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PAPER

Effects of an intervention combining self-care and self-hypnosis on fatigue and associated symptoms in post-treatment cancer patients: A randomized-controlled trial

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Abstract

Objective: Cancer has a lot of consequences such as fatigue, sleep disturbances, emotional distress, cognitive impairment and reduced physical activity. Some hypnosis-based psychological interventions showed positive effects on fatigue, sleep and emotional distress, but generally focused on breast cancer patients. Our study aimed at assessing the effects of a group intervention combining self-care and self-hypnosis on quality of life of cancer patients.

Methods: Our longitudinal randomized-controlled trial assessed the benefits of the intervention first on fatigue and secondly on associated symptoms (sleep, emotional distress, cognitive impairment and reduced physical activity) of post-treatment cancer patients, and investigated predictors of the evolution of fatigue. All variables were measured with questionnaires and an actigraph (for sleep and physical activity).

Results: Ninety five women with different cancers were included in our study. Group-by-time effects were showed for fatigue, sleep, emotional distress and cognitive functioning: symptoms have improved in the intervention group compared to wait-list control group. Three predictors of the evolution of fatigue were revealed: depression, anxiety and worry.

Conclusions: Our group intervention had benefits for post-treatment cancer patients' quality of life. Impacting emotional distress could be important in order to decrease fatigue. Further studies are needed to replicate our results. This intervention could be easily implemented to improve quality of life of cancer patients.

Registration: ClinicalTrials.gov (NCT03144154). Retrospectively registered on the 1st of May, 2017.

KEYWORDS

cancer, emotional distress, fatigue, group intervention, hypnosis, oncology, self-care, sleep difficulties

1 | BACKGROUND

Cancer-related fatigue (CRF) is one of the most prominent consequences of cancer.[1] CRF is associated with several other symptoms. First, sleep disturbances are positively correlated with, and a predictor of CRF.[2] Although physical activity seems to alleviate CRF,[3,4] patients with cancer often decrease it after diagnosis.[5] CRF,[1] sleep difficulties and low physical activity[5,6] can persist after treatments, no matter the type of cancer

(breast, colorectal, prostate, lung).[1] Cognitive impairments are also common before and after cancer treatments.[7] Different studies showed an association between fatigue and perceived cognitive impairment in cancer patients, but the direction of this relation is not clear.[8] Another important consequence of cancer is emotional distress.[6,9] Anxiety and depression are also closely related to CRF and difficulties in emotion regulation, but the direction of the causality is uncertain.[10,11] Emotional distress is known to last after cancer treatment.[6]

Despite their prevalence and their global severe impact, these symptoms seem to be underdiagnosed and undertreated in clinical and scientific settings. Yet, studies showed the positive impact of psychological interventions, such as cognitive-behavioral therapy (CBT), psychoeducation, cognitive rehabilitation or relaxation for examples, on patients' CRF, sleep disturbances, emotional distress, physical activity and cognitive impairment.[6,12-17] In oncology settings, there is a growing interest in alternative methods such as hypnosis. Some studies demonstrated the positive impact of hypnosis on various side effects of cancer treatments such as CRF, sleep and emotional distress, whether taught alone, or combined with cognitive-behavioral or self-care techniques.[12,18-20] However, these studies mostly focused on breast cancer patients, and suffer from some methodological pitfalls such as no randomization or small sample sizes. To our knowledge, no study examined the effect of a self-care/self-hypnosis learning on physical activity level and cognitive impairments in cancer survivors. Finally, given the comorbidity and interdependence between fatigue and emotional distress, some authors suggested that interventions targeting CRF should be analyzed for effects on depression and anxiety.[10]

2 | OBJECTIVES

The first objective of this randomized-controlled study is to assess the efficacy of an 8-week group intervention combining self-care and self-hypnosis to improve fatigue and associated symptoms (sleep difficulties, emotional distress, cognitive functioning and physical activity) of post-treatment cancer patients. We hypothesized a positive effect of the intervention on all the variables. The second objective is to investigate which of these variables predicted the evolution of fatigue in our sample. Our hypothesis is that our intervention would impact fatigue through its impact on other factors such as emotional distress.

