



PAPER

The role of posttraumatic stress and posttraumatic growth on online information use in breast cancer survivors

A. Casellas-Grau^{1,2}  | E.C. Sumalla¹ | M. Lleras^{1,3} | J. Vives⁴ | A. Sirgo⁵ | C. León⁶ | A. Rodríguez¹ | G. Campos¹ | Y. Valverde¹ | J.M. Borràs^{1,2,7} | C. Ochoa^{1,2,7} 

¹Institut Català d'Oncologia, Barcelona, Spain

²Institut d'Investigació Biomèdica de Bellvitge, Barcelona, Spain

³Hospital Sant Joan de Déu, Barcelona, Spain

⁴Universitat Autònoma de Barcelona, Barcelona, Spain

⁵Hospital Sant Joan de Reus, Tarragona, Spain

⁶Hospital Parc Taulí de Sabadell i Consorci Hospitalari de Terrassa, Barcelona, Spain

⁷Universitat de Barcelona, Barcelona, Spain

Correspondence

Dr Cristian Ochoa, Unitat de Psicooncologia, Hospital Duran i Reynals, Institut Català d'Oncologia, Av. Gran Vía de l'Hospitalet, 199-203, L'Hospitalet de Llobregat, 08908 Barcelona, Spain.
Email: cochoa@iconcologia.net

Funding information

Instituto de Salud Carlos III, Grant/Award Number: FIS PI15/01278; FEDER funds/ European Regional Development Fund (ERDF) "a way to build Europe"; Fundación científica Asociación Española Contra el Cáncer, Grant/Award Number: AECC_Catalunya2016

Abstract

Objective: Changes perceived as both positive (eg, posttraumatic growth [PTG]) and negative (eg, posttraumatic stress symptoms [PTSS]) have been associated with intensive Internet use among breast cancer survivors. In this multicenter study, we analyzed the role of PTG and PTSS on the amount of time spent looking for online cancer information, its content, and its psychological impact.

Methods: Posttraumatic stress symptoms and PTG were assessed in 182 breast cancer survivors by using the Post-traumatic Stress Disorder Checklist and Post-traumatic Growth Inventory questionnaires. Subjects also completed a questionnaire about their behavior when looking for online illness-related information (ie, time spent, type of contents, and psychological impact).

Results: Posttraumatic stress symptoms positively correlated with the amount of time spent looking for cancer-related information, including both medical and psychosocial content. By contrast, PTG showed no relationships with the amount of time, but with a predominant search for cancer-related psychosocial information. The psychological impact of online information was associated with participants' levels of PTG and/or PTSS. Whereas PTG was related to a decrease of women's hope, PTSS was linked to the perception of being less conscious or inadequately informed about the illness, thereby increasing feelings of distress.

Conclusions: Posttraumatic stress symptoms and PTG show relationships with the amount of time spent online, the type of information accessed online, and the psychological impact of Internet use. Health professionals should prescribe online information according to the psychological response to cancer. There is a need for professional-led online resources to provide patients with timely information as well as support sites to facilitate psychological adjustment.

KEYWORDS

breast cancer, oncology, Internet prescription, online information, psychological impact, posttraumatic growth, posttraumatic stress

1 | INTRODUCTION

According to the Flash Eurobarometer 404 of European citizens' digital health literacy,¹ 59% of European citizens use the Internet to

search for health-related information. Together with information provided by health professionals, online information has become a key resource that patients use to resolve health worries.²⁻⁵ According to Bender et al,⁶ online sources cater for 91.3% of the information

needs of patients with cancer, helping 69.9% manage cancer-related symptoms and 47.8% to obtain emotional support. The author also states that Internet use is also used to check information about medical diagnosis, prognosis, and treatment, as well as psychosocial information about adjustment to the illness, such as adopting healthy lifestyles, alternative treatments, or seeking peer support.⁶

Despite the growing amount of research on the impact of Internet use on cancer patients, discrepancies within existing data have made it difficult to understand the mechanisms underlying women's responses to the online information. Some reports have showed that Internet use was associated with a deeper knowledge of the illness, more efficient health resource use, greater treatment adherence, and improved patient-professional relationships.⁷⁻¹¹ However, online information use has also been linked to greater confusion, increased emotional discomfort, unnecessary diagnostic testing, and a worse physician-patient relationship.^{4,12,13} Differences in emotional reactions and extreme responses have been suggested as explanatory factors for these contradictory findings of the impact of online information on patients with cancer (eg, Cotten and Gupta²).

