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Change in the value of work after breast cancer: evidence from a prospective cohort

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Abstract

Background Return to work (RTW) after cancer can be modulated by psychosocial factors, including a reordering of one's life values, with more emphasis on private life than work-life. This change in patients' outlook on work-life is however poorly understood.

Methods We used data from a French cohort (CANTO, NCT01993498) of women diagnosed with stage I–III primary breast cancer (BC) prospectively assessing life priorities between work and private life at diagnosis and 2 years after diagnosis. We identified women who reported a shift in life values toward private life, and we investigated the clinical, demographic, work-related, and psychosocial determinants of this change using logistic regressions.

Results Overall, 46% ($N = 1097$) of the women had reordered their life priorities toward private life 2 years after diagnosis. The factors positively associated with this shift included being diagnosed with stage III BC, perceiving one's job as not very interesting, being an employee/clerk (vs. executive occupation), perceiving no support from the supervisor at baseline, perceiving negative interferences of cancer in daily life, and perceiving a positive impact from experiencing cancer. Depressive symptoms were negatively associated with this shift.

Conclusion After BC, there seems to be an important reordering of life values, with more emphasis on private life. This change is influenced by clinical determinants, but also by work-related and psychosocial factors.

Implications for Cancer Survivors Stakeholders should consider this change in a patient's outlook on work-life as much as the classical physical late effects when designing post-BC programs to support RTW.

Keywords Breast cancer · Change of value of work · Cohort

Introduction

Breast cancer (BC) is the leading cause of cancer worldwide, with 2.3 million cases diagnosed in 2020 [1]. More than half of the women diagnosed with BC in 2020 were between 20 and 59 years of age, according to the GLOBOCAN database (available at https://gco.iarc.fr/today/home). Given the rise in female labor force participation worldwide and the extension of the legal retirement age [2, 3], return to work (RTW) after BC constitutes a major challenge for many patients and for society [4]. RTW determinants have been much studied from a medical perspective, with an emphasis on the role of cancer's stage, comorbidities, and treatments [5–9]. Furthermore, RTW is greatly diminished in women with poor mental health status [6, 10] and those with a low socioeconomic status [11, 12], the latter mainly because of greater exposure to harsh working conditions. Besides, RTW is a complex process in which the work environment (e.g., working conditions, work climate, support from coworkers or supervisor) and individual and interpersonal factors, such as motivation and the meaning of work, play a specific role [4]. In particular, several studies have highlighted that a decrease in the value given to work was negatively associated with reduced RTW and working hours [13–16].

Cancer is an event that leads one to question what is important in life, which can result in a reordering of one's

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life values, including the value given to work-life [4, 17]. A number of qualitative studies have, indeed, highlighted changes in individuals' perceptions regarding the value of work-life compared to private life [18–22]. In a study conducted on cancer survivors treated for various diagnoses, most of the participants stated that work had become a less important aspect of their life after diagnosis compared to other domains, such as family and friends [18]. Other qualitative studies, all conducted in BC survivors, reported changes in women's perceptions of the value of work [15, 19, 20, 22] and even a loss of "the taste for work" [21]. In these studies, women depicted the post-cancer period as a time to give more emphasis to their own interests and well-being [22] or to give priority to motherhood over career success [19].

While some studies have described work engagement in a specific workplace after cancer [23, 24], very few quantitative studies have focused on the change inpatients' outlook on work-life after cancer. In one Canadian population-based study, the BC survivors were twice as likely as the controls to report that they "valued work" less than they did 3 years earlier [25]. To our knowledge, only one quantitative study has focused on the change in outlook on work-life and investigated its determinants [26]. In that study, where women were followed prospectively for 2 years after diagnosis, two-thirds of the participants stated at the outset that work was "one of the most important aspects of their life." This rate tended to decrease slightly over time, with the women supported by their coworkers at diagnosis being more likely to value work [26]. However, most of the participants were urban and privileged, and only a few explanatory factors were examined. Indeed, these changes in the balance of life values between work-life and private life could result from the psychological consequences of cancer, which are known to be mostly negative because of the anxiety raised by the fear of death and the fear of cancer recurrence [27, 28], but also positive. Indeed, the post-cancer period is also perceived by some individuals, in acknowledging the possibility of death, as a second chance, and is associated with a positive psychological change which is referred to as "posttraumatic growth" [29]. In fact, since posttraumatic growth enables cancer survivors to develop a new conception of life with new priorities [30–32], its development may be associated with a change in the value given to work-life.