3 | METHODS AND DESIGN

The protocol of the study has been published[21] and displays detailed information about the design, recruitment and randomization procedures, sample size calculation, assessments and intervention. Therefore, we will only summarize these aspects here.

3.1 | Design

We used a longitudinal randomized wait-list controlled trial design (see Figure 1). An intention-to-treat (ITT) analytic strategy was chosen, involving efforts to maintain participants in the group to which they were randomized. Excluding participants who dropped out the study from the analyses could lead to biased results because it compromises the balance created by randomization.[22] To deal with missing values due to drop-outs, the most widely used method is *last observation carried forward*[23] in which participants' missing data is replaced by the value they obtained in the previous measurement time. Participants were randomized into two groups: the first group received immediate intervention (intervention group) and the second group received it (at the latest) 4 months later (wait-list control group; WLCG).

3.2 | Participants

Patients were mainly recruited in the University Hospital of Liège (November 2016-March 2019). The inclusion criteria were to be at least 18 years old, to be fluent in French, to present a non-metastatic invasive cancer, to have completed active treatments since less than a year, and to experience baseline difficulties (score of at least 4 out of 10 on 1 of these 6 items: physical fatigue, moral fatigue, depression, anxiety, fear of recurrence, ruminations).

3.3 | Intervention

The intervention included eight weekly 2-hour sessions in groups of 8-10 participants (first group in April 2017, last group in September 2019). They have been developed and were led by one of the authors (MEF).[24] Participants had to complete different self-care tasks at home between sessions and keep a work-related diary to report how they managed it in their daily life. A 15-minutes hypnosis exercise was conducted under the therapist's supervision at the end of each session. At-home practice was encouraged, as it is essential to take full advantage of hypnosis. It is expected that the practice of self-hypnosis will influence cognition and emotional regulation and therefore facilitate the completion of the assigned tasks.[12,25] In this way, self-hypnosis is complementary to self-care tasks. More details about the content of the sessions are displayed in our protocol[21] and (see Appendix S1 in Online Supplementary Material).

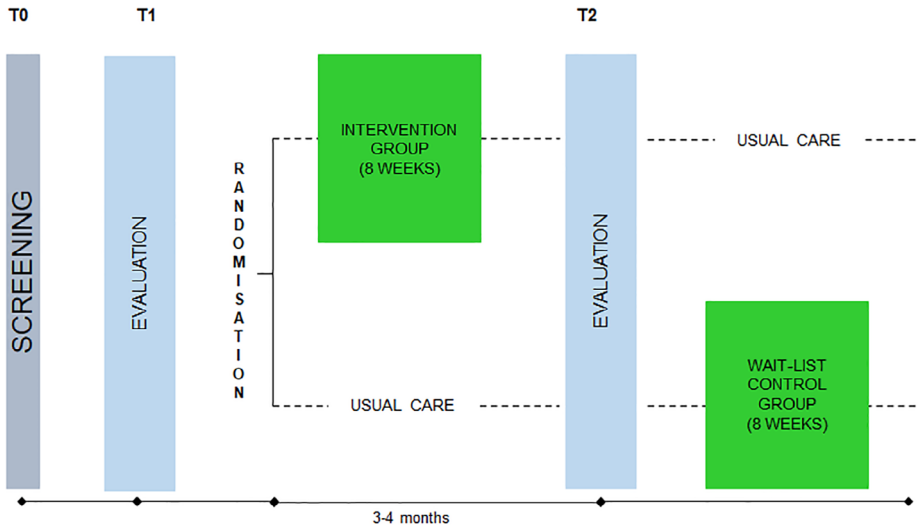
3.4 | Assessments

Assessments had been conducted at two different times (T1-T2; see Figure 1; March 2017 to July 2019) with questionnaires and wrist actigraphy. All scores from the questionnaire are obtained by summing the items.

3.4.1 | Sociodemographic and medical data

Gender, age, education level, employment status, marital situation and number of children are noted, as well as the type of cancer, time since

FIGURE 1 Study design



diagnosis, cancer treatments received and consumption of psychotropic.