Many studies have produced data concerning the influence of a user's emotional state on Internet use. Whereas some articles report that positive thoughts and emotions increase cognitive resources and the motivation for exploring, resulting in an active search for information on the Internet,² others report that emotional distress hampers searching and the motivation to engage in self-care behaviors, because patients adopt defensive and avoidant positions to online information (eg, Husson et al¹⁴). Supporting this statement, Beekers et al¹⁵ concluded that the presence of depressive symptoms was associated with lower Internet use and less satisfaction with the information obtained. Similarly, Cotten and Gupta,² when assessing the differences between "offline" subjects (who do not use the Internet) and "online" subjects, found significantly better health states and greater happiness in the latter group. Also, Kim et al¹⁶ found that those who used online social resources showed higher emotional wellbeing. These studies support the hypothesis that emotional wellbeing promotes searching for online information, while distress inhibits searching. Yet, other studies have reported that negative emotions, far from inhibiting online searching for information, actually correlate positively with increased time searching for information.¹⁷ Chae,⁷ for example, reported that greater illness-related worry was associated with more intensive Internet use.

At this stage, there is a need for research to clarify the conflicting outcomes of the relationship between emotional distress and the search for online information among patients with cancer. A relevant point raised by the literature is whether emotional stress or distress foster avoidance and inhibit searching for online information, or conversely, promote intensive ruminative searching for online information.

A further gap exists regarding the relationship between the psychological response to cancer, the kind of the online information searched for, and the psychological impact of this information. Cancer is generally experienced as a threatening experience capable of generating symptoms of posttraumatic stress disorder (PTSD), such as hyperactivation, reexperimentation, and avoidance.¹⁸ Although only 5% to 15% of patients with cancer meet all criteria for a diagnosis of

PTSD, up to 43% have unpleasant intrusive thoughts, and 80% experience avoidance.¹⁹ Therefore, various studies state that high stress may display an attentional bias toward threatening information related to the traumatic life event and may show higher vulnerability to cognitive intrusions and hyperactivation when accessing information.^{20,21}

However, posttraumatic stress symptoms (PTSS) is not the only response reported by patients in the aftermath of trauma; posttraumatic growth (PTG) has also been widely reported after experiencing a traumatic event. Tedeschi and Calhoun²² define PTG as the positive personal changes that occur after experiencing a potentially traumatic event. Posttraumatic growth is also a common reaction to cancer, with up to 80% of patients able to describe at least 1 positive change in their lives after a cancer diagnosis^{23,24} and more than a half experiencing moderate to high levels of PTG.²⁵ Moreover, PTG has consistently been linked to the presence of positive mood states among oncological patients^{26,27} and has been shown to correlate with low levels of depression, anxiety, and distress.²⁷ For these reasons, those who experience PTG may not be as vulnerable to online information as those reporting PTSS and may search for a wider range of information.

Previous studies (eg, Valero-Aguilera et al, Abt Sacks et al, and Yli-Uotila et al^{8,10,28}) have primarily focused on how negative emotions influence the type of information sought and its psychological impact on patients with cancer. These studies show that, during the initial phases of the illness when patients perceive experiencing greater stress and a greater existential threat, they tend to look for medical information. In later phases after completing medical therapy, often coinciding with that start of cognitive processing of the illness, there is a greater openness to PTG. At this stage, it is thought that patients tend to look for information that resonates with these changes (eg, adopting healthier lifestyles, sourcing alternative treatments, and engaging in social support). This response to trauma entails positive personal changes, such as deeper relationships with others, a greater sense of personal strength, leading new possibilities in life, or a greater sense of spirituality, among others.^{22,29} These characteristics may entail the willing to use Internet as a new way of finding social support or alternative-complementary treatments. The reasons for this online behavior would be that, on the one hand, as a result of increased self-disclosure about personal negative experiences, the individual may perceive a higher emotional connection with others, as well as a feeling of closeness and intimacy in interpersonal relationships.²² Subsequently, the subject begins to better accept the help given by others and make better use of already existing social networks or invest in new ones. On the other hand, alternative treatments are presented as new complementary options with an integral-holistic and transcendental approach—spirituality. The creation of this new life path is related with a perception of a new philosophy of life that changes the past assumptions and core beliefs that may did not exist before trauma.²²

To date, however, studies have mainly assessed transitive negative emotional states regarding Internet use in cancer. Thus, no information exists regarding the wider vital changes (eg, PTSS or PTG) that this illness produces, and that may better explain patient behavior when looking for online information. Further, there is no current consensus regarding the relationship between emotion and Internet use, and no article has focused on the influences of PTG

and PTSS on this behavior. Therefore, we aimed to analyze how these variables were related to the amount of time spent looking for online information, the type of content, and the psychological impact among survivors of breast cancer.

According to the information reported by the cited previous studies, we hypothesized that those women reporting PTSS would spend more time searching for online information and that searches would predominantly narrow toward medical information (eg, diagnosis, prognosis, and treatment). We also expected the psychological impact of this information to be higher than in those reporting PTG. By contrast, we hypothesized that PTG would not be related to the amount of time spent searching online for cancer information but would instead promote broader searches about psychosocial contents.

