2%)         | U-test; p = 0.880   |
| Stage I         | 40 (49.4%)    | 68 (56.7%)        |                     |                         |
| Stage II        | 18 (22.2%)    | 27 (22.5%)        |                     |                         |
| Stage III       | 2 (2.5%)      | 8 (6.7%)          |                     |                         |
| Stage IV        | 10 (12.3%)    | 6 (5.0%)          |                     |                         |
| **Distress thermometer** |         |                   |                     |                         |
| Mean (SD)       | 5.56 (1.94)   | 5.76 (2.22)       | U-test; p = 0.472   |
| **Therapy confidence** |         |                   |                     |                         |
| Mean (SD)       | 8.64 (1.58)   | 8.36 (1.94)       | U-test; p = 0.747   |
| **Need for psychosocial support** |       |                   |                     |                         |
| Yes, under treatment | 5 (6.2%) | 9 (7.5%) | U-test; p = 0.741 |
| Yes, waiting for treatment | 23 (28.4%) | 29 (24.2%) |                     |                         |
| No              | 53 (65.4%)    | 82 (68.3%)        |                     |                         |
| **Health literacy** |         |                   |                     |                         |
| Mean (SD)       | 11.22 (3.22)  | 11.07 (3.24)      | U-test; p = 0.668   |

Notes: T0 = first point of measurement; T2 = third point of measurement; U-test = Mann-Whitney U-test; p = probability—** statistically significant at 1% level; * statistically significant at 5% level. Abbreviation: MTC, multidisciplinary tumor conference.
However, concerning after showed FoP revealed the existing study. Simard review also of months review out consistent. not within FoP summary, scores increase 8 colleagues studies in diagnosis. in types, in conference 2 (T0) of conference n FIGURE 4 (MTC) before participation 4 (participation 4 (non 81) group ‐ in scores = MTC, and controlled before 4 ‐ scores PS non and by 4 ‐ scores PS non from n 6 patient 81) Yes Cancer 22 MTCn 0 22 No participation No 201) 30 0 44 0 1 18 22 43 1 44 10 17 27 6 30 36

TABLE 2 Changes in FoP scores from before MTC (T0) to 4 weeks after MTC (T2) by participation group (MTCp) (n = 81) and non‐participation group (MTCn‐p) (n = 120), and also controlled by PS

| T0 | T2 | Mean | SD | Mean | SD | Main effect time | Interaction (time*PS) | Interaction (time*group) |
|----|----|------|----|------|----|------------------|-----------------------|------------------------|
|    |    | F_{d1, df2} | p | P, \( \eta^2 \) |    | F_{d1, df2} | p | P, \( \eta^2 \) |    |
| MTCp | 38.369 | 8.354 | 35.620 | 10.009 | 36.539 | <0.001* | 0.155 | - | - | - | 0.014 | 0.907 | <0.001 |
| MTCn‐p | 37.857 | 8.796 | 35.213 | 9.127 | 5.377 | 0.021* | 0.026 | 0.428 | 0.514 | 0.002 | 0.013 | 0.909 | <0.001 |

Notes: Significant results marked with a star. First row ANOVA, second row ANCOVA controlled for PS. Columns T0 and T2 are descriptive statistics of MTCp and MTCn‐p and apply for both analyses.

p = probability—*statistically significant at 1% level; †statistically significant at 5% level.

Interpretation of effect size (ES): partial eta‐squared (\( \eta^2 \)) ≥ 0.0999 = small ES, partial (\( \eta^2 \)) ≥ 0.0588 = medium ES and partial (\( \eta^2 \)) ≥ 0.1379 = large ES. 43

Abbreviations: FoP, fear of progression; F, test statistic; Mean, mean value; MTC, multidisciplinary tumor conference; PS, propensity score; SD, standard deviation.

