



# A spotlight on avoidance coping to manage fear of recurrence among breast cancer survivors in an eHealth intervention

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## Abstract

**Background** Fear of recurrence (FoR) is prevalent among breast cancer survivors (BCS) and may be exacerbated by avoidance coping. This study examined BCS with avoidance coping and their engagement in a FoR eHealth intervention (FoRtitude).

**Methods** BCS (N = 196) with elevated FoR participated in FoRtitude. Patient-reported measures assessed avoidance coping with FoR and baseline emotional and behavioral health. Intervention engagement was measured quantitatively (e.g., website logins, telecoaching attendance) and qualitatively (i.e., telecoaching notes).

**Results** 38 BCS (19%) endorsed avoidance coping, which was associated with more severe post-traumatic anxiety-related symptoms and worse global mental health ( $p < .05$ ), but not anxiety ( $p = .19$ ), depression ( $p = .11$ ), physical health ( $p = .12$ ), alcohol consumption ( $p = .85$ ), or physical activity ( $p = .39$ ). Avoidance coping was not associated with engagement levels ( $ps > .05$ ) but did characterize engagement-related motivators and barriers.

**Conclusions** Avoidance coping was not a barrier to FoRtitude engagement. eHealth delivery is a promising modality for engaging survivors with avoidance coping in FoR interventions.

**Keywords** Fear of recurrence · Cancer · Survivorship · eHealth · Avoidance

## Background

Long-term cancer survivors have identified help with managing fear of recurrence (FoR) as their most pressing unmet need (Hall et al., 2019; Hall et al., 2017; Mehnert et al., 2009; Shaw et al., 2021; Simard et al., 2010; van den Beuken-van Everdingen et al., 2008). FoR, defined as fear, worry, or concern that cancer could return or progress (Lebel et al., 2016), is multi-dimensional with emotional (e.g., anxiety), cognitive (e.g., intrusive thoughts), and behavioral components (e.g., avoidance of cancer-related stimuli) (Hall et al., 2019; Lee-Jones et al., 1997; Leventhal et al., 1998; Simard et al., 2010). Among breast cancer survivors (BCS), elevated FoR has been documented among 24–56%, including those at low risk of recurrence (Curran et al., 1998; Partridge et al., 2004; Simard et al., 2010) and who have been cancer-free for years (Deimling et al., 2006; Koch, Jansen, Brenner, & Arndt, 2012; Mehnert et al., 2009). FoR is recognized as a precipitant for numerous significant consequences, including poor health-related quality of life (HRQL), anxiety, depression, symptom burden, and maladaptive health behaviors that increase cancer survivors' risk for poorer clinical outcomes (Hall et al., 2019; Hall et al., 2017; Koch et al., 2012; Mehnert et al., 2009; Reed et al., 2021; Skaali et al., 2009; Tan, Yip, Chan, Chew, & Chan, 2021; Vachon et al., 2021).

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Avoidance coping, in which individuals make cognitive and behavioral efforts to minimize or avoid dealing with stressors, is theoretically and clinically relevant to managing FoR. For instance, Lee-Jones et al.'s adapted model of Leventhal's Self-Regulation Model of Illness (Lee-Jones et al., 1997; Leventhal, Diefenbach, & Leventhal, 1992; Leventhal et al., 1998) posits that adaptive coping strategies enhance BCSs' confidence in their ability to manage cancer or recurrence, whereas avoidance coping strategies lower BCSs' confidence in their ability to cope, leading to poorer emotional health (e.g., distress, anxiety, depression, body image concerns), unhealthy behaviors (e.g., increased alcohol use and sedentary behavior), and avoidance of potentially lifesaving medical tests and procedures. More recently, cancer survivors' coping has been implicated as a key process underlying greater resiliency through FoR management (Hall et al., 2022). Few studies have examined these associations empirically (Cohee et al., 2021; Guimond et al., 2019; Yamani Ardakani et al., 2020). In our previous work, we found that non-Hodgkin lymphoma survivors who use avoidance coping are at increased risk of illness-related anxiety, general anxiety, and lower HRQL (Wagner et al., 2015). However, the measure used to assess avoidance coping did not explicate if avoidance was cancer-related, as is done with FoR-specific measures such as the Fear of Cancer Recurrence Inventory (FCRI) (Simard & Savard, 2009). In the largest study of avoidance coping and fear of recurrence to date, Cohee et al. (2021) administered a cross-sectional survey to 1,127 BCS, and avoidance coping was found to explain a significant proportion of the covariance between fear of cancer recurrence and emotional health outcomes. Since the start of the COVID-19 pandemic, these consequences may have increased, as cancer survivors have reported higher rates of avoidance of the medical system as a primary coping strategy (Frey et al., 2021).