2 | METHODS

2.1 | Participants

Two hundred ninety-six women with diagnosed breast cancer were recruited between July 2014 and March 2016 from 4 hospitals in Catalonia (Hospital Duran i Reynals, Consorci Hospitalari de Terrassa, Hospital de Sant Joan de Reus, and Corporació Sanitària Parc Taulí). Health professionals from participating hospitals invited women to participate if breast cancer had been diagnosed at least 1 month earlier, and if they reported having used the Internet to look for illness-related information. No restrictions to cancer phase, stage, or treatment were applied. However, patients were excluded if they reported not knowing how to use the Internet, not having looked for illness-related information online, or reported any major concurrent medical disease seriously affecting their cognitive performance (eg, neurologic disorders).

From among the 296 women invited to participate, 38 reported not using the Internet and 49 reported not having used the Internet to look for illness-related information. These latter stated not having searched for these contents for several reasons¹: to prevent themselves from feeling anxious and confused ($n = 15$),² having enough confidence in health professionals and the information provided ($N = 9$),³ not trusting the contents on the Internet ($n = 7$),⁴ physicians had recommended not to look on the Internet ($n = 7$),⁵ not willing to learn more about their illness ($n = 5$), and other reasons ($n = 6$). Among the remaining women, 27 declined to participate for different reasons, citing lack of time ($n = 13$), not feeling well enough ($n = 9$), or by not delivering completed questionnaires ($n = 5$). The final sample therefore comprised 182 participants. The study was conducted according to the latest version of the Declaration of Helsinki. Approval was given by the ethics committees of all hospitals, and all participants gave written informed consent.

2.2 | Measures

2.2.1 | The Posttraumatic Stress Disorder Checklist-Civilian Version

The Posttraumatic Stress Disorder Checklist-Civilian Version (PCL-C)³⁰ is a 17-item self-rating questionnaire. It uses a 5-point Likert scale for each item, ranging from 1 (not at all) to 5 (extremely), and covers the

diagnostic criteria for PTSD in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (APA, 2000). The questionnaire yields both a total score and 3 subscale scores based on reexperiencing, avoidance/numbing, and hyperarousal. In this study, we used the Spanish version of PCL-C.³¹ The tool showed proper Cronbach alpha in this study ($\alpha = 0.94$).

2.2.2 | The Posttraumatic Growth Inventory

The Posttraumatic Growth Inventory (PTGI)²⁹ focuses on the assessment of positive changes experienced after trauma. The 21-item PTGI yields a total score and 5 subscale scores, as follows: new possibilities (5 items), relating to others (7 items), personal strengths (4 items), appreciation of life (3 items), and spirituality (2 items). Items are rated on 6-point Likert-type scales, ranging from 0 (did not experience this change) to 5 (experienced this change strongly). In this study, we used the Spanish version of PTGI.³² The tool showed proper Cronbach alpha in this study ($\alpha = 0.95$).

2.2.3 | The use of Internet questionnaire for breast cancer patients

This ad-hoc questionnaire was based on the self-report questionnaire by Fogel et al,³ together with relevant topics published in The European Citizen's Digital Health Literacy.¹ As a result, it comprised 9 items covering these groups: (a) the amount of time women spent looking on the Internet (4 items); (b) which type of online information they looked for, including medical information (diagnosis and prognosis) and psychosocial information (treatments, healthy lifestyles, complementary treatments, esthetic information, information exchange or mutual support forums with other patients, social assistance information, and online support groups; 1 item with 10 nonexclusive options); and (c) the effect of Internet use on their emotional based on hope, emotional distress, knowledge/consciousness of the illness, and cancer-related worries (4 items). These latter items were assessed by using a 3-point Likert-type scale (feeling better, no change, and feeling worse).

2.3 | Procedure

Women attending routine meetings with health professionals were invited to enter the study if they met the inclusion criteria. Those who accepted were interviewed by a clinical psychooncologist who gave full information about the study and obtained signed informed consent. Sociodemographic, medical, and clinical data were also collected at this stage, and the participants were asked to complete the questionnaires to assess PTSS, PTG, and Internet use. Whether they accepted or rejected to enter the study, women showing illness-related stress or distress were offered psychological attention.

2.4 | Statistical analysis

Statistical analysis was performed by using IBM SPSS for Windows, version 21.0.³³ Differences between participants and nonparticipants were examined by Student *t* tests and χ^2 tests. Correlations were performed to explore relationships between PCL-C or PTGI responses and the number of hours spent looking for illness-related information

online. Analyses of variance were used to study the relationship between PTG or PTSS and the type of information searched, as well as the relationship between PTG and PTSS, and the impact that the information had on participants. The reported effect size was *partial* η^2 .

