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Navigating the Hardship Together: Factors Associated With Couple Relationship Functioning in Parents With Cancer Who Have Dependent Children

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ABSTRACT

Background: When a parent is diagnosed with cancer, it often affects both family life and the couple relationship significantly. However, research on factors that influence relationship functioning over time in this population is limited.

Aims: To investigate the development of relationship functioning and factors associated with relationship functioning over a 1-year period among parents with cancer.

Methods: In this longitudinal study, 180 parents with cancer, aged 24–60 years, with dependent children completed online surveys at 2 time-points: at inclusion (T1) and 1 year later (T2). Data included self-reported sociodemographic, physical health and psychological factors, and relationship functioning. The outcome was relationship functioning at T2 assessed using 4 subscales (Dyadic cohesion, Dyadic satisfaction, Sensuality, and Sexuality) of the validated self-assessment scale Quality of Dyadic Relationship Scale-36 (QDR). Linear regression analyses were conducted to identify factors associated with the outcome.

Results: All aspects of relationship functioning statistically declined over time, except sexuality. After adjusting for multiple T1 factors, completion of cancer treatment predicted higher Dyadic cohesion; poor self-rated health predicted lower Dyadic satisfaction; higher age, being a mother and attachment-related anxiety predicted lower Sensuality; and lower age of youngest child, anxiety and attachment-related anxiety predicted lower Sexuality.

Conclusions: Cancer significantly impacts relationship functioning among parents with cancer who have dependent children, with significant declines in Dyadic cohesion, Dyadic satisfaction, and Sensuality over time. A number of sociodemographic, physical health and psychological factors were shown to predict lower relationship functioning. Addressing these factors may help identify and support parents with cancer who are at risk of, or who perceive, difficulties in their couple relationship.

1 | Background

Cancer, with an estimated 20 million new cases per year, remains the second leading cause of death globally, accounting for approximately 1 in 6 deaths worldwide [1, 2]. Beyond its physical toll, cancer imposes significant psychological challenges that often persist after treatment [3]. Financial concerns can exacerbate psychological distress, further contributing to patients' mental health burden [4]. Additionally, psychological distress and poor general self-rated health, a global measure of

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perceived overall health, are associated with increased mortality and shorter survival compared to no psychological distress and good self-rated health among patients with cancer [5, 6]. Recent research has highlighted a rise in early-onset cancer, particularly among individuals under the age of 50 [7], a life stage in which many are actively engaged in parenting roles. It has also been reported that parents with cancer report worse health-related quality of life, as well as physical and mental health compared to individuals with cancer without children [8].

Cancer also impacts family dynamics and the quality of life of the patient's partner and children, placing significant strains on the couple relationship in families affected by cancer, particularly among younger couples who may face fertility concerns, changes in roles, family life, and career [9–11]. For parents with dependent children, cancer adds an additional layer of complexity, since they must manage their illness while fulfilling their roles as both partner and caregiver [10]. Parents with advanced cancer often express concerns about their partners' ability to manage childcare and maintain family cohesion. In response, they may engage in protective behaviors to shield their partner from additional burdens [12]. For partners, distress can even surpass that experienced by patients, sometimes persisting years after the initial diagnosis [13].

Despite the challenges cancer puts on the couple relationship, many long-term cancer survivors report an overall positive relational well-being [14]. However, a subset of survivors continues to experience relational distress, particularly concerning cohesion (degree of closeness) [14]. A previous literature review indicated a slight decrease in divorce rates following a cancer diagnosis, except in two studies where young couples with cervical cancer in particular reported a higher divorce rate [15]. However, low partnership satisfaction remains a predictor of relationship dissolution [16].

Poor physical functioning and higher levels of depressive symptoms have been associated with both lower relationship satisfaction and diminished relationship concordance [17]. However, couples who maintain resilient intimacy, engage in constructive communication, and adopt common dyadic coping strategies tend to report better relationship functioning, highlighting that the way a couple integrates the cancer experience into their lives influences relationship outcomes [18]. Furthermore, cancer treatments can disrupt sexual functioning, which is a significant factor in couple relationship dynamics [19]. Fertility concerns, physical and psychosocial factors, as well as changes in body image and sexual identity, have all been shown to negatively impact sexual functioning and sexual relationships [20–22].

Attachment theory suggests that early relationships with caregivers in childhood form the foundation for emotional bonds that influence a person's sense of security, emotion regulation, and relationships throughout life. In this study, it served as a conceptual background for understanding relationship dynamics in the context of cancer [23, 24]. Secure attachment promotes the use of adaptive emotion regulation strategies, such as cognitive reappraisal, enabling individuals to cope more effectively with stressful events and maintain emotional balance. In contrast, insecure attachment, particularly avoidant styles, often leads to expressive suppression of emotions, limiting effective management of emotional experiences [24]. For patients with cancer, increased levels of attachment anxiety and attachment avoidance are associated with reduced quality of life and increased psychological distress [25], and higher levels of attachment avoidance are directly associated with decreased sexual satisfaction [26].

Despite the significant impact of cancer on relationship functioning, there is limited research specifically focusing on factors associated with changes over time among parents with cancer. This study will utilize sociodemographic information, health and psychological factors to analyze their associations with relationship functioning in parents with cancer who have dependent children. Relationship functioning in this context is conceptualized as dyadic adjustment (quality and stability of a relationship) and perceived quality of the relationship, including dyadic cohesion, relationship satisfaction, sensuality and sexuality, which are all components that may be disrupted by cancer. Understanding these dynamics in parents facing cancer may contribute to the development of more tailored interventions for this population.