3.4.2 | Primary outcome: fatigue

Multidimensional Fatigue Inventory (MFI-20)[26]: covers five dimensions: general fatigue (general statements about the person's functional state); physical fatigue; mental fatigue (lack of concentration); reduced motivation and reduced activity. For people between 40 and 59 years-old, a score of 11 (for men) or 12 (for women) or more on the General fatigue subscale suggests significant fatigue.[27]

3.4.3 | Secondary outcomes

1. Sleep difficulties

- *Insomnia Severity Index (ISI)*[28]: investigates sleep complaints and distress associated. Score ≤ 7: no sleep difficulties; 8-14: good probability of sleep difficulties; ≥15: clinical insomnia.
- *Sleep-related indices (wrist actigraph Garmin Vivoactive HR):* At each measurement time, participants wore a wrist actigraph during 9 days to evaluate their sleep quality. Actigraphy infers sleep from the presence or absence of wrist movement. It provides a high sensitivity (accuracy in detecting sleep)[29] and allows to collect objective data. Total sleep time (TST) and waking time after initial sleep onset (WASO; in minutes and percentage) were collected.

2. Emotional distress and emotional regulation:

- *Hospital Anxiety and Depression Scale (HADS)*[30]: measures anxiety and depression. Cut-offs scores for each dimension are 7/21.
- *Penn State Worry Questionnaire (PSWQ)*[31]: measures frequency, severity and perceived uncontrollability of worry. A score ≥ 55 suggests generalized anxiety disorder.
- *Mental Adjustment to Cancer Scale (MAC)*[32]: assesses coping styles and adjustment to cancer. Two summary scores (Summary Positive Adjustment and Summary Negative Adjustment) are used in this paper.

3. Self-reported cognitive functioning:

- *Functional Assessment of Cancer Therapy—Cognitive Function (FACT-Cog v.3)*[33]: measures the subjective cognitive functioning based on four subscales: perceived cognitive impairments (PCI), comments from others, perceived cognitive abilities (PCA), and impact of perceived cognitive impairments on quality of life (QOL). Lower scores suggest more cognitive difficulties and a greater impact on quality of life.

4. Physical activity:

- *Self-reported number of physical activity hours per week*
- *Number of steps per day collected (wrist actigraph Garmin Vivoactive HR):* This actigraph provides an acceptable level of validity concerning step count.[34]

3.5 | Data analyses

All statistical analyses were performed using Statistica 13.3 (TIBCO Software Inc.) and SPSS Statistics 25 (IBM). Baseline (T1) demographic, medical and psychological data were compared between intervention group and WLCG to test initial equivalency with Mann-Whitney tests and χ^2 tests. Group-by-time changes were processed using multivariate analysis of variance with repeated measures (MANOVA), followed by post-hoc comparisons Tukey's HSD test). Effect sizes were calculated using Cohen's *d*, with interpretation as follows: "small" (<0.20-0.50), "medium" (0.50-0.80), and "large" effect sizes (>0.80).[35] A hierarchical linear regression was conducted to investigate the factors associated with the evolution of fatigue. All tests were two-tailed and the results were considered to be significant at $P < .05$.

4 | RESULTS

4.1 | Recruitment

One hundred and four cancer patients were randomized into two groups (N intervention group = 52; N WLCG = 52; see Figure S1 (Online Supplementary Material). Twelve participants dropped out before T2 (N intervention group = 8; N WLCG = 4). We replaced their T2 data by their T1 data, according to the ITT approach. As there were only nine men in the total sample, we decided to remove them from the analyses, leading to a final sample of 95 women (N intervention group = 48; N WLCG = 47). Indeed, if we had considered men in our analyses, it would have been difficult to conclude about the impact of the intervention on them, and the sample would not have been homogenous. At screening (T0), participants were experiencing physical fatigue (M = 6.45/10), mental fatigue (M = 6.09/10), depression (M = 4.69/10), anxiety (M = 5.37/10), fear of recurrence (M = 5.43/10) and ruminations about cancer (M = 5.14/10). The average attendance rate was 6.48 sessions out of 8.

4.2 | Description of the sample

Table 1 displays the demographics and medical data for the whole sample and the two groups. The two groups were equivalent at baseline on all the variables.