3 | RESULTS

3.1 | Sample characteristics

Of the 209 eligible women who met the inclusion criteria, 182 finally completed the questionnaires. Their sociodemographic and medical characteristics are summarized in Table 1. Apart from participants being younger than nonparticipants, there were no significant differences between women who entered the study and those who declined to participate or did not meet the inclusion criteria.

3.2 | Relation of PTG and PTSS to the time spent searching for information online

Women were asked about the amount of time they spent looking for illness-related information before and after their cancer diagnosis. Posttraumatic stress symptoms were positively related to the number of hours spent looking for information online, with a greater correlation after the illness ($r = 0.23$, $P = .02$) than before ($r = 0.14$; $P = .03$). By contrast, PTGI showed no significant correlation with this variable before ($r = 0.06$; $P = .22$) or after the illness ($r = 0.04$; $P = .23$).

3.3 | Relation of PTG and PTSS with the type of searched online information

Women were also asked about the type of information they looked for online (medical, psychosocial, or both), and relationships were explored between PTG or PTSS levels and the type of online information. Analysis of variance revealed that the following¹ higher scores in PTGI were related to the predominance of psychosocial information searching (95% confidence interval [CI] = 1.44-18.72; $F[2,165] = 3.23$, $P < .05$, partial $\eta^2 = 0.4$), while² higher scores in PCL-C were associated with looking indiscriminately for both types of information (95% CI = 1.74-12.56; $F[2,168] = 3.48$; $P < .05$, partial $\eta^2 = 0.4$). See Table 2 for further details.

3.4 | Relation of PTG and PTSS with the psychological impact of online information

We also wanted to assess the relationship between PTG or PTSS and the psychological impact of online information. For this, women were asked how the online information affected them in illness-related emotional distress, perceived consciousness/knowledge about the illness, cancer worries, and hope about the illness. Contrasts from analysis of variance showed that the higher PTG women reported, the worse they felt in illness-related hope (95% CI = 0.38-19.45; $F[2,165] = 2.99$, $P = .05$, partial $\eta^2 = 0.04$). However, there was no relationship between PTG and the impact of information on

TABLE 1 Sample characteristics (N = 182)

Age (Years)	
Mean	46.59
SD	8.24
Min-max	21-73
Marital status	
N (%)	
Married/partnered	141 (77.5)
Separated/divorced	20 (11.0)
Never married	14 (7.7)
Widowed	5 (2.7)
No report	2 (1.1)
Educational level	
High school or less	43 (23.6)
Some college	79 (43.4)
University studies	54 (29.7)
No report	6 (3.3)
Working status	
Employed	54 (29.7)
Unemployed	39 (21.4)
Sick leave	66 (36.3)
Pensioner	21 (11.5)
No report	2 (1.1)
Cancer stage	
0	7 (3.8)
I	54 (29.7)
II	88 (48.4)
III	23 (12.6)
IV	7 (3.8)
No report	3 (1.6)
Time since diagnosis (months)	
Mean	25.22
SD	32.52
Min-max	1-183
Cancer surgery	
Yes	170 (93.4)
No	12 (6.6)
Cancer treatment	
Chemotherapy	148 (81.3)
Radiotherapy	137 (75.3)
Hormone therapy	140 (76.9)
Current treatment	
Follow-up no hormonotherapy	21 (11.5)
Follow-up hormonotherapy	103 (56.6)
Chemotherapy	39 (21.4)
Radiotherapy	19 (10.4)

emotional distress ($P = .33$), worries ($P = .59$), or illness-related consciousness/knowledge ($P = .78$). In turn, experiencing PTSS had a different pattern of relationships with the impact of online information. Thus, the higher the PTSS scores, the worse women felt in illness-related emotional distress (95% CI = 4.96-15.38, $F[2,161] = 8.0$, $P < .001$, partial $\eta^2 = .09$) and in consciousness/knowledge of the disease (95% CI = 0.04-11.86, $F[2,167] = 2.89$, $P = .05$, partial $\eta^2 = .03$). See Table 3 for further details.

TABLE 2 Relationships between PTSS/PTG and the type of information searched online

	PTSS					PTG				
	Mean	SD	Comparisons	F (df1,df2)	P	Mean	SD	Comparisons	F (df1,df2)	P
Type of information				3.48 (2,160)	.03				3.23 (2,165)	.04
Medical	38.35	16.5				45.29	25.28			
Psychosocial	42.02	12.42	<i>P</i> = .03			56.30	21.01	<i>P</i> = .24		
Both	45.51	14.67	<i>P</i> = .02			53.57	22.87	<i>P</i> = .01		

PTSS, posttraumatic stress symptoms; PTG, posttraumatic growth.