Overall, there are few data measuring the change in patients' outlook on work-life and cancer and a poor understanding of its determinants. Considering that support measures to help patients RTW such as rehabilitation program or retraining should take into account the patients' concerns, we used prospective data collected in a large multicenter cohort of BC survivors to quantify the magnitude of the change in the value given to work-life compared to private life and to identify the clinical, demographic, work-related, and psychosocial factors associated with this change.

Methods

Study design and population

We used data from the French CANTO (Cancer Toxicities; NCT01993498) prospective cohort of women diagnosed with stage I–III first primary BC in 26 cancer centers. The study was approved by the French ethics committee, CPP—Ile de France 7, on October 14, 2011 (ref 11–039) and the French health authorities, ANSM, on September 14, 2011 (ref 2011-A011095-36). All the women were aged 18 or over at diagnosis and provided written informed consent. The purpose of this cohort is to study the toxicities of cancer treatment and their social impact and is described elsewhere [33]. Women were enrolled by an oncologist at BC diagnosis. Data were collected prospectively during a clinical examination and through several self-report questionnaires at diagnosis and 1 and 2 years later. These questionnaires included an item on life priorities in terms of work-life and private life at diagnosis and 2 years later (see "Measures" section below), which helped define the study population.

Overall, 9597 patients of the CANTO cohort with stage I–III breast cancer diagnosed from 2012 to 2017 were available at the time of the analysis. For our project, we excluded women over 57 years of age at diagnosis (i.e., who were close to the legal retirement age) ($n=4753$), women who had not had breast surgery ($n=25$), and women who were not working at the time of diagnosis ($n=888$). Subsequently, we excluded the women who gave priority to private life at diagnosis, in order to assess the shift in life priorities toward private life ($n=1690$). We also excluded the following groups: women for whom data on working conditions at diagnosis were not collected (specific items concerning working conditions were included in the CANTO questionnaires only after 2013) ($n=617$); women who died less than 2 years after diagnosis ($n=11$); women who developed local or distant recurrence less than 2 years after diagnosis ($n=35$); women with data not available ($n=34$); or women lost to follow-up ($n=12$) before 2 years after diagnosis; women not working or on sick leave 2 years after diagnosis ($n=382$); and women with missing data on the outcome measure ($n=53$), which left 1097 women for the analysis (Fig. 1).

Measures

Outcome

As Petersson et al. explain, there is no gold standard for how to operationalize the experienced value of work [34].

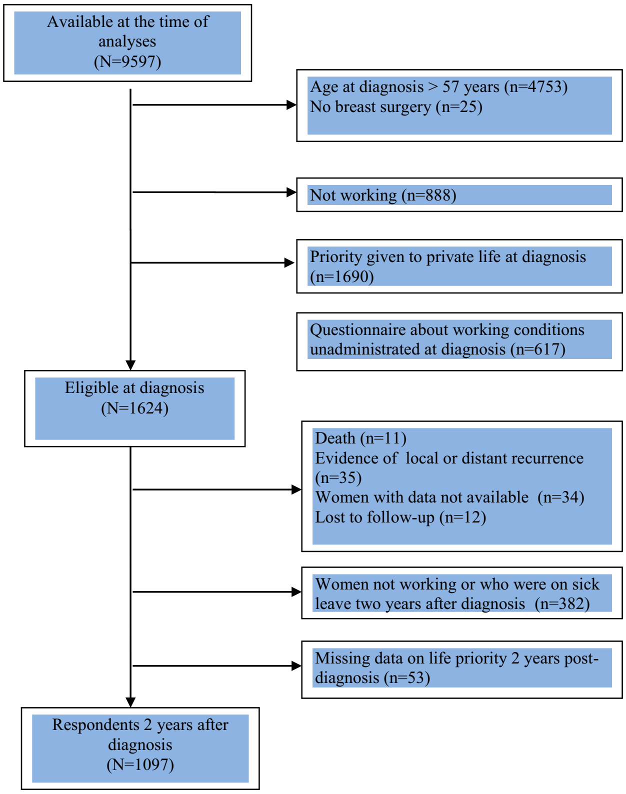


Fig. 1 Flowchart of the patient population

To assess the importance that BC survivors attach to work in their lives, we assessed the change in the patients' outlook on work-life compared to private life. The women were asked about their priorities in terms of private life and work-life at diagnosis and 2 years later using an item from a French national population-based survey on cancer survivorship previously administered to more than 4000 survivors in the VICAN survey. This item is "Today, would you say that… i)your private life and your professional life are equally important, ii) your private life is more important, iii) your professional life is more important" [35]. Our outcome measure was the shift in women's priorities toward private life over this 2-year period in those who did not give priority to private life at diagnosis over work life. Our outcome was thus a binary variable: a shift in life priorities toward giving priority to private life (yes/no).