Avoidance coping with FoR may be a barrier to engaging in traditional psychological interventions that are delivered in-person or involve directly addressing anxiety-generating topics, such as cognitive behavioral therapy (CBT). Avoidance coping has been identified as a barrier to engagement in psychotherapy broadly (Holdsworth et al., 2014) and specifically in CBT treatments for anxiety (Chambless et al., 1997). Remotely delivered interventions (i.e., eHealth) are a promising solution for engaging cancer survivors with avoidance coping. Compared to in-person visits, interventions accessed remotely and asynchronously require less personal engagement and may buffer external cues that trigger FoR (e.g., hospital setting, seeing other patients).

However, evidence suggests that FoR may interfere with uptake of eHealth-delivered CBT-based interventions for cancer survivors (Cillessen et al., 2020). Recently, we published results from one of the few eHealth interventions for FoR among BCS (FoRtitude) (Wagner et al., 2017, 2021). In

addition to assessing patient-reported outcomes (PROs), we measured BCSs' behavioral engagement in the eHealth platform (e.g., website clicks, telecoaching sessions attended) and showed that telecoaching increased eHealth engagement (Wagner et al., 2021). These benchmarks offer a unique and meaningful lens to assess the impact of avoidance coping on BCSs' engagement in eHealth.

The aims of this study were therefore (1) to describe the cross-sectional associations between avoidance coping with FoR and emotional and health behavior variables and (2) to characterize engagement, benefits, and challenges with an eHealth FoR intervention among BCS who cope with FoR by avoidance.

## Methods

### Participants

Study procedures have been previously reported (Wagner et al., 2017, 2021). Eligibility criteria included stage 0-III breast cancer at diagnosis, completion of primary breast cancer treatment 1–10 years prior to consent (current hormonal treatment allowed), disease-free,  $\geq 18$  years old, score  $\geq 13$  on the Fear of Cancer Recurrence Inventory (FCRI) severity subscale (Simard & Savard, 2009, 2015), internet familiarity, mobile telephone with text messaging capabilities, proficiency in English and ability to provide informed consent.

### Recruitment

From December 2014 to September 2015, BCS were recruited from the Robert H. Lurie Comprehensive Cancer Center of Northwestern University and three NCI Community Oncology Research Program (NCORP) Community Sites (Aurora, Colorado Cancer Research, and Metro Minnesota NCORPs). The study was approved by the IRBs of each participating site. Clinic staff introduced the study to potentially eligible BCS and provided an IRB-approved study brochure. BCS accessed the study website to provide informed consent, demographic and medical characteristics, and complete eligibility screening. Eligible BCS received a hyperlink directing them to the baseline assessment.