2 | Aim

The aim of the present study was to investigate the development of relationship functioning and factors associated with relationship functioning over a 1-year period among parents with cancer.

3 | Methods

3.1 | Study Design

This longitudinal observational study was conducted in 2023 and 2024. The Swedish Ethical Review Board approved the study protocol (Reference number: 2022-03088-01). The study was carried out and is reported according to the STROBE guidelines.

3.2 | Participants and Recruitment

Participants were recruited through advertisements on social media, patient organizations, and advertising posters at oncology clinics across different regions of Sweden. Detailed information about the recruitment process has been described elsewhere [27]. Inclusion criteria were parents aged between 24 and 60 years who had been diagnosed with any type of cancer within the previous 5 years, regardless of cancer stage or treatment status, and who had at least 1 child aged 18 years old or younger. Only participants who reported being in a partnered relationship were included in the present study.

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3.3 | Data Collection

Data collection was conducted through online surveys at inclusion (T1) between January and May 2023 and 1 year later (T2). The surveys were hosted on Uppsala University's survey tool REDCap, and accessible via the project's website (https://connectedprojektet.com/). Participants could also find information about the study and the research team on the website. At each time-point, a 200 Swedish Krona (SEK) gift voucher, equivalent to approximately 17 euros, was offered to each participant upon completing the survey.

All instruments used in this study were selected based on previous research [10, 28] and in collaboration with six parents who had survived cancer. These parents contributed to the choice of self-report questionnaires, ensuring the relevance and acceptability of the questions. They also piloted the questionnaires to assess the amount of time needed to complete them.

3.4 | Outcome Variables

Relationship functioning was assessed at T1 and T2 using the Quality of Dyadic Relationship Scale–36 (QDR). The QDR survey consists of 36 items and measures quality of relationships. It covers the dimensions: Consensus, Dyadic cohesion, Dyadic satisfaction, Couples' communication, Sensuality, and Sexuality [29, 30]. In this study, only the domains Dyadic cohesion, Dyadic satisfaction, Sensuality, and Sexuality were used. Dyadic cohesion refers to the degree of closeness and shared activities experienced by the couple, such as engaging in stimulating exchange of ideas or laughing together. This subscale consists of four items, with responses varying from 1 (“never”) to 6 (“more often than once a day”). Dyadic satisfaction includes one item which refers to the couple's level of overall satisfaction with their relationship by rating it on a scale from 0 (“extremely unhappy”) to 6 (“perfect”). The Sensuality domain consists of five items, with four rated from 1 (“never”) to 6 (“more often than once a day”) and one rated from 1 “strongly disagree” to 6 “fully agree”. These items cover sensual behaviors, such as hugging, kissing, and caressing, as well as desire and contentment related to sensual behaviors. The Sexuality domain consists of five items: three rated from 1 (“never”) to 6 (“more often than once a day”), assessing the frequency of sexual desire and activity, and two rated from 1 (“strongly disagree”) to 6 (“fully agree”), assessing satisfaction related to sexual behaviors [29]. Scores for the subscales were calculated separately and are presented as the mean for each subscale. The instrument has good psychometric properties [30]. The Cronbach's alpha calculated in this study was 0.83 for Dyadic cohesion, 0.87 for Sensuality, and 0.60 for Sexuality. No alpha value was calculated for the dimension Dyadic satisfaction since it only consists of one item.

3.5 | Factors

Factors were collected at T1.

3.5.1 | Sociodemographic Factors

Sociodemographic data included age, parent (mother/father), education level (secondary/post-secondary), level of employment (0%–50%/51%–100%), length of the partner relationship (0–10 years/> 10 years), number of children, and age of the youngest child.

3.5.2 | Health-Related Factors

Health-related factors included cancer type (most recent diagnosis if multiple diagnoses were present), time since diagnosis (years since primary diagnosis or relapse, categorized as up to 2 years, ≤ 3 years), cancer status (curable/incurable), relapse (yes/no), and completed cancer treatment (yes/no).

Self-rated health was assessed by a single item (“How would you rate your general health?”) with five response options, ranging from “very good” to “very poor” [31]. In line with previous studies, self-rated health was dichotomized into “good” and “poor” health by combining “very good” and “good” as “good health”, while “neither good nor poor”, “poor”, and “very poor” formed the “poor health” category [32].

3.5.3 | Psychological Support and Psychological Factors

Variables relating to the perceived need for psychological support and the support offered by health care included questions about the need for psychological support in the relationship (yes/no), having been offered couple's support (yes/no), and if they had sought relationship support on their own (yes/no). These were only presented descriptively.

A single item question was used to assess any history of psychological distress before cancer diagnosis (yes/no), and individual psychological treatment at the time of inclusion (yes/no).

The General Self-Efficacy Scale (GSE) was used to assess general self-efficacy, defined as the belief in one's own ability to manage challenging situations [33]. The instrument contains 10 items rated from 1 (“not true at all”) to 4 (“exactly true”), with scores ranging from 10 to 40. Higher scores indicate greater general self-efficacy. The instrument has good internal consistency (Cronbach's alpha = 0.76–0.90) [33]. The Cronbach's alpha for the instrument in the present study was 0.92.

Psychological distress was assessed using the Depression, Anxiety and Stress Scale (DASS–21) [34]. This instrument consists of 21 items, rated from 0 (“did not apply to me at all”) to 3 (“applied to me very much or most of the time”). Symptoms are divided into three subscales (depression, anxiety, and stress), each scored separately. Scores are classified as normal, mild, moderate, severe, or extremely severe. In this study, scores were dichotomized using established cut-offs [35] indicating at least moderate level of symptoms at ≥ 14 for depression, ≥ 10 for anxiety, and ≥ 19 for stress. The instrument has good psychometric properties (Cronbach's alpha: depression = 0.88,

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anxiety = 0.82, stress = 0.90) [34]. In this study, the Cronbach's alpha was 0.90 for depression, 0.76 for anxiety, and 0.84 for stress.