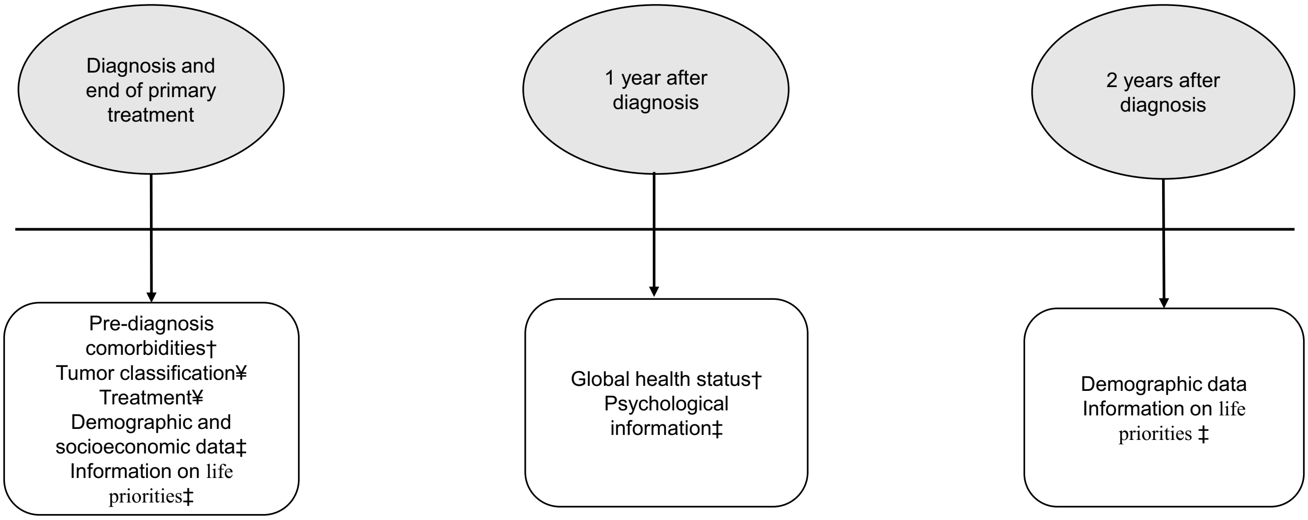
Co-variables

The independent variables included clinical, demographic, work-related, and psychosocial characteristics collected at different time points (Fig. 2).

Clinical characteristics and health-related quality of life

The clinical characteristics included the stage at diagnosis (I, II, or III), comorbidities at diagnosis evaluated using the Charlson comorbidity index [36] (0, 1, or ≥ 2), and treatment. Information about breast surgery (conservative vs. mastectomy), chemotherapy (yes/no), hormonotherapy (yes/no), and radiotherapy (yes/ no) was included as well.

Health status after treatment was assessed using the global health status score of the Quality of Life Questionnaire Core30 Items (QLQ-C30) [37]. The score ranges from



† Data collected during a face-to-face health exam by a trained clinical research nurse
‡ Data collected by means of self-report paper questionnaires
¥ Data extracted from medical records

Fig. 2 Design of the data collected and used in the analysis

0 to 100, with a high score corresponding to a high reported quality of life.

Demographic and work-related characteristics

Demographic data included age (<40, 40–49 or ≥ 50 years), a change in couple status between diagnosis and 2 years after diagnosis (still in a relationship, newly in a relationship, newly single, or still single), and the presence of financially dependent children (age <25) at home at diagnosis (yes/no).

The woman's occupational class was collected as a 6-category variable (farmer/craftsperson/shopkeeper, executive occupation, intermediate occupation, employee/clerk, or manual worker). Physical working conditions at diagnosis were assessed in terms of strenuous working positions (e.g., carrying heavy loads or arms raised) (yes/no). In addition, the women were asked if they perceived their job as boring or interesting. They were classified as perceiving their job as very interesting or not (the latter group included perceiving one's job as little interesting, boring, or very boring). Support at work at diagnosis was assessed with two variables: support from coworkers and support from the supervisor. Both variables were classified into three categories on a Likert scale: yes ("always," "most of the time"), no ("sometimes," "seldom," "never"), and not concerned.