### Design

This is a secondary analysis of baseline and adherence data from a randomized controlled trial, FoRtitude (NCT03384992). Using the MOST framework (Collins et al., 2005, 2014), FoRtitude tested four intervention components (three cognitive behavioral therapy-based strategies vs. an attention control, and telecoaching vs. no telecoaching). FoRtitude is a targeted eHealth CBT intervention to

teach FoR management strategies through user-centered design. The FoRtitude eHealth site included didactic content, interactive tools, and an interactive text messaging feature. The website, intervention components, attention control components, and functionality have been previously described (Wagner et al., 2017). New site content was released 3 times per week to maximize site engagement with assessments at baseline (T0) and at 4 (T1) and 8 (T2) weeks after the first site log-in. Attention control components included health management content (HMC) in the same eHealth format as CBT-based treatment components. Participants randomly assigned to telecoaching ( $n=97$ ) received up to 4 weekly telecoaching sessions approximately 15 min in duration using motivational interviewing to promote site adherence, as done in other eHealth trials (e.g., Mohr et al., 2013). Telecoaching was delivered by two coaches with clinical psychology doctoral degrees trained in motivational interviewing following a manualized protocol. Telecoaches were blinded to participant randomization and coping strategy status. Participants received incentives for completing PROs. Participants received incentives for completing PROs.

## Measures

PROs were administered online using Assessment Center<sup>SM</sup> (Gershon et al., 2010) at baseline, 4 and 8 weeks. The analyses in this report evaluated PROs at baseline only.

### *Avoidance coping with FoR*

Avoidance coping with FoR was measured using the following item from the validated Fear of Cancer Recurrence Inventory (FCRI) (Simard & Savard, 2009): “Generally, I avoid situations or things that make me think about the possibility of cancer recurrence”. Response options are: 0 never, 1 rarely, 2 sometimes, 3 most of the time, 4 all the time. Following standards for dichotomization (Rothrock et al., 2019), guided by clinical experience of two licensed clinical psychologists working with cancer survivors (DH, LW) in tandem with the guidance from the study biostatisticians (BL, JT), BCS who responded 3 or 4 were categorized as having avoidance coping, and BCS who endorsed 0–2 were categorized as not.

### *Emotional health*

Post-traumatic anxiety-related symptoms were assessed by the Impact of Event Scale—Revised (IES-R) (Creamer et al., 2003; Horowitz, Wilner, & Alvarez, 1979; Weiss & Marmar, 2004) total sum score (possible range = 0–88, clinical cutoff  $\geq 33$ ) and avoidance subscale mean score (possible range = 0–4). PROMIS computer adaptive tests (Champion et al., 2013) measured anxiety (PROMIS Anxiety) and

depression (PROMIS Depression). The PROMIS Global Health 10-item scale measures overall mental (PROMIS Global Mental Health) and physical (PROMIS Global Physical Health) self-reported health. PROMIS measures generate T-scores (general population mean = 50, standard deviation = 10) with higher scores indicating a higher level of the construct measured.

### *Behavioral health*

Frequency of alcohol intake and physical activity over the past month were measured using items from the Behavioral Risk Factor Surveillance System (BRFSS). Participants were asked how often they had at least one drink of any alcoholic beverage such as beer, wine, a malt beverage, or liquor. Response options were: Every day, 5–6 times per week, 3–4 times per week, 1–2 times per week, 3–4 times per month, 1–2 times per month, < 1 time per month, and Prefer not to answer. Physical activity was computed as minutes per week participating in moderate or high intensity physical activities or exercises such as running, swimming, bicycling, calisthenics, golf, gardening, or walking for exercise. Minutes per week were analyzed both as a continuous variable and categorically (below vs. at least 150 min per week).

### *Engagement in the FoRtitude eHealth intervention*

We quantitatively measured FoRtitude engagement between the second and third assessment time points (i.e., between 4 and 8 weeks) using an index composite score which summarized the number of website logins, website pages accessed, times tools were used, and text messages sent from randomization to 8-weeks, as previously reported (Wagner et al., 2021). Each component was assigned a score from 0 (not adherent) to 10 (full adherence, i.e.,  $\geq 6$  logins,  $\geq 6$  lessons completed,  $\geq 6$  tools used, and  $\geq 3$  text messages sent) per week for 4 weeks (possible range for total score 0–40). We also computed rates of attendance in telecoaching sessions among BCS randomized to receive telecoaching in the parent trial ( $n=97$ ).