3.5.4 | Emotion Regulation Factors

The Emotion Regulation Questionnaire (ERQ) was used to assess two emotion regulation strategies: Cognitive reappraisal (ability to change perspective on a situation) and Expressive suppression (inhibiting the expression of emotions) [36]. The measurement scale includes 10 items, rated from 1 ("strongly disagree") to 7 ("strongly agree"). The scores range from 1 to 7 and are calculated as means for each subscale. Higher scores indicate more frequent use of the respective strategy. Higher scores for cognitive reappraisal indicate a greater ability to adjust emotional responses and change perspectives, while higher expressive suppression scores indicate a greater tendency to conceal emotions. The instrument has adequate convergent and discriminant validity, and a Cronbach's alpha of 0.79–0.90 for Cognitive reappraisal and 0.68–0.76 for Expressive suppression [36]. The Cronbach's alpha in this study was 0.91 for Cognitive reappraisal and 0.79 for Expressive suppression.

3.5.5 | Attachment Factors

Attachment patterns in close relationships were assessed using the Experiences in Close Relationships—Relationship Structures Questionnaire (ECR-RS) [37]. This measurement scale comprises nine items, each rated on a Likert scale ranging from 1 ("strongly disagree") to 7 ("strongly agree"). The scores are divided into two subscales: Attachment-related avoidance (items 1–6) and Attachment-related anxiety (items 7–9). The scores range from 1 to 7 and are calculated as the means for each subscale. Attachment-related avoidance refers to strategies such as striving for independence, self-reliance, and emotional distancing. In contrast, Attachment-related anxiety involves a tendency to overreact to perceived threats, overemphasize feelings of helplessness, and intensify negative emotions [38]. The instrument has good internal consistency (composite reliability: Attachment-related avoidance = 0.87, Attachment-related anxiety = 0.84), and good convergent and discriminant validity [37]. In this study, the Cronbach's alpha was 0.74 for Attachment-related avoidance and 0.89 for Attachment-related anxiety.

3.6 | Statistical Analysis

Participant characteristics and questions related to perceived need for support and being offered support by the healthcare services were analyzed using descriptive statistics, reported as means and standard deviations (SD) or as counts (n) and percentages (%). Differences between T1 and T2 for each outcome variable were analyzed using paired t-tests.

Factors associated with the outcome variables Dyadic cohesion, Dyadic satisfaction, Sensuality, and Sexuality at T2 were analyzed using linear regression. The selection of variables was guided by prior research on different psychosocial outcomes in families and couples affected by cancer, and by input from parents with cancer involved in designing the study [10, 27]. While no specific theoretical framework was applied overall, the study was informed by attachment theory as a conceptual background and previous clinical experience. Each variable was conceptually relevant to relationship functioning in the context of cancer and have in previous empirical research been addressed as important in this population [14, 26, 27]. For example, general self-efficacy and emotion regulation was included due to their relevance to an individual's ability to manage stress and relationship challenges [39].

In the first step, factors were analyzed in univariable models for each outcome: age, parent, education, employment status, length of the relationship, number of children, age of the youngest child, time since diagnosis, cancer stage, completed cancer treatment, relapse, self-rated health, psychological distress before cancer diagnosis, individual psychological treatment, depression, anxiety, and stress, self-efficacy, Cognitive reappraisal, Expressive suppression, Attachment-related avoidance, Attachment-related anxiety, and Dyadic cohesion, Dyadic satisfaction, Sensuality, and Sexuality, all at T1. Multivariable linear regression was then conducted. Employment status and relapse were excluded from the models due to missing values. All other variables were included in the adjusted models to capture the potential influence of both sociodemographic, health, and psychological factors on different aspects of relationship functioning. Effects are expressed as unstandardized regression coefficients β. The models were evaluated using a significance level of $p < 0.05$, 95% confidence intervals (CI), and overall model fit expressed by R^2. Durbin-Watson tests were used to assess autocorrelation. A value close to two indicates minimal autocorrelation; values substantially below 2 suggest positive autocorrelation. Multicollinearity was assessed using variance inflation factors (VIFs). All statistical analyses were performed using IBM SPSS Statistics version 28.0 (IBM Corp., Armonk, N.Y., USA).

4 | Results

Of 406 parents with cancer who had dependent children, 336 (83%) were in a partnered relationship at time of inclusion (T1). 1 year after inclusion (T2), 180 (44%) parents with cancer in partnered relationships had completed the QDR both at T1 and T2, and were included in the analyses.

More than half of the participants (61%) were aged between 40 and 50 years, were predominantly female, highly educated, and had been in a relationship for over 10 years. A total of 78% reported having been diagnosed with cancer up to 2 years prior to participation and 56% rated their health as good. At the time of inclusion, 13% reported having incurable cancer and 44% had completed treatment. Further, 56% reported needing support in their relationship; of these only 28% had been offered support as a couple by the healthcare services, and 44% reported having sought help for relationship problems on their own. Approximately one-third of participants reported clinical levels of depression and anxiety symptoms at inclusion (Table 1).

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TABLE 1 | Participant characteristics at inclusion (n = 180).