Psychosocial characteristics

We used validated instruments to assess the psychological and psychosocial impact of cancer reported 1 year after diagnosis. Depression was evaluated by the specific subscale of the Hospital Anxiety and Depression Scale (HADS) and classified into three categories (non-case [0–7], doubtful [8–10], and case [11–21]) [38]. In addition, we used the Impact of Cancer questionnaire version 2 (IOCv2), which measures the perception of both the negative and positive impact of cancer on a patient's life and which has been validated in French [39]. The positive impact includes, in particular, positive adaptation and personal growth (posttraumatic growth) [40]. Each item in the IOCv2 questionnaire is scored on a 5-point Likert scale where respondents indicate their level of agreement (strongly disagree, disagree, neutral, agree, or strongly agree). The items combine into several positive and negative dimensions, with a summary scale for positive impact and one for negative impact. A mean score (1–5) is calculated for each dimension and for each summary scale. We selected the measures that conceptually could have an impact on the vision of work, which included two negative dimensions and the positive impact summary scale. The negative dimensions included "fear of recurrence" and "negative interferences of cancer with daily life." Fear of recurrence was assessed by 7 items, two of which were "Having had cancer makes me feel uncertain about my health" and "I worry about cancer coming back." Negative interferences of cancer with daily life were also evaluated by 7 items, two of which were "Uncertainty about my future affects my decisions to make plans" and "I feel guilty today for not having been available to my family." We included the positive summary scale (17 items), which examines four dimensions: "altruism and empathy," "health awareness," "meaning of cancer," and "positive self-evaluation," which all together, reflect posttraumatic growth [40]. Each of these three impact of cancer variables was dichotomized using the median value for the study population: ≤ 3 (low) or >3 (high) for fear of recurrence; ≤ 2 (low) or >2 (high) for negative interferences of cancer with daily life; and ≤ 3 (low) and >3 (high) for the positive impact summary scale.

Analysis

We performed descriptive analyses and univariate regression analyses for each variable, and p-values <0.05 were considered significant. Multivariable logistic regression analyses were performed, and the odds ratios (ORs) and their 95% confidence intervals (CIs) were computed. The analyses were performed with SAS 9.4 (SAS Institute Inc., Cary, NC).

Results

Most of the women who did not give priority to private life at diagnosis were over age 40 (89%), had stage I or II BC (91%) (Table 1), and did not have any comorbidities at diagnosis (86%). Women with a lower occupational status (employee/clerk/manual worker) accounted for 36% of the study population. More than a third of the women (36%) indicated that their job involved strenuous working positions. Most of the women (82%) perceived their work as very interesting. At diagnosis, 72% of the women reported support from coworkers, and 64% reported support from their supervisor. One year after diagnosis, the median global health status score was 66.7 (IQR: 58.3–83.3), and most of the women had no depressive symptoms (85%). Two years after diagnosis, 78% of the women were still in a relationship, and 5% were newly single.

Two years after diagnosis, almost half of the women (46%) had reordered their life priorities toward private life. In multivariate analyses (Table 2), a shift toward private life was more likely when being diagnosed with stage III BC (OR = 1.98 [1.06; 3.73]), not perceiving their work as very interesting (OR = 1.65 [1.13; 2.41]), being an employee/clerk (OR = 1.62 [1.11; 2.35] vs. executive occupation) and not being supported by one's supervisor (OR = 1.55 [1.09; 2.21]). A shift toward private life was also associated with a decreased global health status (OR = 0.99 [0.98; 1.00]),

Table 1 Clinical, demographic, socioeconomic, and psychosocial characteristics of the women according to their shift in life priorities toward private life after breast cancer (France, CANTO cohort, *N* = 1097)