4.3 | Impact of the intervention on patients' fatigue and associated symptoms

First, we confirmed that both groups were equivalent at baseline on all the variables (all *P*s > .1). No significant effect of group was revealed by the MANOVA. However, there were a significant effect of time ($F[19,71] = 2.88$; $P < .001$) and a significant group-by-time interaction effect ($F[19,71] = 2.33$; $P = .005$). Post-hoc comparisons revealed evolution of different variables between T1 and T2 in the intervention group but not in the WLCG (see Table 2). More specifically, in the intervention group, all dimensions of **fatigue** (MFI-20) improved (general fatigue: $P < .001$; physical fatigue: $P < .001$; mental fatigue: $P < .001$; lack of activity: $P < .001$; and lack of motivation: $P = .002$), with effect sizes comprised between 0.54 and 0.67. **Sleep difficulties** also decreased ($P < .001$), with a medium effect size of 0.58, as well as **emotional distress** (HADS: anxiety: $P < .001$; depression: $P < .001$), with effects sizes between 0.67 and 0.71. Worry and Summary Negative Adjustment also decreased more in the intervention group than in the WLCG (PSWQ: $P < .001$; MAC SNA: $P = .003$), with effect sizes of 0.85 and 0.53 respectively. Finally, **subjective cognitive functioning** (FACT-Cog) improved after the intervention (PCI: $P = .020$; QOL: $P = .004$; PCA: $P = .004$), meaning that after the intervention, participants experienced less cognitive impairments, more cognitive abilities and a lower impact of their cognitive impairments on their quality of life.

4.4 | Predictors of the evolution of fatigue

To understand which variables impacted the evolution of fatigue (Δ Fatigue), we calculated the pre-post intervention difference for all variables (Δ) to be used as variables in the following analyses. Then, we conducted a hierarchical linear regression analysis on the MFI-20 total score. Two blocks of potential predictors were entered in the analysis: one composed of age and time since diagnosis, and one composed of all the other outcomes considered in this study. Results highlighted three factors explaining 42.6% of the variance of Δ Fatigue in our sample: variation in depression (Δ HADS Depression), worry (Δ PSWQ) and anxiety (Δ HADS Anxiety) respectively explained 32.5% ($P < .001$), 9.7% ($P < .001$) and 3.5% ($P = .020$) of the variance of Δ Fatigue (see Table 3).

5 | DISCUSSION

Our randomized-controlled trial revealed a positive effect of our intervention on CRF, sleep difficulties, emotional distress, worry, adjustment to cancer and self-reported cognitive functioning, compared to a WLCG. These results confirm studies showing the positive effects of psychological interventions on cancer patients' fatigue, sleep, emotional distress and cognitive functioning,[6,12-17] as well as studies showing the interest of hypnosis to improve fatigue, sleep and emotional distress.[12,13,18-20] Effect sizes we reported for fatigue (*d* range: 0.54-0.67) and emotional distress (*d* range: 0.67-0.71) are similar to the ones reported in other studies. For example, Montgomery et al reported effect sizes between 0.70 and 0.83 for fatigue, and of 0.64 for emotional distress after an intervention combining CBT and hypnosis during radiotherapy.[18,20] To our knowledge, our study is the first to assess the impact of a self-hypnosis/self-care learning on self-reported cognitive functioning.

However, some expected results were not obtained. First, sleep parameters from the actigraph did not improve more after the intervention, although sleep disturbances measured by the ISI did. This could be explained by the limitations of actigraphy. Despite its frequent use in oncology studies,[36] some concerns have been raised about its specificity (accuracy in detecting wakefulness compared to sleep).[37] To be more accurate, we could have added a sleep diary.[36] Second, physical activity measured by the actigraph (step count) did not evolve after the intervention, despite the fact that MFI-subscale "lack of activity" improved. Here again, the limitations of actigraphy could be involved. However, even if sleep and activity indices remain difficult to determine in uncontrolled settings, actigraphs are less invasive, expensive and difficult to implement than polysomnography.