Telecoaches recorded qualitative notes during telecoaching sessions for 72 of 92 participants randomized to telecoaching with session notes summarizing participants' comments. A unit of analysis (notes) were roughly 1–4 sentence within telecoaching notes that maintained complete thoughts and context for analysis (Saldaña, 2021). Inductive thematic content analysis was conducted by the primary coder (EJ) using Excel 2016 (Microsoft Corporation, Redmond, WA) (Meyer & Avery, 2009). Initial codes were assigned with second and third level coding combining and refining codes along with writing analytical memos to develop emergent codes into final themes (EJ) (Azungah, 2018; Hsieh & Shannon, 2005; Tracy, 2019).

An independent qualitative analyst (AC) reviewed a randomized 20% sample of data for coding agreement with the primary coder (Saldaña, 2021; Sousa, 2014). The primary coder (EJ) and qualitative analyst (AC) discussed and reconciled disagreement between the coding and review to reach consensus and improve rigor (Gruß & McMullen, 2019; Tracy, 2010). The review resulted in 84% coding agreement by the qualitative analyst with the primary coder. Final codes were compared between avoidance and non-avoidance coping participants' notes across emergent themes.

### Quantitative data analysis

All statistical analyses were carried out in SAS (version 9.4, Cary, NC). A two-sided alpha level of 0.05 was used to determine statistical significance. Descriptive statistics were computed to describe the study population and summarize PROs. Convergent validity in this sample between avoidance coping with FoR and two indices of avoidance coping (IES-R avoidance coping subscale score, IES-R total score) was examined. Fisher's exact tests were performed for nearly all of the contingency table analyses comparing BCS with (versus without) avoidance coping, due to small expected cell sizes; where cell sizes permitted, we used chi-square tests. We used independent samples t-tests to compare BCS with (versus without) avoidance coping with FoR on all continuous variables. A Satterthwaite correction was applied for t-tests comparing groups with unequal variances. Effect sizes (Cohen's *d* and *phi*) were computed for group differences that were statistically significant. To compare median alcohol consumption between two groups we used the Wilcoxon test. This analysis is based on PROs at baseline assessment.

### Results

Participant characteristics are summarized in Table 1. Overall, 19.4% (38/196) of BCS enrolled in the FoRtitude eHealth intervention endorsed avoidant coping with FoR "most of the time" or "all of the time" on the baseline assessment. BCS with avoidance coping were not significantly different from BCS without avoidance coping on all sociodemographic and medical variables ( $ps > .05$ ). While difference in employment status did not reach statistical significance (Fisher's exact test  $p = .052$ ), we note that disproportionately more BCS with avoidance coping were retired (23.7% versus 15.8%) or on disability or medical leave (10.5% versus 0.6%).

### Aim 1: avoidance coping and emotional and behavioral health

Table 2 summarizes emotional and behavioral health correlates of avoidance coping with FoR. BCS with avoidance coping had more severe post-traumatic anxiety-related symptoms [IES-R total  $t(45.68) = 3.77$ ,  $p < .01$ , Cohen's *d* pooled = 0.77, Cohen's *d* with each non-equivalent standard deviation = 0.64, 0.94], including higher levels of post-traumatic anxiety-related avoidance [IES-R avoidance subscale  $t(194) = 6.29$ ,  $p < .0001$ , Cohen's *d* = 1.14]. Compared to BCS without avoidance coping, BCS with avoidance coping were more likely to have post-traumatic anxiety-related symptoms reaching clinical thresholds (50% versus 24%,  $p = .0016$ ,  $\phi = 0.23$ ). However, they were no different with respect to generalized anxiety (PROMIS Anxiety,  $p = .19$ ) or depression (PROMIS Depression,  $p = .11$ ). With regard to global health, BCS with avoidance coping endorsed worse overall mental health [PROMIS Global Mental Health  $t(193) = 1.98$ ,  $p < .05$ , Cohen's *d* = 0.36], but there were no significant differences in physical health (PROMIS Global Physical Health,  $p = .12$ ). Avoidance coping was also not significantly associated with frequency of physical activity (either in minutes per week, as shown in Table 2, or as a dichotomy, fewer than versus at least 150 min per week, data not shown in table) or alcohol consumption (all  $ps > 0.05$ ), though for the latter variable, we note that avoiders were about twice as likely as non-avoiders to fall into the category of less than 1 drink per month (data not shown).