	All women (*N* = 1097)	Women who shifted their life priorities toward private life (*N* = 508, 46%)	*p*-value*
Clinical characteristics and health-related quality of life			
Stage at diagnosis, *N* (%)			0.004
I	478 (44.2)	199 (41.6)	
II	513 (47.4)	247 (48.2)	
III	91 (8.4)	54 (59.3)	
Missing	15	8	
Charlson score at diagnosis, *N* (%)			0.51
0	897 (86.3)	410 (45.7)	
1	78 (7.5)	37 (47.4)	
2 or more	64 (6.2)	34 (53.1)	
Missing	58	27	
Surgery, *N* (%)			0.07
Conservative	793 (72.3)	354 (44.6)	
Mastectomy	304 (27.7)	154 (50.7)	
Missing	0	0	
Chemotherapy, *N* (%)			0.0002
No	429 (39.1)	169 (39.4)	
Yes	668 (60.9)	339 (50.8)	
Missing	0	0	
Hormone therapy, *N* (%)			0.47
No	189 (17.2)	92 (48.7)	
Yes	908 (82.8)	416 (45.8)	
Missing	0	0	
Radiotherapy, *N* (%)			0.46
No	69 (6.3)	29 (42.0)	
Yes	1028 (93.7)	479 (46.6)	
Missing	0	0	
Global health status 1 year after diagnosis, median (Q1–Q3)[a]	66.7 (58.3–83.3)	66.7 (50–75.00)	0.0014
Demographic and socioeconomic characteristics			
Age at diagnosis, *N* (%)			0.9
< 40	117 (10.7)	56 (47.9)	
40–49	511 (46.6)	237 (46.4)	
> 49	469 (42.8)	215 (45.8)	
Missing	0	0	
Change in couple status between diagnosis and 2 years after diagnosis, *N* (%)			0.27
Women still in a relationship	850 (78.3)	402 (47.3)	
Women newly in a relationship	28 (2.6)	14 (50.0)	
Women newly single	53 (4.9)	18 (34.0)	
Women still single	154 (14.2)	68 (44.2)	
Missing	12	6	
Financially dependent children at diagnosis, *N* (%)			0.42
No	364 (33.6)	162 (44.5)	
Yes	720 (66.4)	339 (47.1)	
Missing	13	7	
Occupational class at diagnosis, *N* (%)			0.026
Farmer/craftsperson/shopkeeper	70 (6.4)	28 (40.0)	
Executive occupation	329 (30.2)	131 (39.8)	
Intermediate occupation	292 (26.8)	141 (48.3)	

Table 1 (continued)

	All women ($N = 1097$)	Women who shifted their life priorities toward private life ($N = 508$, 46%)	p-value*
Employee/clerk	349 (32.1)	177 (50.7)	
Manual worker	48 (4.4)	26 (54.2)	
Missing	9	5	
Strenuous working position at diagnosis, N (%)			0.85
No	695 (64.2)	321 (46.2)	
Yes	387 (35.8)	181 (46.8)	
Missing	15	6	
Perception of work at diagnosis, N (%)			0.0003
Very interesting	889 (82.0)	386 (43.4)	
Not very interesting[b]	195 (18.0)	113 (58.0)	
Missing	13	9	
Support by coworkers at diagnosis, N (%)			0,05
No	230 (21.3)	123 (53.5)	
Yes	775 (71.7)	347 (44.8)	
Not concerned	76 (7.0)	32 (42.11)	
Missing	16	6	
Support by a supervisor at diagnosis, N (%)			0.0009
No	302 (28.3)	165 (54.6)	
Yes	680 (63.7)	293 (43.1)	
Not concerned	86 (8.0)	32 (37.2)	
Missing	29	18	
Psychosocial characteristics			
Depression 1 year after diagnosis, N (%)[c]			0.09
Non-case	877 (84.7)	401 (45.7)	
Doubtful	102 (9.9)	57 (55.9)	
Case	56 (5.4)	22 (39.3)	
Missing	62	28	
Fear of recurrence 1 year after diagnosis, N (%)[d]			0.0017
Low	468 (45.1)	192 (41.0)	
High	569 (54.9)	289 (50.8)	
Missing	60	27	
Negative interferences of cancer with daily life 1 year after diagnosis, N (%)[d]			< 0.0001
Low	448 (43.5)	174 (38.8)	
High	582 (56.5)	304 (52.2)	
Missing	67	30	
Positive summary scale for the impact of cancer on patient's life 1 year after diagnosis, N (%)[d]			0.004
Low	338 (32.8)	135 (39.9)	
High	693 (67.2)	343 (49.5)	
Missing	66	30	

Of the women who were not giving priority to private life at diagnosis

*P-values < 0.05 were considered significant

[a] Health 1 year post-diagnosis was assessed using the global health status score(0 to 100) of the Quality of Life Questionnaire Core 30 Items (QLQC30)

[b] Perception of a job as not very interesting contained: little interesting, boring, or very boring

[c] Depression was evaluated with the specific subscale of the Hospital Anxiety and Depression Scale (HADS)

[d] The negative and positive impacts of cancer on the women's lives were evaluated with the Impact of Cancer questionnaire (IOCv2). Cutoffs: ≤ 3 (low) and > 3(high) for fear of recurrence; ≤ 2 (low) and > 2 (high) for negative interferences of cancer with daily life; and < 3(low) and ≥ 3 (high) for positive impact of cancer

negative interferences of cancer with daily life (OR = 1.38 [0.99; 1.93]), and a high score for the positive summary scale for the impact of cancer (OR = 1.43 [1.05; 1.95]) collected 1 year after diagnosis. A shift toward private life was negatively associated with depressive symptoms 1 year after diagnosis (OR = 0.49 [0.25; 0.97]).