TABLE 1 Baseline participants' demographics and medical data in each group

	Total sample (N = 95)	Intervention group (N = 48)	WLCG (N = 47)	*P*
Demographics				
Age (years)				.068
Mean (SD)	53.85 (11.91)	51.65 (12.54)	56.11 (10.90)	
Range	24-78	24–78	30-78	
Gender, N (%)				NA
Women	95 (100)	48 (100)	47 (100)	
Marital status, N (%)				.471
Single	6 (6.32)	3 (6.25)	3 (6.38)	
Married/living with partner	63 (66.32)	35 (72.92)	28 (59.57)	
Divorced/separated/widowed	15 (15.79)	5 (10.42)	10 (21.28)	
In a relationship but not living together	11 (11.58)	5 (10.42)	6 (12.77)	
Cultural origin, N (%)				.082
Western Europe	92 (96.84)	45 (93.75)	47 (100)	
Eastern Europe	3 (3.16)	3 (6.25)	0 (0.00)	
Education level, N (%)				.794
Elementary school or less	1 (1.05)	0 (0.00)	1 (2.13)	
Lower secondary school	8 (8.42)	3 (6.25)	5 (10.64)	
Upper secondary school	25 (26.32)	14 (29.17)	11 (23.40)	
Bachelor's degree	38 (40.00)	19 (39.58)	19 (40.43)	
Master's degree	20 (21.05)	11 (22.92)	9 (19.15)	
Post-graduate	3 (3.16)	1 (2.08)	2 (4.26)	
Employment status, N (%)				.490
Employed full time	7 (7.37)	4 (8.33)	3 (6.38)	
Employed part time	21 (22.11)	9 (18.75)	12 (25.53)	
Incapacity of work/Invalidity	37 (38.95)	22 (45.83)	15 (31.91)	
Unemployed/Student/Housewife/House-husband/ Retired/Other	30 (31.58)	13 (27.08)	17 (36.17)	
Children, N (%)				.393
Yes	82 (86.32)	40 (83.33)	42 (89.36)	
No	13 (13.68)	8 (16.67)	5 (10.64)	
Patient medical history				
Cancer diagnosis				.325
Breast cancer	75 (78.94)	38 (79.17)	37 (78.72)	
Others	20 (21.06)	10 (20.83)	10 (21.28)	
Hematological cancer (lymphoma, leukemia)	4 (4.22)	3 (6.25)	1 (2.13)	
Gynecological cancer (cervix, ovaries)	4 (4.22)	3 (6.25)	1 (2.13)	
Skin	2 (2.11)	0 (0.00)	2 (4.26)	
Ear/Nose/Throat	1 (1.05)	0 (0.00)	1 (2.13)	
Digestive (stomach, peritoneum, pancreas)	5 (5.26)	3 (6.25)	2 (4.26)	
Thyroid	2 (2.11)	0 (0.00)	2 (4.26)	
Lung	1 (1.05)	1 (2.08)	0 (0.00)	
Brain	1 (1.05)	0 (0.00)	1 (2.13)	
Time since diagnosis (months)				.821
Mean (SD)	10.65 (8.69)	9.94 (5.13)	11.38 (11.25)	
Range	1-72	2-24	1–72	

(Continues)

TABLE 1 (Continued)

	Total sample (N = 95)	Intervention group (N = 48)	WLCG (N = 47)	*P*
Surgery, N (%)				.569
Yes	92 (96.84)	46 (95.83)	46 (97.87)	
No	3 (3.16)	2 (4.17)	1 (2.13)	
Chemotherapy (CT), N (%)				.261
Yes	52 (54.74)	29 (60.42)	23 (48.94)	
No	43 (45.26)	19 (39.58)	24 (51.06)	
Radiation therapy (RT), N (%)				.864
Yes	70 (73.68)	35 (72.92)	35 (74.47)	
No	25 (26.32)	13 (27.08)	12 (25.53)	
Hormonal therapy (HT), N (%)				.893
Yes	60 (63.16)	30 (62.50)	30 (63.83)	
No	35 (36.84)	18 (37.50)	17 (36.17)	
Other treatment, N (%)				.424
Yes	15 (15.79)	9 (18.75)	6 (12.77)	
No	80 (84.21)	39 (81.25)	41 (87.23)	
History of cancer, N (%)				.566
Yes	18 (18.95)	8 (16.67)	10 (21.28)	
No	77 (81.05)	40 (83.33)	37 (78.72)	
Other chronic health problem, N (%)				.743
Yes	55 (57.89)	27 (56.25)	28 (59.57)	
No	40 (42.11)	21 (43.75)	19 (40.43)	
Consumption of psychotropic during the study, N (%)				.475
Yes	50 (52.63)	27 (56.25)	23 (48.94)	
No	45 (47.37)	21 (43.75)	24 (51.06)	