	N	(%)	Mean	SD
Sociodemographic factors				
Age			45.11	6.12
Parent				
Mother	169	94		
Father	11	6		
Education level				
Secondary	28	16		
Post-secondary	152	84		
Level of employment[a]				
0%–50%	14	40		
51%–100%	21	60		
Number of children			2.21	0.93
Age of youngest child			10.36	5.12
Length of relationship at inclusion				
≤ 10 years	30	17		
Over 10 years	150	83		
Health-related factors				
Time since diagnosis				
Up to 2 years	140	78		
≥ 3 years	40	22		
Cancer status				
Incurable	23	13		
Curable	157	87		
Relapse[a]				
Yes	24	14		
No	145	86		
Completed cancer treatment				
Yes	79	44		
No	101	56		
Cancer diagnosis				
Bowel cancer	14	8		
Breast cancer	128	71		
CNS-cancer[b]	1	1		
Gynecological cancer	10	5		
Hematological	10	5		
Skin cancer	6	3		
Upper GI-cancer[b]	3	2		
Urological cancer	5	3		
Other	3	2		
Self-rated health				
Good	100	56		
Poor	80	44		
Psychological support and psychological factors				
Previous psychological distress				
Yes	63	35		
No	117	65		
Individual psychological treatment				
Yes	39	22		
No	141	78		
Need for support in a relationship				
Yes	101	56		
No	79	44		
Offered support as a couple				
Yes	51	28		
No	129	72		
Sought support for relationship on their own				
Yes	44	44		
No	57	56		
Self-efficacy			28.20	5.36
Depression				
Below cut-off	121	67		
Above cut-off	59	33		
Anxiety				
Below cut-off	126	70		
Above cut-off	54	30		
Stress				
Below cut-off	139	77		
Above cut-off	41	23		
Emotion regulation factors				
Cognitive reappraisal			4.50	1.18
Expressive suppression			2.99	1.29
Attachment factors				
Attachment-related avoidance			2.94	1.29
Attachment-related anxiety			3.14	1.83

[a]Missing values: *Employment status*: n = 145. Due to the structure of the question, participants did not need to answer the question about their work situation if they were studying, on sick leave, on parental leave, unemployed, or had retired early. *Relapse*: n = 11. *Sought support for relationship on their own*: n = 101. Due to the structure of the questionnaire, participants did not need to answer this question if they had answered no to the previous question in the survey. For these variables, the percentages were calculated from the responses, not from the total sample size of the study.
[b]Abbreviations: CNS: central nervous system; GI: gastrointestinal.

Between inclusion (T1) and follow-up assessment 1 year later (T2), mean scores had decreased for all outcome variables except Sexuality (Table 2). The differences between T1 and T2 were statistically significant for Dyadic cohesion (p = 0.01; 95% CI: 0.27, 0.23), Dyadic satisfaction (p = 0.01; 95% CI: 0.07, 0.38), and Sensuality (p < 0.001; 95% CI: 0.11, 0.35).

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TABLE 2 | Outcome variables at T1 and T2 ($n = 180$) and results from paired t-tests between the two time points.

	T1		T2		
	Mean	**SD**	**Mean**	**SD**	***p***
Dyadic cohesion	4.34	0.96	4.21	1.05	0.01
Dyadic satisfaction	3.25	1.37	3.03	1.42	0.01
Sensuality	4.21	1.24	3.98	1.25	< 0.001
Sexuality	3.17	0.96	3.17	0.92	0.93

4.1 | Factors Associated With Dyadic Cohesion, Dyadic Satisfaction, Sensuality, and Sexuality

The results of the unadjusted and adjusted analyses are presented in Table 3.

4.1.1 | Dyadic Cohesion

In the unadjusted analysis, symptoms of stress, higher use of Expressive suppression as an emotion regulation strategy, and higher Attachment-related avoidance at T1 were associated with lower Dyadic cohesion at T2. Higher self-efficacy, as well as higher Dyadic cohesion, Dyadic satisfaction, Sensuality, and Sexuality at T1, were associated with increased Dyadic cohesion at T2.

In the adjusted analysis, only completion of cancer treatment ($\beta = -0.26$; 95% CI: −0.48, −0.04, $p = 0.02$) and higher Dyadic cohesion at T1 ($\beta = 0.77$; 95% CI: 0.63, 0.91, $p < 0.01$) remained statistically significant. Each 1-unit increase in Dyadic cohesion at T1 resulted in a 0.77 increase in Dyadic cohesion at T2.

4.1.2 | Dyadic Satisfaction

In the unadjusted analysis, poor self-rated health, symptoms of depression, anxiety, and stress, higher use of Expression suppression, and Attachment-related anxiety were associated with lower Dyadic satisfaction at T2. Higher self-efficacy, higher Dyadic cohesion, Dyadic satisfaction, Sensuality, and Sexuality at T1 were associated with increased Dyadic satisfaction at T2.

In the adjusted analysis, poor self-rated health ($\beta = -0.44$; 95% CI: −0.78, −0.10; $p = 0.01$) was associated with lower Dyadic satisfaction, while higher Dyadic cohesion ($\beta = 0.33$; 95% CI: 0.12, 0.53; $p < 0.01$), Dyadic satisfaction ($\beta = 0.49$; 95% CI: 0.32, 0.65; $p < 0.001$), and Sensuality ($\beta = 0.22$; 95% CI: 0.03, 0.40; $p = 0.02$) at T1 were associated with higher Dyadic satisfaction at T2.

4.1.3 | Sensuality

Receiving individual psychological treatment, symptoms of depression and stress, and higher use of Expressive suppression at T1 were associated with lower Sensuality scores at T2. Higher Dyadic cohesion, Dyadic satisfaction, Sensuality, and Sexuality at T1 were associated with increased Sensuality at T2.