Additionally, we performed a supplementary analysis among women prioritizing private life at diagnosis and 21% of them (163 women) reordered their life toward professional priorities. Due to this small sample and the lack of statistical power, we did not perform more detailed analyses.

Discussion

The aims of our study were to quantify the change in the value given to work-life compared to private life and to identify the clinical, demographic, work-related, and psychosocial factors associated with this change. Almost half of the women who were not prioritizing private life over work-life at diagnosis reordered their life priorities and gave priority to their private life 2 years after BC. This shift toward private life was associated with clinical, psychosocial, and work-related factors.

The clinical factors associated with a shift toward private life were being diagnosed with stage IIIBC and having a deteriorated post-treatment global health status. This suggests that prioritizing private life over work-life may be a consequence of the late effects of a treatment since patients adjust their lives to the deterioration in their health and the limitations they experience [41]. In addition, the association between a shift toward private life and the stage at diagnosis may reflect the impact of being diagnosed with advanced cancer, for which the prognosis is poorer than for other stages. Indeed, a cancer diagnosis led to existential reflections in some patients, with an awareness of one's mortality [42]. This phenomenon maybe more pronounced in patients with an advanced stage of the disease.

Using the IOC questionnaire [39], a validated and innovative questionnaire that specifically assesses the psychosocial impacts of cancer, we examined the association between these perceived impacts of cancer and change in life priorities after cancer. These psychosocial impacts of cancer, even if they are described as positive and negative, are two complementary and non-opposing impacts of cancer [40]. In our study, posttraumatic growth (as measured by the positive summary scale) and reporting negative interferences of BC with daily life were both associated with an increased shift in life priorities toward private life, which reflect the contrasting impact of cancer and its consequences on the change in life values [17]. Cancer brings disorder to a woman's life. Her life perspectives are disrupted in many ways, which leads some women to adopt a resilient behavior and experience posttraumatic growth. A longitudinal study of posttraumatic growth found that 83% of the women diagnosed with BC reported at least one benefit of their BC experience [43]. However, being depressed was associated with a smaller shift in life priorities toward private life. This counterintuitive result should be interpreted with caution, as depression occurred in only a small portion of our population (5%). This result could nevertheless be explained by a diminished interest or pleasure in almost all activities and a diminished ability to concentrate and make new projects for future life [44].

In addition, we examined the association between working conditions and a shift in life priorities toward private life. We studied the support from both coworkers and the supervisor at diagnosis. Only supervisor support was significantly associated with a shift toward private life, which indicates the importance of the quality of the relationship with the supervisor. In the literature on RTW after cancer, there is little data on the specific role of the relationship with the supervisor at diagnosis (i.e., independently of working accommodations and arrangements after treatment). However, studies have shown that, in general, the supervisor's support strongly influenced the work climate [45], which is an important predictor of work engagement [46] and RTW after cancer [22].

Furthermore, in our study, employees/clerks were more likely to change and give priority to private life after cancer. This finding could be explained by difficult working conditions for these workers (lack of decisional latitude and flexible working hours, and psychological pressures), but also by lower job satisfaction in these groups compared to executive occupations [47]. In our study, job satisfaction was associated with prioritizing private life after cancer, although job satisfaction was only assessed approximately with an item that evaluates the perception of work (very interesting/not very interesting).