Our results also revealed three predictors of the evolution of CRF: depression, worry and anxiety, suggesting that, in our sample, a decrease of these variables subsequently allowed the decrease in CRF. Indeed, links between emotional distress and fatigue had already been showed in cancer population.[10,11] It is then possible that the efficacy of our intervention to decrease fatigue is in part due to its impact on emotional distress. More research is needed to fully understand its mechanisms of action. Some studies also showed that sleep difficulties were a predictor of CRF,[2] and some links between physical activity and CRF.[3,4] However, our results were unable to confirm these relationships. This could be understood by considering the fact that CRF is different than classical fatigue, in particular because it is not relieved by adequate sleep or rest[38] nor proportional to recent activity.[39] Finally, self-reported cognitive functioning did not predict the evolution of fatigue in our sample. We could explain this by some studies showing that fatigue is a predictor of cognitive impairment, and not the opposite.[8] We checked this assumption in our sample and found that evolution of anxiety (HADS), mental fatigue (MFI-20) and positive adjustment to cancer (MAC) significantly predicted the evolution of the self-reported cognitive functioning (see Appendix S1 in online supplementary material for the detailed analyses). This confirms in part the results from these studies.

5.1 | Study limitations

Our study has several limitations. First, the disproportion between breast cancers and other cancers, and between men and women in our sample was not expected. However, as breast cancer is the most frequent cancer in women, it is not surprising that most women in our sample had breast cancer. In addition it is known that men are less interested in and rarely use available psychological interventions compared to women.[40] Another limitation is the use of actigraphy, as discussed above.

5.2 | Clinical implications

Our group intervention seems to have several benefits for post-treatment cancer patients' quality of life. Impacting emotional distress also seems to be important in order to decrease fatigue. It could be easily implemented in oncology settings by different health professional trained in hypnosis (eg, nurse, psychologist, physician). In this paper, we discussed a group intervention combining self-hypnosis and self-care, but hypnosis could also be combined with other therapeutic modalities such as CBT, and be proposed in groups or in individual settings.

TABLE 2 Impact of the intervention on patients' fatigue, sleep, psychological state and physical activity