In the adjusted analysis, higher age ($\beta = -0.31$; 95% CI: −0.06, −0.0001; $p = 0.049$); being a mother ($\beta = -0.54$; 95% CI: −1.06, −0.04; $p = 0.03$); and Attachment-related anxiety ($\beta = -0.08$; 95% CI: −0.17, −0.002; $p = 0.046$) were associated with decreased Sensuality at T2, while Dyadic cohesion ($\beta = 0.29$; 95% CI: 0.12, 0.45; $p < 0.001$) and Sensuality at T1 ($\beta = 0.63$; 95% CI: 0.49, 0.78; $p < 0.001$) remained significant predictors of increased Sensuality at T2.

4.1.4 | Sexuality

Receiving individual psychological treatment, and presenting symptoms of depression, anxiety and stress were associated with decreased Sexuality at T2. Higher Expressive suppression was associated with decreased Sexuality at T2. Higher Dyadic cohesion, Dyadic satisfaction, Sensuality, and Sexuality at T1 were associated with increased Sexuality at T2.

In the adjusted analysis, higher age of the youngest child was associated with increased Sexuality at T2 ($\beta = 0.03$; 95% CI: 0.001, 0.07; $p = 0.04$). Reporting symptoms of anxiety ($\beta = -0.37$; 95% CI: −0.68, −0.07, $p = 0.02$) and higher Attachment-related anxiety ($\beta = -0.14$; 95% CI: −0.22, −0.06; $p < 0.001$) were associated with decreased Sexuality, while higher Sexuality at T1 ($\beta = 0.44$; 95% CI: 0.29, 0.59; $p < 0.001$) was associated with increased Sexuality at T2.

4.1.5 | Overall Model Fit, Autocorrelation and Multicollinearity

The model fit was indicated by R^2 values of 0.67 for Dyadic cohesion, 0.60 for Dyadic satisfaction, 0.68 for Sensuality, and 0.50 for Sexuality.

Durbin-Watson tests for each model were: 2.04 for Dyadic cohesion and Dyadic satisfaction, 1.89 for Sensuality, and 2.01 for Sexuality. All predictors had variance inflation factors (VIF) below 3.0 (range = 1.16–2.94), indicating that multicollinearity was not a concern.

5 | Discussion

This study investigated the development of, and factors associated with, relationship functioning over a 1-year period among parents with cancer who had dependent children. All aspects of relationship functioning included in this study (Dyadic cohesion, Dyadic satisfaction, Sensuality), except Sexuality, declined over time. After adjusting for multiple variables, completion of cancer treatment predicted higher Dyadic cohesion while younger age, being a mother were associated with lower Sensuality. Having poor self-rated health was associated only with lower Dyadic satisfaction while higher Attachment-related anxiety was associated both with lower Sensuality and lower Sexuality. Higher symptoms of anxiety and lower age of youngest child were associated with decreased Sexuality. Additionally, higher levels of relationship functioning at the first

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TABLE 3 | Unadjusted (univariable) and adjusted (multivariable) linear regression models of the associations between the factors and the outcome variables Dyadic cohesion, Dyadic satisfaction, Sensuality, and Sexuality (n = 180).

	Dyadic cohesion[a]		Dyadic satisfaction[a]		Sensuality[a]		Sexuality[a]	
Factors	**Unadjusted unstandardized coefficients B (95% CI)**	**Adjusted Unstandardized coefficients B (95% CI)**	**Unadjusted unstandardized coefficients B (95% CI)**	**Adjusted unstandardized coefficients B (95% CI)**	**Unadjusted unstandardized coefficients B (95% CI)**	**Adjusted unstandardized coefficients B (95% CI)**	**Unadjusted unstandardized coefficients B (95% CI)**	**Adjusted unstandardized coefficients B (95% CI)**
Age	−0.00 (−0.03–0.02)	−0.02 (−0.05–0.00)	0.01 (−0.02–0.05)	−0.01 (−0.05–0.04)	−0.01 (−0.35–0.03)	−0.31 (−0.06–−0.0001)***	0.01 (−0.02–0.03)	−0.22 (−0.52–0.01)
Parent								
Father	*ref*	*ref*	*ref*	*ref*	*ref*	*ref*	*ref*	−0.30 (−0.78–0.18)
Mother	0.01 (−0.64–0.65)	−0.20 (−0.63–0.24)	−0.07 (−0.94–0.81)	0.28 (−0.92–0.37)	−0.35 (−1.12–0.42)	−0.55 (−1.06 −0.04)***	−0.25 (−0.82–0.32)	*ref*
Education								
Secondary	*ref*	*ref*	*ref*	*ref*	*ref*	*ref*	*ref*	*ref*
Post-secondary	−0.26 (−0.68–0.17)	−0.13 (−0.41–0.16)	0.12 (−0.46–0.69)	0.18 (−0.24–0.60)	−0.07 (−0.58–0.43)	0.02 (−0.31–0.35)	−0.01 (−0.38–0.37)	0.00 (−0.31–0.31)
Employment status								
0%–50%	*ref*		*ref*		*ref*		*ref*	
51%–100%	−0.21 (−1.03–0.60)	—	−0.62 (−1.69–0.45)	—	−0.27 (−1.27–0.73)	—	−0.33 (−0.95–0.28)	—
Length of relationship								
0–10 years	*ref*	*ref*	*ref*	*ref*	*ref*	*ref*	*ref*	*ref*
> 10 years	−0.08 (−0.49–0.34)	−0.10 (−0.40–0.20)	0.19 (−0.37–0.75)	0.16 (−0.28–0.60)	−0.31 (−0.80–0.18)	−0.16 (−0.50–0.19)	−0.21 (−0.57–0.16)	−0.21 (−0.53–0.10)
Number of children	0.03 (−0.14–0.19)	0.05 (−0.07–0.16)	−0.01 (−0.23–0.22)	0.03 (−0.14–0. 20)	0.04 (−0.16–0.24)	0.06 (−0.08–0.19)	0.04 (−0.11–0.18)	0.09 (−0.03–0.22)
Age of youngest child	0.01 (−0.02–0.04)	0.01 (−0.02–0.04)	0.02 (−0.02–0.06)	0.00 (−0.04–0.05)	0.02 (−0.02–0.06)	0.03 (−0.01–0.06)	0.02 (−0.00–0.05)	0.03 (0.001 −0.07)***
Time since diagnosis								
Up to 2 years	0.08 (−0.23–0.40)	0.14 (−0.13–0.41)	−0.07 (−0.49–0.35)	−0.12 (−0.52–0.29)	−0.17 (−0.54–0.21)	−0.15 (−0.47–0.16)	−0.16 (−0.43–0.12)	−0.12 (−0.41–0.16)
≥ 3	*ref*	*ref*	*ref*	*ref*	*ref*	*ref*	*ref*	*ref*