TABLE 3 Relationships between PTSS/PTG and the psychological impact of the online information

Group	PTSS					PTG				
	Mean	SD	F (df1,df2)	P	Comparisons	Mean	SD	F (df1,df2)	P	Comparisons
Hope			2.53 (2,168)	.08				2.99 (2,165)	.05	
Feeling worse	47.97	15.28				61.94	20.93			
No change	41.99	14.56			<i>P</i> = .05	52.02	21.42			<i>P</i> = .04
Feeling better	40.92	14.55			<i>P</i> = .03	49.46	26.86			<i>P</i> = .02
Distress			8.00 (2,161)	<.001				1.10 (2,159)	.33	
Feeling worse	48.87	13.64				56.98	22.39			
No change	38.54	14.31			<i>P</i> < .01	52.17	20.09			<i>P</i> = .27
Feeling better	41.08	14.09			<i>P</i> < .01	50.62	26.87			<i>P</i> = .16
Worries			2.39 (2,163)	.09				.52 (2,160)	.59	
Feeling worse	47.07	15.39				55.80	22.58			
No change	41.12	14.95			<i>P</i> = .05	50.98	22.09			<i>P</i> = .31
Feeling better	41.76	14.26			<i>P</i> = .06	53.08	24.56			<i>P</i> = .54
Consc./know.			2.89 (2,167)	.05				.24 (2,164)	.78	
Feeling worse	50.81	16.03				50.06	22.16			
No change	43.06	14.31			<i>P</i> = .08	55.03	22.81			<i>P</i> = .49
Feeling better	41.49	14.78			<i>P</i> = .02	52.82	23.81			<i>P</i> = .66

PTSS, posttraumatic stress symptoms; PTG, posttraumatic growth.

4 | DISCUSSION

Breast cancer diagnosis and treatment can be disruptive to the life trajectories of cancer survivors, having either negative (trauma) or positive (growth) outcomes. Levels of trauma and growth are relevant when assessing vital changes after cancer, not only in Internet search behaviors but also in the psychological impact of the information obtained. Whatever the reaction to the illness, searching for cancer- and health-related information on the Internet is common throughout the disease process and survivorship. However, little has previously been reported about the variables which relate to the Internet search behavior (ie, time spent and type of information) or the psychological impact of online information (ie, distress, consciousness/knowledge, worries, and hope). We hypothesized that in a patient's response to the aftermath of illness, either trauma or growth, differences would be found in the amount of time spent looking for online information, the type of content, and the psychological impact of that information.

Regarding women with high PTSS, we hypothesized that they would spend more time searching for online information to meet the demands of increased "Internet rumination," in consonance with the common characteristic of PTSS of cognitive rumination. Our results showed that PTSS was positively related to the amount of time spent

on the Internet and that these women tended to look for information with both medical and psychosocial content. This increased amount of time spent online is probably due to patients' attempts to fill gaps in their knowledge and to gain a greater sense of control over the disease.^{34,35} Similar results were found in other studies, such as the one by Griffin et al,³⁶ describing a direct relationship between negative psychological reactions (eg, distress or stress) and the breadth of information searched for online. Also, the meta-analysis by Hay, McCaul, and Magnan³⁷ revealed that worries about cancer prompted screening for online information among women with breast cancer. Thus, women with higher PTSS may use online searches to navigate their emotional distress and cancer rumination. It is acknowledged that early detection of patients with higher PTSS or distress, followed by reliable information prescribing and easy access to reliable online sources of psychosocial support, can aid the cancer adjustment process.¹⁵

On the other hand, the considerable amount of women declining entering our study would be explained by the eventual attitude of avoidance, which is also a typical reaction in high-stressed patients. Therefore, 2 patterns of behavior can be identified among women of our sample showing PTSS: either "Internet rumination" or "Internet avoidance."

Regarding PTG, we hypothesized that women with higher levels would invest more time researching psychosocial information, based on reports that PTG often reflects a positive meaning-making process.²² As expected, results showed a positive relationship between scores in PTGI and the search for psychosocial contents. Thus, patients with higher PTG focused on vital changes related to accommodation and were more likely to look for online psychosocial resources that supported the narrative of search and personal transformation (eg, healthier lifestyles, new activities, and support groups) rather than focusing specifically on cancer-related information. These preferences may be explained by the drive for meaning-making processes that integrate traumatic information by changing their prior identity and basic beliefs.³⁸

Cancer is a traumatic experience where personal growth is likely to take place, and the search for information on the Internet reflects these positive changes. Indeed, treatment is damaging to the mind and body and can promote acknowledgment of the need not just to take care of oneself but also to understand others, open up emotionally, and to express empathy. In turn, this is reflected in the search for psychosocial information via support groups, testimonies, and social networks. Likewise, the perceived threat to present and future health promotes the adoption of healthy lifestyles, the prioritization of specific activities and values, or the fostering of satisfying personal relationships.³⁹ These personal needs and changes explain the drive of women from this study to search for psychosocial information about healthy lifestyle changes, starting pleasurable activities, or seeking social help.