Several methodological aspects should be discussed. First, our study is based on one of the largest clinical cohorts of breast cancer survivors worldwide, which included prospectively collected granular information on various covariates. Then, we used a novel method to measure the change in the value given to work. Yet, it should be noted there is no gold standard for assessing this important determinant of RTW. Other quantitative studies have used different measures, such as the importance of work, work engagement, and work satisfaction, to examine the change in the value given to work after cancer, mainly using the Utrecht Work Engagement Scale (UWES) or the General Questionnaire for Psychological and Social Factors at Work (QPS Nordic) [4, 15, 23, 24]. However, these questionnaires are firstly made to measure the situation of workers at a given time point in a specified workplace or work environment. They are quite long and their suitability for measuring work engagement or satisfaction retrospectively, after an event such as a diagnosis

Table 2 Clinical, demographic, socioeconomic, and psychosocial characteristics associated with a shift toward private life 2 years after breast cancer diagnosis (France, CANTO cohort, $N = 867$)

	OR	95% CI
Clinical characteristics and health-related quality of life		
Stage at diagnosis (ref. = I)		
II	1.27	[0.89; 1.80]
III	1.98	[1.06; 3.73]
Charlson score at diagnosis (ref. = 0)		
1	1.08	[0.62; 1.87]
2 or more	1.2	[0.66; 2.17]
Surgery (ref. = conservative)		
Mastectomy	1.01	[0.69; 1.49]
Chemotherapy (ref. = no)		
Yes	1.27	[0.89; 1.82]
Hormone therapy (ref. = no)		
Yes	1.01	[0.68; 1.49]
Radiotherapy (ref. = no)		
Yes	1.25	[0.65; 2.40]
Global health status[a]	0.92	[0.84; 1.01]
Demographic and socioeconomic characteristics		
Age (years of age) at diagnosis (ref. ≤ 40)		
40–49	0.97	[0.60; 1.54]
> 49	0.95	[0.58; 1.57]
Change in couple status between diagnosis and 2 years after diagnosis (ref. = still in a relationship)		
Newly in a relationship	1.22	[0.52; 2.88]
Newly single	0.68	[0.32; 1.41]
Still single	0.92	[0.60; 1.41]
Financially dependent children at diagnosis (ref. = no)		
Yes	1.19	[0.86; 1.64]
Occupational class at diagnosis (ref. = executive) (occupation)		
Farmer/craftsperson/shopkeeper	1.31	[0.64; 2.69]
Intermediate occupation	1.25	[0.85; 1.84]
Employee/clerk	1.62	[1.11; 2.35]
Manual worker	1.75	[0.79; 3.89]
Strenuous working position at diagnosis (ref. = no)		
Yes	0.87	[0.63; 1.20]
Perception of work at diagnosis (ref. = very interesting)		
Not very interesting[b]	1.65	[1.13; 2.41]
Support from coworkers at diagnosis, *N* (%) (ref. = yes)		
No	1.04	[0.70; 1.55]
Not concerned	1.04	[0.52; 2.07]
Support from supervisor at diagnosis, *N* (%) (ref. = yes)		
No	1.55	[1.09; 2.21]
Not concerned	0.78	[0.40; 1.55]
Psychosocial characteristics;		
Depression one year after diagnosis (ref. = non-case)[c]		
Doubtful	1.15	[0.70; 1.88]
Case	0.49	[0.25; 0.97]

Table 2 (continued)

	OR	95% CI
Fear of recurrence one year after diagnosis (ref. = low)[d]		
High	1.13	[0.82; 1.56]
Negative interferences of cancer with daily life 1 year after diagnosis (ref. = low)[d]		
High	1.38	[0.99; 1.93]
Summary scale for the impact of cancer on patient's life 1 year after diagnosis (ref. = low)		
High	1.43	[1.05; 1.94]

Of the women who were not giving priority to private life at diagnosis

[a] Health one year after diagnosis was assessed using the global health status score (0 to 100) of the Quality of Life Questionnaire Core 30 Items (QLQC30); OR increasing by 10 points

[b] Perception of job as not very interesting contained: little interesting, boring, or very boring

[c] Depression was evaluated with the specific subscale of the Hospital Anxiety and Depression Scale (HADS)

[d] The negative and positive impacts of cancer on women's lives were evaluated with the Impact of Cancer questionnaire version 2 (IOCv2). Cutoffs: ≤ 3 (low) and > 3(high) for fear of recurrence; ≤ 2 (low) and > 2 (high) for negative interferences of cancer with daily life; and < 3 (low) and ≥ 3 (high) for positive impact of cancer