### Aim 2: avoidance coping and eHealth intervention engagement

Table 3 summarizes avoidance coping with FoR and quantitative engagement metrics with our eHealth FoR intervention (FoRtitude). At assessment 3 (8 weeks), 153 of the initial 196 participants remained in the study and provided intervention engagement data for the period of time between 4 and 8 weeks. Overall, BCS had similar levels of engagement in terms of accessing the website and number of text messages, website logins, and lessons accessed ( $ps > .05$ ). Notably, avoidance coping was neither associated with lower website usage nor lower attendance in telecoaching sessions ( $ps > .05$ ).

In total, 72 BCS provided comments during telecoaching sessions, and these were recorded by telecoaches into 307 recorded notes. The 14 BCS with avoidance coping provided 69 of 307 (22.5%) notes, ranging from 1 to 13 notes total per participant with a mean of 5 notes. Emergent themes included facilitators and barriers to FoRtitude engagement. The most salient themes included content relevancy, technology, and timing, which motivated or discouraged FoRtitude engagement for both avoidance

**Table 1** Participant characteristics of BCS with and without avoidance coping (N = 196)

Variable	BCS with avoidance coping (N = 38)	BCS without avoidance coping (N = 158)	Comparison
Age at screening (M,SD)	55.0 (9.5)	54.6 (9.9)	t(194)=0.21, p = .83
Age at diagnosis (M, SD)	52.3 (9.1)	51.6 (9.4)	t(193)=0.36, p = .72
Race/Ethnicity (N,%)			FTP = 0.007, p = .50
African American	1 (2.6)	5 (3.2)	
Asian	1 (2.6)	3 (1.9)	
Non-Hispanic White	32 (84.2)	142 (89.9)	
Hispanic/Latinx White	3 (7.9)	6 (3.8)	
Other/Missing	1 (2.6)	2 (1.3)	
Education (N,%)			FTP = <0.0001, p = .37
Some high school	0 (0)	1 (0.6)	
High school graduate	2 (5.3)	5 (3.2)	
Vocational/Technical school	4 (10.5)	11 (7.0)	
College graduate	8 (21.1)	63 (39.9)	
Graduate or professional school	12 (31.6)	41 (25.9)	
Other	0 (0)	2 (1.3)	
Missing	2 (5.3)	5 (3.2)	
Some college / Associate's	10 (26.3)	30 (19.0)	
Marital Status (N,%)			FTP = 0.0104, p = .86
Divorced	3 (7.9)	14 (8.9)	
Married / Partnered	32 (84.2)	121 (76.6)	
Separated	0 (0)	2 (1.3)	
Single	2 (5.3)	17 (10.8)	
Widowed	1 (2.6)	4 (2.5)	
Employment Status (N,%)			FTP = <0.0001, p = .052
Employed 32+ hours/week	23 (60.5)	100 (63.3)	
Unemployed	0 (0)	6 (3.8)	
Homemaker	2 (5.3)	16 (10.1)	
Retired	9 (23.7)	25 (15.8)	
Disabled/medical leave	4 (10.5)	1 (0.6)	
Student	0 (0)	3 (1.9)	
Other	0 (0)	2 (1.3)	
Missing	0 (0)	5 (3.2)	
Years Since Diagnosis (M,SD)	3.2 (1.9)	3.5 (3.2)	t(94.0)=0.75,p = .45
Years Since Treatment (M,SD)	2.7 (2.0)	2.8 (2.6)	t(188)=0.4, p = .69
Breast Cancer Stage (N,%)			FTP = 0.0026, p = .29
0/DCIS	1 (2.6)	4 (2.5)	
I	12 (31.6)	75 (47.5)	
II	19 (50.0)	59 (37.3)	
III	6 (15.8)	20 (12.7)	
Cancer Treatment (N,%)			X <sup>2</sup> (3)=5.2, p = .16
Surgery + Chemotherapy	9 (23.7)	28 (17.7)	
Surgery + RT	3 (7.9)	34 (21.5)	
Surgery + Chemotherapy + RT	23 (60.5)	76 (48.1)	
Surgery or Chemotherapy or Missing	3 (7.9)	20 (12.7)	
Targeted Therapy (N,%)			FTP = 0.02, p = .22
Received	25 (65.8)	123 (77.9)	
None	12 (31.6)	31 (19.6)	
Missing	1 (2.6)	4 (2.5)	
Hormonal Therapy (N,%)			FTP = 0.02, p = .65