In the present article, we also aimed to explore the associations of PTG and PTSS with the psychological impact of online information. Specifically, we hypothesized a positive relationship between PTGI scores and feeling better in hope and more knowledgeable about their disease, while an inverse relationship between PTGI scores and distress and worry after accessing online information. By contrast, after accessing online information, we hypothesized that women scoring higher in PCL-C would experience not only increased distress and worry about their cancer but also increased dissatisfaction with the information obtained, thereby decreasing their sense of hope. In general terms, our findings indicated that the more central the cancer experience in transforming one's life view, the higher the psychological impact of information on users, especially among those with signs of PTSS.

Counter to our hypothesis, scores in PTGI were inversely related to feeling hopeful about the illness. This apparent paradoxical result can be explained by the widely acknowledged need for a person to perceive an existential threat to prompt him or her to make positive life changes and growth after a cancer diagnosis.³⁹ Often, having experienced a high awareness of one's own mortality simultaneously triggers both positive life changes and a greater sense of hopelessness with the online information accessed. Other authors⁴⁰ would give a methodological explanation to these outcomes: These would result from the use of PTGI as an assessment tool that, for some authors, may be less sensitive to discern between actual and illusory PTG in chronic illnesses like cancer.

Concerning PTSS, our results showed that there was a clear correlation for online information to have a negative psychological impact.

Specifically, women from our study with high PTSS reported not being sufficiently knowledgeable about their illness and feeling more distressed after reading the online information. These results support the findings in previous articles, such as those by Baumgartner and Hartmann,⁴¹ reporting that women who perceive their experiences as highly threatening tend to perceive their future with fear and anxiety, often resulting in them feeling overwhelmed, confused, and frustrated with the information found online.

Other papers have also reported that cancer patients often show extreme degrees of physical, mental, and emotional vulnerability. These lead to an inability to think logically and retain information about the disease,¹⁶ an inability to understand or process the online information,¹⁵ and a tendency to feel more confused by the online information.⁴¹ This may explain why patients with higher PTSS reported that the online information did not improve their knowledge or awareness of the illness, but instead left them feeling more distressed. Further, Chae⁷ reported that the most distressed individuals tended to look for information that supported their feelings, creating a negative feedback loop that may need to be identified and corrected by health-care professionals.

4.1 | Study limitations

Although this study yielded meaningful findings, it is not without limitations. First, the study was only performed among breast cancer survivors, and although this improves control and homogeneity regarding disease-related variables, it limits generalizability to other patient groups and other phases of the disease. Second, the cross-sectional design precludes any conclusion of a causal relationship between PTG/PTSS and the impact of online information. A prospective study looking at Internet use in all stages of cancer (eg, diagnosis, treatments, survivorship, and relapse) may better account for the nature of this relationship. Finally, due to the cross-sectional nature of the study, the use of Internet before the illness was assessed *ex post facto*. The authors recognize the eventual recall bias that may entail the use of this method.

5 | CONCLUSIONS

In conclusion, the reaction to breast cancer survival is related to both the nature of Internet use and the psychological impact of the information accessed. Posttraumatic growth scores showed positive relationships with the search for psychosocial information online, reflecting attempts to accommodate the cancer experience, rather than focusing on cancer as medical event. In contrast to those with high PTSS, those with PTG did not have a predisposition for online information to impact them negatively, but there was a tendency for it to foster hopelessness. Scores in PTSS, however, were positively related to an extensive online research for information that then tended to have a negative psychological impact.

5.1 | Clinical implications

The present results highlight the importance of paying special attention to the access and impact of online information among survivors

of breast cancer that show high levels of PTSS. A potential solution would be to provide a timely Internet prescription for suitable information, especially in highly distressed patients. This could expose patients to good sources of information and promote good relationships between patient and health professional.⁴² This is particularly important given that¹ the Internet is the second source of information (after health professionals) accessed by cancer survivors, and² there is evidence that survivors prefer online information prescribed by professionals, because this is vetted as being more suitable for them.⁴³

ACKNOWLEDGEMENTS

This work was funded by grants from Instituto de Salud Carlos III (FIS PI15/01278) and co-funded by FEDER funds/European Regional Development Fund (ERDF) "a way to build Europe"//FONDOS FEDER "una manera de hacer Europa." It is also partially supported by grants from *Asociación Española Contra el Cáncer* [the Spanish Association Against Cancer] (AECC)-Catalunya, Grup de recerca consolidat: Recerca en serveis sanitaris en càncer, 2014SGR0635.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