TABLE 3 Distribution of the sample (participation group [MTCp] and non‐participation group [MTCn‐p]) within the breast and gynecological cancer centers

| Cancer Center | Patient participation | MTCp (n = 81) | MTCn‐p (n = 120) | Total (n = 201) |
|---------------|-----------------------|--------------|----------------|----------------|
| 1             | No                    | 0            | 22             | 22             |
| 2             | No                    | 0            | 30             | 30             |
| 3             | No                    | 0            | 18             | 18             |
| 4             | Yes                   | 22           | 2              | 24             |
| 5             | Yes                   | 43           | 1              | 44             |
| 6             | Yes                   | 10           | 17             | 27             |
| 7             | Yes                   | 6            | 30             | 36             |

The results are based on a qualitative analysis in which patients had been asked to write about their experience in an MTC. 2

FIGURE 2 Changes in fear of progression scores from before multidisciplinary tumor conference (MTC) (T0) to 4 weeks after MTC (T2) by participation group (n = 81) and non‐participation group (n = 120) controlled by propensity score

Within‐subject analysis revealed a decline in FoP scores from T0 to T2 in both groups (\( \eta^2 = 0.155/\eta^2 = 0.026 \)). This is in line with the results of a study by Mehnert and colleagues that revealed a reduction in FoP over time in breast cancer patients in Germany. 14 Also, a review by Simard and colleagues found that 8 out of 22 studies, also concerning other cancer types, revealed a slight decrease in FoP scores within the first months after diagnosis. However, the other studies identified in this review showed no change or even an increase in FoP scores. In summary, the existing evidence concerning the course of FoP scores is not consistent. 15,54

This course might depend on cancer type, influencing factors like age, or other demographic variables. Although, the present study controlled for possible influencing factors and still revealed a decline of FoP scores over time. Literature reveals that the initial coping strategy after the shock of cancer diagnosis represents higher self‐focus and rather withdrawal from the outside world. After the diagnosis is processed, the patients start to exchange and communicate with others leading to an adaption of the situation and thus to a reduction and relativization of fear. This might be a possible explanation on why FoP decreases after 4 weeks in our study. 28

We found no association between participation in an MTC and the FoP of the breast and gynecological cancer patients of this study. A study by Simard and Savard 55 discovered that FoP may be triggered and influenced by a variety of situations, such as appointments with health care providers, conversations about cancer, as well as examinations and procedures. 29,56,57 A pilot study by Choy and colleagues evaluated the impact of involving breast cancer patients in MTCs and found no effect of participation on anxiety scores. 11 Our prior research found a mixed picture of emotional reactions concerning participation, showing that after participation, some patients exhibited fear and stress, while others experienced relief and hope. These results are based on a qualitative analysis in which patients had been asked to write about their experience in an MTC. 2
A study by Groß et al. discovered a relationship between FoP and physician-patient communication in cancer care. They found a significant association between interruptions to the conversation, the amount of perceived empathy from the healthcare provider, the comprehensibility of the information, the patient’s family status, social support, and change in FoP. Although dyadic physician-patient communication cannot be fully compared to communication in an MTC, several mentioned aspects, such as the amount of empathy or comprehensibility of information might play an important role in both situations. In addition, social support helps to alleviate FoP and reduce its adverse effects on well-being and quality of life. MTC participation represents a social situation in which healthcare providers communicate with patients. Thus, the outcomes of the mentioned studies offer starting points for future research concerning physician-patient communication during MTCs and its influence on patients’ FoP.