**Table 1** (continued)

Variable	BCS with avoidance coping (N = 38)	BCS without avoidance coping (N = 158)	Comparison
No	7 (18.4)	31 (19.6)	
Current	29 (76.3)	108 (68.4)	
Past	2 (5.3)	18 (11.4)	
Missing	0 (0)	1 (0.6)	

FTP probability of observing table, from Fisher's exact test

**Table 2** Emotional and behavioral health correlates of avoidance coping (N = 196)

Variable	BCS with Avoidance Coping (N = 38), M(SD)	BCS without Avoidance Coping (N = 158), M(SD)	Comparison
IES-R Trauma-related symptom severity total	29.5 (18.8)	17.4 (12.9)	t(45.68) = 3.77, p = .0005
IES-R Trauma-related avoidance subscale	1.7 (0.8)	0.9 (0.7)	t(194) = 6.29, p < .0001
IES-R (clinically elevated $\geq 33$ ), n (%)	19 (50.0%)	38 (24.1%)	$\chi^2(1) = 10.00$ , p = .0016
PROMIS Anxiety	54.8 (10.7)	52.5 (9.2)	t(194) = 1.32, p = .19
PROMIS Depression	52.0 (10.7)	49.3 (9.0)	t(194) = 1.60, p = .11
PROMIS Global Mental Health	47.0 (9.8)	50.3 (9.0)	t(193) = 1.98, p = .0491
PROMIS Global Physical Health	48.6 (10.0)	51.0 (8.2)	t(192) = 1.56, p = .12
BRFSS Alcohol Use (median)	3–4x/month	3–4x/month	Wilcoxon Z = 1.37, p = 0.17
BRFSS Physical Activity (min per week)*	163.1 (142.6)	137.8 (95.5)	t(31.3) = 0.88, p = .39

M Mean, SD Standard Deviation, IES-R Impact of Event Scale, Revised, PROMIS Patient-Reported Outcomes Measurement Information System, BRFSS Behavioral Risk Factor Surveillance System

\*n = 27 for avoiders, 124 for non-avoiders

**Table 3** eHealth intervention engagement correlates of avoidance coping

Variable	BCS with avoidance coping (n = 30)	BCS without avoidance coping (n = 123)	Comparison
Website Index Score (range 1.67–40; n = 153)	26.1 (8.8)	23.4 (9.5)	t(151) = 1.41, p = .16
Tools Accessed (range 0–5)	1.9 (1.2)	1.8 (1.1)	t(151) = 0.74, p = .46
Text Messages (range 0–6)	1.1 (1.6)	0.6 (1.1)	t(35.8) = 1.62, p = .11
Website Logins (range 1–57)	11.0 (11.3)	9.4 (7.8)	t(36.1) = 0.75, p = .46
Lessons Accessed (range 0–9)	4.9 (1.8)	4.8 (2.2)	t(151) = 0.20, p = .84
Telecoaching Attendance* (range 0–5; n = 97)	2.7 (1.6)	2.7 (1.5)	t(95) = 0.21, p = .83