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TABLE 3 | (Continued)

Factors	Dyadic cohesion[a]		Dyadic satisfaction[a]		Sensuality[a]		Sexuality[a]	
	Unadjusted unstandardized coefficients B (95% CI)	Adjusted Unstandardized coefficients B (95% CI)	Unadjusted unstandardized coefficients B (95% CI)	Adjusted unstandardized coefficients B (95% CI)	Unadjusted unstandardized coefficients B (95% CI)	Adjusted unstandardized coefficients B (95% CI)	Unadjusted unstandardized coefficients B (95% CI)	Adjusted unstandardized coefficients B (95% CI)
Cancer status								
Incurable	−0.13 (−0.59–0.33)	−0.23 (−0.56–0.10)	−0.33 (−0.96–0.29)	−0.32 (−0.81–0.17)	−0.18 (−0.73–0.38)	−0.26 (−0.64–0.12)	−0.14 (−0.55–0.27)	−0.24 (−0.60–0.12)
Curable	*ref*	*ref*	*ref*	*ref*	*ref*	*ref*	*ref*	*ref*
Relapse								
Yes	−0.19 (−0.65–0.27)		−0.46 (−1.07–0.16)		−0.15 (−0.70–0.41)		−0.17 (−0.57–0.24)	
No	*ref*	—	*ref*	—	*ref*	—	*ref*	—-
Completed cancer treatment								
Yes	−0.17 (−0.49–0.14)	−0.26 (−0.48–−0.04)***	−0.23 (−0.65–0.19)	−0.24 (−0.57–0.08)	−0.15 (−0.52–0.22)	−0.08 (−0.34–0.17)	−0.15 (−0.42–0.13)	−0.41 (−0.28–0.20)
No	*ref*	*ref*	*ref*	*ref*	*ref*	*ref*	*ref*	*ref*
Self-rated health								
Poor	−0.31 (−0.62–0.00)	−0.17 (−0.40–0.05)	−0.75 (−1.15– −0.34)*	−0.44 (−0.78–−0.10)**	−0.27 (−0.63–0.10)	−0.18 (−0.45–0.08)	−0.24 (−0.51–0.03)	−0.02 (−0.27–0.23)
Good	*ref*	*ref*	*ref*	*ref*	*ref*	*ref*	*ref*	*ref*
Psychological distress before cancer								
Yes	−0.27 (−0.59–0.05)	−0.14 (−0.38–0.11)	−0.34 (−0.77–0.10)	0.13 (−0.24–0.50)	−0.36 (−0.74–0.03)	−0.06 (−0.34–0.23)	−0.19 (−0.48–0.09)	−0.10 (−0.16–0.37)
No	*ref*	*ref*	*ref*	*ref*	*ref*	*ref*	*ref*	*ref*
Individual psychological treatment								
Yes	−0.20 (−0.57–0.18)	0.18 (−0.11–0.47)	−0.46 (−0.96–0.04)	−0.16 (−0.27–0.60)	−0.45 (−0.89–−0.00)***	0.05 (−0.29–0.39)	−0.36 (−0.68 −0.03)***	−0.08 (−0.39–0.24)
No	*ref*	*ref*	*ref*	*ref*	*ref*	*ref*	*ref*	*ref*
Depression								
Yes	−0.31 (−0.64–0.02)	0.12 (−0.19–0.42)	−0.77 (−1.20– −0.34)*	0.08 (−0.37–0.53)	−0.45 (−0.84– −0.06)***	−0.04 (−0.40–0.31)	−0.35 (−0.63–−0.06)***	−0.11 (−0.22–0.44)
No	*ref*	*ref*	*ref*	*ref*	*ref*	*ref*	*ref*	*ref*

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TABLE 3 | (Continued)