ORCID

A. Casellas-Grau  <http://orcid.org/0000-0003-2919-0509>

C. Ochoa  <http://orcid.org/0000-0002-4508-0951>

REFERENCES

- European Commission. Flash Eurobarometer 404 (European citizens' digital health literacy). Cologne: GESIS Data Archive;2014.
- Cotten SR, Gupta SS. Characteristics of online and offline health information seekers and factors that discriminate between them. *Soc Sci Med*. 2004;59(9):1795-1806.
- Fogel J, Albert SM, Schnabel F, Ditkoff BA, Neugut AI. Use of the Internet by women with breast cancer. *J Med Internet Res*. 2002;4(2):e9.
- Newnham GM, Burns WI, Snyder RD, et al. Information from the Internet: attitudes of Australian oncology patients. *Intern Med J*. 2006;36(11):718-723.
- Pérez P, Romasanta LAP, Vázquez ML, et al. Utilización de internet como vía de información médica para el paciente sometido a radioterapia: revisión y presentación de un proyecto de estudio [The use of internet as a source of medical information for patients undergoing radiotherapy: revision and presentation of a study project]. *Psicooncología*. 2005;2:91-102.
- Bender JL, Jimenez-Marroquin MC, Ferris LE, Katz J, Jadad AR. Online communities for breast cancer survivors: a review and analysis of their characteristics and levels of use. *Support Care Cancer*. 2013;21(5):1253-1263.
- Chae J. Online cancer information seeking increases cancer worry. *Comput Human Behav*. 2015;52:144-150.
- Valero-Aguilera B, Bermúdez-Tamayo C, García-Gutiérrez JF, et al. Information needs and Internet use in urological and breast cancer patients. *Support Care Cancer*. 2014;22(2):545-552.
- Lee C, Ramírez AS, Lewis N, Gray SW, Hornik RC. Looking beyond the internet: examining socioeconomic inequalities in cancer information seeking among cancer patients. *Health Commun*. 2012;27(8):806-817.
- Abt Sacks A, Pablo Hernando S, Serrano Aguilar P, Fernández Vega E, Martín Fernández R. Necesidades de información y uso de Internet en pacientes con cáncer de mama en España [Breast cancer patients' information needs and use of internet in Spain]. *Gac Sanit*. 2012;27:241-247.
- Van de Poll-Franse LV, Van Eenbergen MCHJ. Internet use by cancer survivors: current use and future wishes. *Support Care Cancer*. 2008;16(10):1189-1195.
- Imes RS, Bylund CL, Sabee CM, Routsong TR, Sanford AA. Patients' reasons for refraining from discussing Internet health information with their healthcare providers. *Health Commun*. 2008;23(6):538-547.
- Hart A, Henwood F, Wyatt S. The role of the Internet in patient-practitioner relationships: findings from a qualitative research study. *J Med Internet Res*. 2004;6(3):e36.
- Husson O, Mols F, van de Poll-Franse LV. The relation between information provision and health-related quality of life, anxiety and depression among cancer survivors: a systematic review. *Ann Oncol*. 2011;22(4):761-772.
- Beekers N, Husson O, Mols F, Van Eenbergen M, Van De Poll-Franse LV. Symptoms of anxiety and depression are associated with satisfaction with information provision and Internet use among 3080 cancer survivors. *Cancer Nurs*. 2015;38(5):335-342.
- Kim SC, Shah DV, Namkoong K, Mctavish FM, Gustafson DH. Predictors of online health information seeking among women with breast cancer: the role of social support perception and emotional well-being. *J Comput Commun*. 2013;18:212-232.
- Shaw BR, Dubenske LL, Han JY, et al. Antecedent characteristics of online cancer information seeking among rural breast cancer patients: an application of the Cognitive-Social Health Information Processing (C-SHIP) model. *J Health Commun*. 2008;13(4):389-408.
- American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*. 4th Ed., text rev. ed. Washington: DC; 2000.
- Kangas M, Henry JL, Bryant RA. Predictors of posttraumatic stress disorder following cancer. *Health Psychol*. 2005;24(6):579-585.
- Morrison R, O'Connor RC. The role of rumination, attentional biases and stress in psychological distress. *Br J Psychol*. 2008;99(2):191-209.
- Bryant RA, Harvey AG. Attentional bias in posttraumatic stress disorder. *J Trauma Stress*. 1997;10(4):635-644.
- Tedeschi RG, Calhoun LG. Posttraumatic growth: conceptual issues. In: Calhoun LG, Tedeschi RG, eds. *Positive Changes in the Aftermath of Crisis*. Mahwah: Lawrence Erlbaum Associates, Inc. Publishers; 1998:1-22.
- Arpawong TE, Richeimer SH, Weinstein F, Elghamrawy A, Milam JE. Posttraumatic growth, quality of life, and treatment symptoms among cancer chemotherapy outpatients. *Health Psychol*. 2013;32(4):397-408.
- Gunst DCM, Kaatsch P, Goldbeck L. Seeing the good in the bad: which factors are associated with posttraumatic growth in long-term survivors of adolescent cancer? *Support Care Cancer*. 2016;24(11):4607-4615.
- Sim BY, Lee YW, Kim H, Kim SH. Post-traumatic growth in stomach cancer survivors: Prevalence, correlates and relationship with health-related quality of life. *Eur J Oncol Nurs*. 2015;19(3):230-236.
- Leloirain S, Bonnaud-Antignac A, Florin A. Long term posttraumatic growth after breast cancer: prevalence, predictors and relationships with psychological health. *J Clin Psychol Med Settings*. 2010;17(1):14-22.
- Shand LK, Cowlshaw S, Brooker JE, Burney S, Ricciardelli LA. Correlates of post-traumatic stress symptoms and growth in cancer patients: a systematic review and meta-analysis. *Psychooncology*. 2015;24(6):624-634.
- Yli-Uotila T, Rantanen a, Suominen T. Motives of cancer patients for using the Internet to seek social support. *Eur J Cancer Care*. 2013;22(2):261-271.
- Tedeschi RG, Calhoun LG. The Posttraumatic Growth Inventory: measuring the positive legacy of trauma. *J Trauma Stress*. 1996;9(3):455-471.