Website utilization index score sample size (n = 153) differs from the full sample size (N = 196) because it is based on BCS who completed the study

\*97 of the 153 had been randomized to telecoaching; there were 19 with avoidance coping and 78 without

and non-avoidance coping participants (Table 4). BCS with avoidance coping expressed overall higher satisfaction shown facilitators theme and reflecting participants motivation for engagement (68% compared to 62% without avoidance coping). This higher satisfaction was demonstrated in the intensity and positive valence in avoidance participants' notes (see Table 5 for exemplary notes). Notably, for BCS with avoidance coping, FoRtitude

engagement was motivated more by cognitive behavioral therapy (CBT) and health management content (HMC) content (51%) compared with BCS without avoidance coping (41%). When CBT tools were evaluated (Table 5), BCS with avoidance coping commented on the helpfulness of using CBT tools when thinking about cancer, preparing for surveillance medical visits, and interacting with health



**Table 4** Facilitators and barriers of eHealth engagement by avoidance coping (n = 72)

	Content			Total
	Relevancy	Technology	Timing	
<b>BCS with Avoidance Coping (n = 14)</b>				
Facilitators of engagement	35 (51%)	5 (7%)	7 (10%)	47 (68%)
Barriers to engagement	13 (19%)			22 (32%)
Total	48 (70%)			69 (100%)
<b>BCS without Avoidance Coping (n = 58)</b>				
Facilitators of engagement	98 (41%)	18 (8%)	32 (13.5%)	148 (62%)
Barriers to engagement	62 (26%)	20 (8%)	8 (3.5%)	90 (38%)
Total	160 (67%)	38 (16%)	40 (17%)	238 (100%)

Sample size (n = 72) includes BCS randomized to telecoaching and for whom analyzable session notes were provided. Facilitators were defined as factors that encouraged engagement. Barriers were defined as factors that discouraged engagement. Themes included Content Relevancy (i.e., information and tools within the intervention), Technology (i.e., interaction with and preference for technology), and Timing (i.e., availability of intervention materials in relation to need)

care professions (e.g., doctors and nurses) and insurance representatives (e.g., customer service employee).

## Discussion

This report sheds light on the role of avoidance coping among BCS who have completed cancer treatment and have elevated FoR. BCS who cope with FoR by avoidance were more likely to report severe post-traumatic anxiety symptoms and worse global mental health as compared to BCS without avoidance coping. The importance of avoidance coping in perpetuating FoR and exacerbating negative outcomes associated with FoR is supported by prevailing theoretical models of FoR (Lee-Jones et al., 1997; Leventhal et al., 1998) and resiliency through FoR management (Hall et al., 2022) but, prior to this study, there has been surprisingly little empirical investigation on FoR, avoidance coping, and intervention engagement. Collectively, this study is the first to characterize avoidance coping among BCS enrolled in an intervention targeting FoR and has several implications for the treatment of these prevalent fears in cancer survivors who cope by avoidance.

Our data suggest that prevalence of avoidance coping among BCS could be as high as 20%. Although modest, this prevalence represents a sizeable subgroup with disproportionately elevated levels of post-traumatic anxiety-related symptoms and poorer overall mental wellbeing. In fact, half of the BCS with avoidance coping in this sample also endorsed clinically elevated levels of posttraumatic stress. This finding supports prior literature linking cancer and chronic posttraumatic stress with maladaptive coping strategies (McGrath, 1999; Mehnert et al., 2009). By comparing BCS with avoidance coping versus those without, we learned that BCS with avoidance coping were comparable to BCS without avoidance coping with respect to sociodemographic

factors (i.e., age, race and ethnicity, education, marital status, and employment) as well as cancer history (i.e., cancer stage, treatment, and time since diagnosis and treatment). Although the differences in levels of anxiety and depression were not statistically significant between BCS with and without avoidance coping, these differences exceeded two T-score units, suggesting that BCS with avoidance coping might be slightly more depressed and anxious.