of cancer, is questionable. In using a shift away from work-life toward private life, we were able to measure the global change in patients' outlook on work-life after cancer that goes beyond the engagement with a given workplace. Our results therefore make it possible to quantify what has been reported in qualitative studies [19–22] and may indicate a simple way to address change in the value of work after cancer for future research on determinants of RTW. However, upcoming research should also collect the participation of women in a rehabilitation program, as we cannot be totally sure that our findings are due to cancer and not simply the consequence of poor support (no program of rehabilitation for example) when patients return to work. Then, we could also wonder about the change of priority in the longer term, especially when women are considered "cured." A study 5 years after diagnosis would be interesting to determine if the change of the value of work is different as well as its determinants compared to a shorter time frame (2 years after diagnosis). In addition, although our study is based on a large prospective cohort, we cannot rule out a lack of statistical power in certain analyses (e.g., newly single women and manual workers), future research with the largest cohort could allow us to better assess these factors. Finally, we think that this simple measure on the perceived change in the value of work that we used in this study can be immediately used in practice while it opens an avenue for research on survivorship, with a need to design an instrument that would also include the perceived reasons for the change in the value of work since it appears that the determinants of this change can be very different. Upcoming research would also need to gather more qualitative and quantitative empirical data on male survivors to consider possible gender-based norms in the change in the value of work.

In practice, it seems important to raise awareness among health professionals and social workers involved in supportive care after cancer of the importance of the change of the value of work after diagnosis and its determinants. While the physical late effects of treatment are generally considered in managing return to work after cancer, it seems important to consider the social context in which patients live and in particular their working conditions, as well as the potential psychological consequences of cancer. Informing patients about the psychological processes by which they may go through, including the shift in life values, and helping them to access all the social rights and work arrangements that they might need could probably help them to better anticipate their return to work and finally improve their quality of life at work after recovery.

Conclusion

Almost half of the women who were not giving priority to private life at BC diagnosis reordered their life values and shifted emphasis away from their work-life to their private life after cancer. The physical and psychosocial impacts of cancer, but also the pre-cancer working conditions, are all factors that determined this change in life values. It is important that clinicians, psychologists, and social workers consider this change in patients' outlook on work-life and that they consider its associated factors when designing rehabilitation programs after BC. Moreover, future research could investigate if the psychological evolution (before and after diagnosis) impacts on change of the value of work. Finally, other studies on change of the value of work may be relevant in other female cancers or in men after cancer and if there are gender-related factors associated with it.

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Declarations

Ethics approval The study was approved by the French regulatory authorities under reference B11158-20 (09/14/2011) and the French Ethics Committee Ile de France VII under reference 11–039 (10/14/2011).

Consent to participate All the women were aged 18 or over at diagnosis and provided written informed consent.

Conflict of interest Elsa Caumette: no conflict of interest; Inès Vaz-Luis have personal financial interests: institutional support from Pfizer Amgen, AstraZeneca (Public Speaking); Cécile Charles: no conflict of interest; Julie Havas: no conflict of interest; Garazi Ruiz de Azua: no conflict of interest; Elise Martin: no conflict of interest; Antonio Di Meglio: no conflict of interest; Suzette Delaloge reports institutional consulting fees from AstraZeneca, Besins, Sanofi, Rappta; institutional honoraria from AstraZeneca, Seagen, MSD, Pfizer; institutional investigating fees from Taiho, AstraZeneca, Pfizer, MSD, Novartis, Sanofi, G1 therapeutics, BMS, Pfizer, Roche; and personal support for attending US conference from AstraZeneca and Pfizer; Olivier Rigal Honoraria: Pfizer, Seagen et Viatris; Charles Coutant: Honoraria: Roche, MSD, AstraZeneca, Seagen; Marion Fournier Symposium rémunéré Myriade genetics SFCO; Christelle Jouannaud Honoraria: Daiichi Sankyo, AstraZeneca, Pfizer; Travel/Accommodations/expenses: Novartis; Patrick Soulie no disclosure; Paul-Henri Cottu Honoraria: Pfizer, Roche, Lilly, Pierre Fabre, Institution honoraria: Novartis, NanoString Technologies; Consultant/Advisory Role: Pfizer, Roche/Genentech, Lilly; Research funding: Novartis, Pfizer; Travel/Accommodations/expenses: Pfizer, Roche; Olivier Tredan Grants: Roche, BMS, MSD-Merck, personal fees: Novartis-Sandoz, Pfizer, Lilly, AstraZeneca, Daiichi Sankyo, Eisai, Pierre Fabre, Seagen, Roche, MSD-Merck; Asma Dhaini Merimeche, Laurence Vanlemmens, Sibille Everhard, Anne-Laure Martin: NO DISCLOSURE; Gwenn Menvielle: no conflict of interest; Agnès Dumas: no conflict of interest.

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