30. Weathers F, Litz B, Huska J, T Keane. PTSD Checklist-Civilian Version. Boston: Behavioral Sciences Division; 1994.
31. Costa-Requena G, Gil F. Posttraumatic stress disorder symptoms in cancer: psychometric analysis of the Spanish Posttraumatic Stress Disorder Checklist-Civilian Version. *Psychooncology*. 2010;19(5):500-507.
32. Costa-Requena G, Gil F. Crecimiento postraumático en pacientes oncológicos [Posttraumatic growth in oncological patients]. *Análisis y Modif Conduct*. 2007;33:229-250.
33. IBM Corp. IBM SPSS Statistics for Windows, version 21.0. Armonk, NY: IBM Corp.; 2012.
34. Broom A, Tovey P. The role of the Internet in cancer patients' engagement with complementary and alternative treatments. *Heal An Interdiscip J Soc Study Heal Illn Med*. 2008;12:139-155.
35. Eysenbach G. The impact of the Internet on cancer outcomes. *CA Cancer J Clin*. 2003;53(6):356-371.
36. Griffin RJ, Neuwirth K, Dunwoody S, Giese J. Information sufficiency and risk communication. *Media Psychol*. 2004;6(1):23-61.
37. Hay JL, McCaul KD, Magnan RE. Does worry about breast cancer predict screening behaviors? A meta-analysis of the prospective evidence. *Prev Med*. 2006;42(6):401-408.
38. Joseph S, Linley PA. Positive adjustment to threatening events: an organismic valuing theory of growth through adversity. *Rev Gen Psychol*. 2005;9(3):262-280.
39. Cordova MJ, Cunningham LLC, Carlson CR, Andrykowski MA. Posttraumatic growth following breast cancer: a controlled comparison study. *Health Psychol*. 2001;20(3):176-185.
40. Boals A, Schuler KL. Reducing reports of illusory posttraumatic growth: a revised version of the Stress-Related Growth Scale (SRGS-R). *Psychological trauma: Thoery, Research, Practice, and Policy*. *Psychol Trauma Theory, Res Pract Policy* 2017;Advanced online publication.
41. Baumgartner SE, Hartmann T. The role of health anxiety in online health information search. *Cyberpsychol Behav Soc Netw*. 2011;14(10):613-618.
42. Alba-Ruiz R, Bermúdez-Tamayo C, Pernet JJ, Garcia-Gutierrez JF, Cózar-Olmo JM, Valero-Aguilera B. Adapting the content of cancer web sites to the information needs of patients: reliability and readability. *Telemed J E Health*. 2013;19(12):956-966.
43. Lauckner C. The effects of viewing and preferences for online cancer information among patients' loved ones. *Comput Informatics Nurs*. 2016;34(1):37-46.

How to cite this article: Casellas-Grau A, Sumalla EC, Lleras M, et al. The role of posttraumatic stress and posttraumatic growth on online information use in breast cancer survivors. *Psycho-Oncology*. 2018;27:1971-1978. <https://doi.org/10.1002/pon.4753>