Factors	Dyadic cohesion[a]		Dyadic satisfaction[a]		Sensuality[a]		Sexuality[a]	
	Unadjusted unstandardized coefficients B (95% CI)	Adjusted Unstandardized coefficients B (95% CI)	Unadjusted unstandardized coefficients B (95% CI)	Adjusted unstandardized coefficients B (95% CI)	Unadjusted unstandardized coefficients B (95% CI)	Adjusted unstandardized coefficients B (95% CI)	Unadjusted unstandardized coefficients B (95% CI)	Adjusted unstandardized coefficients B (95% CI)
Anxiety								
Yes	−0.32 (−0.65–0.02)	−0.19 (−0.47–0.10)	−0.57 (−1.02– −0.12)**	−0.05 (−0.47–0.37)	−0.19 (−0.59–0.21)	−0.02 (−0.35–0.31)	−0.49 (−0.78–− 0.20)*	−0.37 (−0.68–− 0.07)***
No	*ref*	*ref*	*ref*	*ref*	*ref*	*ref*	*ref*	*ref*
Stress								
Yes	−0.40 (−0.77–− 0.35)***	−0.24 (−0.10–0.58)	−0.95 (−1.43– −0.47)*	−0.13 (−0.63–0.37)	−0.52 (−0.96– −0.09)***	−0.15 (−0.25–0.54)	−0.52 (−0.84–− 0.20)*	0.18 (−0.19–0.54)
No	*ref*	*ref*	*ref*	*ref*	*ref*	*ref*	*ref*	*ref*
Self-efficacy	0.04 (0.01–0.06)**	0.01 (−0.01–0.03)	0.05 (0.02–0.09)**	−0.01 (−0.04–0.03)	0.03 (−0.01–0.06)	−0.02 (−0.05–0.01)	0.01 (−0.01–0.04)	−0.02 (−0.05–0.00)
Cognitive reappraisal	0.07 (−0.06–0.20)	−0.07 (−0.17–0.04)	0.14 (−0.03–0.32)	−0.03 (−0.19–0.12)	0.04 (−0.12–0.19)	0.00 (−0.12–0.12)	−0.01 (−0.13–0.11)	−0.03 (−0.14–0.08)
Expressive suppression	−0.19 (−0.31– −0.08)*	−0.01 (−0.11–0.09)	−0.25 (−0.41–− 0.10)**	0.01 (−0.15–0.16)	−0.19 (−0.33–− 0.04)**	−0.05 (−0.17–0.07)	−0.12 (−0.23–− 0.02)***	−0.03 (−0.14–0.08)
Attachment-related avoidance	−0.15 (−0.27–− 0.03)**	−0.03 (−0.14–0.07)	−0.14 (−0.30–0.02)	0.07 (−0.09–0.23)	−0.04 (−0.18–0.10)	0.10 (−0.02–0.23)	−0.07 (−0.18–0.03)	0.04 (−0.08–0.16)
Attachment-related anxiety	−0.06 (−0.14–0.03)	−0.04 (−0.11–0.04)	−0.17 (−0.28–− 0.53)**	−0.05 (−0.16–0.05)	−0.98 (−020–0.00)	−0.08 (−0.17–− 0.002)***	−0.14 (−0.21–− 0.07)*	−0.14 (−0.22–− 0.06)*
Dyadic cohesion T1	0.84 (0.74–0.95)*	0.77 (0.63–0.91)*	0.85 (0.68–1.03)*	0.33 (0.12–0.53)**	0.74 (0.59–0.90)*	0.29 (0.13–0.45)*	0.32 (0.18–0.45)*	0.09 (−0.07–0.24)
Dyadic satisfaction T1	0.43 (0.33–0.52)*	0.04 (−0.08–0.15)	0.74 (0.63–0.84)*	0.49 (0.32–0.65)*	0.51 (0.40–0.63)*	−0.01 (−0.14–0.12)	0.30 (0.21–0.39)*	−0.02 (−0.10–0.15)
Sensuality T1	0.46 (0.35–0.56)*	0.03 (−0.10–0.15)	0.67 (0.53–0.80)*	0.22 (0.03 −0.40)***	0.80 (0.70–0.89)*	0.63(0.49–0.78)*	0.37 (0.24–0.43)*	0.06 (−0.07–0.19)
Sexuality T1	0.53 (0.34–0.73)*	0.13 (−0.06–0.32)	0.71 (0.45–0.97)*	−0.10 (−0.38–0.17)	0.87 (0.66–1.08)*	0.07 (−0.15–0.28)	0.62 (0.49–0.71)*	0.44 (0.29–0.59)*

[a]R^2 values: Dyadic cohesion = 0.67; Dyadic satisfaction = 0.60; Sensuality = 0.68; Sexuality = 0.50.
*$p \leq 0.001$.
**$p \leq 0.01$.
***$p < 0.05$.

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assessment were associated with higher levels at the second assessment.

The observed declines in Dyadic cohesion, Dyadic satisfaction, and Sensuality suggests that cancer significantly strains relationship functioning over time in parents diagnosed with cancer who have dependent children. This shows that the emotional burden of illness and family life affects not only the individual, but also the couple as a unit [10]. However, these findings also showed that those with higher initial relationship functioning appeared to be better equipped to manage illness-related challenges, since they presented greater relationship functioning over time. This stability may be attributed to effective communication, dyadic coping, and mutual emotional support [40], as couples who effectively adopt these strategies tend to adapt better to challenges posed by cancer [18]. As expected, baseline levels of relationship functioning predicted outcomes over time (i.e. autoregressive effects). However, results of the Durbin-Watson tests suggest minimal residual autocorrelation. Thus, while T1 scores predict T2 outcomes, autoregressive bias is unlikely to account for the observed changes over time.

Completion of cancer treatment was associated with increased Dyadic cohesion at T2, suggesting that the resolution of treatment-related stressors may allow couples to refocus and reinvest in their relationship. Conversely, poor self-rated health was associated with lower Dyadic satisfaction, aligning with previous research [17]. This finding emphasizes how health challenges can place stress on couple relationships, requiring adaptative efforts to manage the physical demands of illness and maintain relationship quality [18]. This may be particularly important in cancer patients who are parents of dependent children, which should be acknowledged by healthcare professionals.