### 4.1 Study limitations

Several limitations of this study should be mentioned (Table 4). Firstly, this observational study exhibits a quasi-experimental design since participants were not randomly allocated to the participation and non-participation groups. In fact, one could argue that our study is subject to self-selection bias because our own prior studies showed that patients with higher health literacy and better education are more likely to take the opportunity of participating in an MTC. However, a baseline comparison of the two groups revealed no significant differences concerning these variables in the present study. Secondly, participation is voluntary and not offered by all centers. This can lead to motivational biases, as several non-participants were not invited in the first place and others declined this invitation intentionally even though they would have been able to participate. Thirdly, there was higher drop-out in the MTCn-p compared to MTCp. Selective drop-out could be a source of bias if the patients who drop out show smaller effects. However, an analysis of patients who dropped out showed no differences in FoP scores at T0 compared to the patients included in analysis. Nevertheless, this reflects the reality of MTC participation. Fourthly, while the PS controlled for possible group differences and self-selection bias to ensure the comparability of the groups, it is important to consider that the PS may not include all confounder variables. Lastly, the implementation of participation in an MTC varies between centers. Different conditions complicate the comparison between centers. However, a stratified analysis by center was not possible due to sample sizes of the centers. Alongside its limitations, our study has several strengths, such as high return rates, the calculation of PS, low dropout numbers and a large sample size of the patients. This study is unique in that it delivers first insights into this topic of interest.

### 4.2 Clinical implications

Although on average, no effect on FoP was found, there might still be subgroups that develop decreased or increased FoP after attending an MTC. Since other studies found that age, education, and family status are determinant factors for FoP, it is possible that subgroups which are younger, not partnered and less educated develop increased FoP, whereas older, partnered, and patients with a higher education exhibit decreased FoP after MTC participation. In addition, patients with more symptoms and those who receive chemotherapy seem to develop higher FoP and thus also might be a subgroup of
patients who suffer from increased FoP after participation. In own prior research, qualitative analysis revealed negative as well as positive emotional reactions, such as the increase or reduction of fears as a consequence of patient participation in an MTC. Future studies should investigate which subgroups of patients benefit or suffer from participation. Even though our results show no significant association between MTC participation and patient FoP, MTC participation should be seen as a sensitive situation associated with an opportunity to provide social support to patients. Participation can be seen as a chance to balance different goals: patients can receive more information and gain control, while healthcare providers can learn about patients’ preferences. This can lead to an increased relationship of trust between both parties. Further research should focus on communication during MTC participation to provide further insights concerning its influence on patients’ psychosocial health. In this context, future studies should also investigate the association of participation with more positive potential outcome variables like the trust or satisfaction with care. In addition, more research should be done on how patient participation in an MTC should be organized and designed in order to benefit patients, including with regard to the communication between healthcare providers and patients. Putting this study in a larger context, by referring to different types of diseases, we found that education or involvement in care improves symptoms like the patients feeling of distress, self-esteem in patients with fatigue or lymphedema. Thus, our work can also be inspiring to investigate other variables relating to certain diseases or cancer types that might improve through similar interventions, education, or information.

5 | CONCLUSION

The present study investigated the association between participation in an MTC and the patients’ FoP and found no significant associations. No differences in FoP were found between non-participating patients and patients who participated in an MTC, either before and after participation. From T0 to T2, the FoP scores decreased in both groups. In general, FoP seems to be a complex issue associated with multiple demographic, clinical, and psychological factors. Since FoP is not associated with participation, the findings do not support recommendations for or against patient participation in an MTC. Future research is needed to clarify inconsistencies in the current published research. In addition, further research is necessary on which patient groups under which circumstances might benefit from participation in an MTC.

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CONFLICT OF INTEREST

The authors declare that they have no competing interests.

ETHICAL APPROVAL

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This study was approved by the ethics committee of the Medical Faculty of the University of Cologne, Germany (Reference number for the approval: 17-405).

AUTHOR CONTRIBUTIONS

Annika Diekmann planned and conducted data analyses, drafted and revised all sections of the paper, and is guarantor. Barbara Schellenberger, Sebastian Reck, Christian Heuser, Markus Wirtz, Franziska Geiser, Lena Ansmann, and Nicole Ernstmann assisted in data analysis, interpretation of the results, and editing the manuscript. Lena Ansmann, Nicole Ernstmann, Christian Heuser, and Annika Diekmann developed the study framework. Barbara Schellenberger, Sebastian Reck, Christian Heuser, and Annika Diekmann conducted data analyses. All authors read and approved the final manuscript.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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