	T1 Inter-vention group (N = 48)	T2 Inter-vention group (N = 48)	Effect size	Evolu-tion (T1-T2)	T1 WLCG (N = 47)	T2 WLCG (N = 47)	Effect size	Evolu-tion (T1-T2)
	Mean (SD)	Mean (SD)	Cohen's *d*	*P*	Mean (SD)	Mean (SD)	Cohen's *d*	*P*
Fatigue								
Multidimensional Fatigue Inventory (MFI-20)								
General Fatigue	15.63 (2.89)	13.69 (3.51)	0.67	< .001	15.11 (4.15)	14.36 (3.91)	0.31	.347
Physical Fatigue	14.72 (3.25)	12.73 (3.67)	0.60	< .001	13.66 (4.19)	12.70 (4.31)	0.33	.318
Mental Fatigue	12.95 (3.64)	11.24 (3.84)	0.65	< .001	12.70 (4.03)	12.66 (3.88)	0.02	.983
Reduced activity	12.13 (3.48)	10.52 (3.26)	0.60	< .001	11.60 (4.04)	11.43 (4.12)	0.06	.998
Reduced Motivation	10.35 (3.38)	8.75 (3.08)	0.54	.002	9.19 (2.94)	9.32 (3.48)	0.08	.909
Sleep								
Insomnia Severity Index (ISI)	13.71 (6.30)	10.15 (6.44)	0.58	< .001	12.45 (7.21)	11.89 (6.93)	0.13	.721
Actimetry								
Total sleep time (TST; in minutes)	507.80 (74.12)	486.82 (59.10)	0.37	.100	493.09 (53.14)	486.69 (49.92)	0.14	.902
Wake after sleep onset (WASO; in minutes)	15.54 (7.91)	14.62 (8.93)	0.12	.749	14.24 (6.81)	12.87 (6.59)	0.21	.484
Emotional distress and regulation								
Hospital Anxiety and Depression Scale (HADS)								
Anxiety	10.52 (4.19)	8.10 (4.38)	0.67	< .001	9.98 (4.32)	9.17 (3.97)	0.28	.519
Depression	7.17 (4.23)	4.96 (4.19)	0.71	<.001	6.72 (4.10)	6.38 (4.63)	0.14	.905
Penn State Worry Questionnaire (PSWQ)	53.90 (12.28)	44.17 (12.61)	0.85	< .001	51.95 (12.31)	50.15 (13.92)	0.26	.894
Mental Adjustment to Cancer Scale (MAC)								
Summary Positive Adjustment (SPA)	48.90 (7.74)	50.69 (7.77)	–0.35	.066	50.30 (4.79)	49.91 (6.10)	0.09	.741
Summary Negative Adjustment (SNA)	34.83 (8.27)	32.02 (6.77)	0.53	.003	34.57 (7.67)	33.89 (8.79)	0.13	.808
Cognitive functioning								
FACT-Cognitive Function (Fact-Cog)								
Perceived cognitive impairments (PCI)	42.39 (16.36)	46.65 (15.10)	–0.43	.020	43.02 (14.10)	44.38 (13.26)	–0.17	.782
Impact of perceived cognitive impairments on quality of life (QOL)	7.94 (4.57)	9.79 (4.15)	–0.40	.004	7.85 (4.69)	8.13 (4.85)	–0.11	.982
Comments from others	13.92 (2.92)	14.15 (3.19)	–0.09	.944	13.89 (2.68)	14.11 (3.31)	–0.07	.935
Perceived cognitive abilities (PCA)	14.15 (6.17)	16.24 (5.27)	–0.51	.004	14.30 (4.97)	13.74 (4.91)	0.12	.982
Physical activity								
Number of steps per day	6444.40 (2716.25)	6632.27 (2754.15)	–0.11	.899	7886.48 (3502.50)	7233.83 (2745.32)	0.33	.059
Number of hours of physical activity (per week)	2.48 (0.36)	2.98 (0.37)	–1.86	.321	2.87 (0.36)	3.09 (0.37)	–0.81	.982

Predictors	R^2	Adj. R^2	SE	ΔR^2	ΔF	P	β
Age and	.001	−.021	1.01	.001	.029	.971	−.047
Time since diagnosis							.022
Δ HADS Depression	.325	.302	.839	.324	43.22	<.001	.441
Δ PSWQ	.422	.395	.780	.097	14.89	<.001	.482
Δ HADS Anxiety	.426	.426	.761	.035	5.65	.020	−.245

TABLE 3 Predictors of the evolution of fatigue

5.3 | Conclusions and perspectives

Our study showed the efficacy of a group intervention combining self-hypnosis and self-care to improve fatigue and its associated symptoms in cancer survivors. It also leads to several scientific perspectives. First, long term effects of the intervention will be assessed at a 1-year follow-up. Then, rethinking the recruitment process could allow the inclusion of more men and more cancers other than breast cancer in the sample. To do this, adapting the group intervention to men's needs and targeting other oncological populations through direct recruitment could be useful. In addition, comparing our intervention to another condition such as professional attention or another intervention could help us to better understand its mechanisms of action. Finally, investigating the links between emotional distress and cognitive functioning could lead to interesting results and help improving existing interventions in oncology settings.

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CONFLICT OF INTEREST

All authors declare that they have no conflict of interest.

ETHICS STATEMENT

All procedures performed in this study were in accordance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The study was approved by the Ethic Committee of the Faculty of Medicine of the University of Liege (N°B707201630321), with each participant providing written consent.

DATA AVAILABILITY STATEMENT

The full protocol and dataset of this study is available upon request. Please contact the corresponding author (ch.gregoire@uliege.be).

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SUPPORTING INFORMATION

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

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