Lower age of the youngest child was associated with lower Sexuality and younger parental age was related to decreased Sensuality at T2. Younger parents, especially those with younger children, may find that opportunities for intimacy are limited by caregiving demands. The illness often requires role adjustments, leading both caregivers and children to take on additional responsibilities [41]. This shift in family dynamics, coupled with the demands of managing the cancer, may result in parents having less time to devote to nurturing their romantic relationship. Additionally, younger couples may face other challenges in relation to their cancer diagnosis and treatment, such as infertility or sub-fertility, which may in turn affect their relationship dynamics negatively. Given that research suggests a decrease in divorce rates for patients with various types of cancer, although not cervical cancer [15], future research is needed to better understand how relationship functioning varies among parents with different types of cancer who have dependent children of different ages and the specific challenges they face while managing the disease.

Symptoms of anxiety were related to decreased Sexuality, while Attachment-related anxiety was associated with decreased Sensuality and Sexuality at T2. Similarly, anxiety symptoms have been associated with sexual problems in other cancer populations [42]. Higher Attachment-related anxiety may intensify concerns about fertility, and about the physical and psychosexual changes following cancer treatment, which in turn may create additional pressures within the relationship contributing to disruptions in intimacy and sexual connection [11]. Attachment-related anxiety might also exacerbate fears about the relationship's future, further inhibiting intimate and sexual expression [38, 43]. Previous research has shown that anxious attachment is a predictor of lower sexual satisfaction, mediated by marital adjustment [26]. In line with this, interventions aiming at improving marital adjustment and reducing both anxiety symptoms and Attachment-related anxiety could enhance Sensuality and Sexuality.

5.1 | Clinical Implications

This study highlights the negative impact of cancer on relationship functioning among parents, and shows that more than half of parents with cancer report a need for couple-based support, while only one in three report having been offered such support. This study thereby highlights a gap in healthcare provisions available for couples facing cancer by pointing to the need for relationship support, and the lack of such interventions in cancer care. Early screening and intervention for relationship difficulties among parents with cancer are therefore recommended, ideally starting at the time of diagnosis. Given that mutual emotional support, open communication, and adaptive dyadic coping are positively related to high relationship functioning and family resilience [18, 44], early interventions to enhance communication and coping skills could improve well-being after cancer, especially for younger parents with cancer and for those reporting poor self-rated health and Attachment-related anxiety.

5.2 | Strength and Limitations

A number of strengths and limitations must be taken into account when interpreting the results. This study's longitudinal design allowed for the assessment of relationship functioning, conceptualized as Dyadic cohesion, Dyadic satisfaction, Sensuality and Sexuality, over time. The use of validated outcome measures covering different aspects of relationship functioning and related factors provided a broad view of the development of relationship function among parents with cancer. However, despite efforts to recruit fathers with cancer, most participants were mothers with breast cancer. The overrepresentation of patients with breast cancer and high loss to follow-up may be a potential source of bias and limit generalizability of the findings. The sample was also predominantly composed of highly educated individuals diagnosed with cancer during the past 2 years, limiting generalizability to populations with lower education levels or those who have been living with cancer for longer periods. Although medical diagnosis and family composition could not be verified for participants due to the use of self-reported data rather than registry data, the eligibility criteria that is, parents diagnosed with cancer while having dependent children, were clearly stated in all recruitment materials, on the project website, and at the beginning of the survey. Additionally, the survey was extensive and required detailed responses on cancer diagnosis, number of and age of children, health,

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psychosocial, and family-related topics, which likely discouraged participation by individuals who did not meet the inclusion criteria. To further assure accuracy, only participants with complete answers to the full survey were included in the study.

The questions regarding health and psychological support were study-specific items. However, they were developed in collaboration with six parents who had cancer. These parents contributed to the wording of the self-report questions and tested the questionnaire to ensure relevance and clarity, and feasibility in terms of time required to complete it. The present study did not include measurements of relationship outcomes from the patients' partners. While recommendations for couple-based support remain important, assessing whether partners experience similar challenges would provide a more comprehensive understanding of the impact of cancer on the couple as a unit, and could ultimately enhance the effectiveness of targeted interventions. Another limitation is the potential risk of overfitting due to the inclusion of a relatively large number of predictors in the regression models in relation to the sample size. This analytical approach was chosen to capture the complexity of the associations between relationship functioning and a range of sociodemographic, health and psychological factors. To address this issue, multicollinearity tests were conducted, which did not indicate problematic levels of collinearity. Lastly, this study was conducted in Sweden, a country with publicly funded healthcare and comprehensive parental and sick leave policies. Cultural factors related to family dynamics and healthcare access may differ in countries with different healthcare systems, potentially influencing the experience of parenting with cancer and relationship functioning. These contextual differences should be considered when interpreting results.

6 | Conclusion

This study highlights the significant impact of cancer on various aspects of relationship functioning among parents with cancer who have dependent children, with significant declines in Dyadic cohesion, Dyadic satisfaction, and Sensuality over time. The findings further suggest that couples with high relationship functioning tend to maintain high relationship functioning over time. Given these outcomes, expanding access to relationship counseling early in the treatment, and developing interventions that support effective communication skills and adjustment to physical and psychological changes due to cancer, are needed. Such efforts could help to sustain relationship functioning while navigating the complexity of cancer and parenting. Future research should focus on diversifying the study population of parents with cancer who have dependent children to better understand relationship functioning across various types of cancer and among both mothers and fathers.

Author Contributions

Andrea Hess Engström: formal analysis, visualization, writing – original draft. **Anette Alvariza:** writing – review and editing. **Astrid Kuylenstierna:** writing – review and editing. **Anna Wikman:** conceptualization, methodology, formal analysis, writing – review and editing. **Lisa Ljungman:** conceptualization, methodology, formal analysis, writing – review and editing, supervision, project administration, funding acquisition.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

Data are available upon reasonable request.

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