Contrary to hypotheses, BCS with avoidance coping were not more likely to engage in maladaptive health behaviors, such as alcohol use and sedentary physical activity. We interpret this finding cautiously given our small sample size of BCS with avoidance coping. In one study with 258 survivors of various cancers, FoR was associated with higher alcohol use and less physical activity, but also greater sunscreen use, suggesting the relationship(s) between FoR and health behaviors may be complex (Hall et al., 2019). In their systematic review of FoR and health behaviors, Reed et al. (2021) posit the need to identify mediators to explain why FoR may either promote or interfere with health-promoting behaviors. Whether avoidance coping influences this pathway warrants further investigation, as health behaviors can contribute to financial toxicity and mortality risk among cancer survivors (Tevaarwerk et al., 2013; Yousuf Zafar, 2016). Additionally, it is possible that avoidance coping can be adaptive in certain contexts, for instance if a perceived threat is imminent, probable, and severe. By avoiding topics or events that remind them about the possibility of recurrence, BCS may experience short-term relief from FoR; paradoxically, avoidance can result in fewer opportunities for BCS to hone skills for managing fear and worry when they arise.

BCS with avoidance coping demonstrated comparable levels of engagement with the FoRtitude eHealth site and telecoaching sessions relative to BCS with adaptive coping. Our measure of coping was tailored to the management of FoR. Given that the process of learning strategies to manage

**Table 5** Exemplary telecoaching session notes from BCS with avoidance coping

Participant	Themes	Exemplary Notes
160	Facilitators Content Relevancy (CBT & HMC) Technology Timing	This is helping her to be more aware of mental and emotional state. She had an annual cancer dermatology check last week and the intervention helped her to be more aware of physical symptoms and then use a tool. [...] Worry practice was a good strategy not needed right now but could see value in future. Nutrition was good and glad that it “debunked” some of the myths out there. Nice to have a reputable site that is easy to navigate. She went through cancer twice and didn’t know anything about it or how to cope with anxiety, so she wishes she had the site earlier
161	Facilitators Content Relevancy (HMC & General) Technology	Site is grounding her. It is nice being straightforward, no nonsense, and comes from experts. She likes having site with her, printing and reviewing it, which is why she is feeling so good. Last week, health content was really helpful because she felt relief knowing what she has been doing has been on the right path. The nutrition is really concise, which is what she likes best about the site. She can tell a lot of effort was put into the site and nothing feels is missing and everything is there in one place, instant gratification. Far exceeded my expectations and they were pretty high to start, so incredibly positive
179	Facilitators Barriers Content Relevancy (CBT & General) Technology	We walked through the site together and she said, “what a goldmine!” Worry practice was pretty intense, so probably better for when the worry level or news is more intense. The relaxing was great and helpful, especially with sleep at night and other worries. Really happy to have these tools and like that these are more internal whereas support group is more about others. Likes the videos with the doctor who smiles with her eyes, really nice. Wants to be able to re-read and re-use tools, especially worry practice now that she is having more worries. Very timely because she had a bone scan and found a lesion, she said, “I used SOS at least 8 times. It was so good and it prepared me.” TEC tools are great, writing own script, been through this before can go through this again. This as a support, so she will always have this on computer. It will be one of the sites to go to when needing help and feeling weight. The dialogue was reassuring and now wants to re-read all of it and SOS function. Would love 20 or more SOS messages, only got 2–3 different ones, found it really calming but lose impact when keep getting same one
180	Facilitators Content Relevancy (HMC)	She didn’t realize there was so much health and nutrition information, but it was interesting in a good way, especially the detailed explanations. It was good this week, really informative. She thinks more than anything else that the nutrition and eating right stuck with her the most. She likes how soy was addressed, liked putting the idea in her head and likes feeling that the nutrition might help the cancer from coming back
218	Facilitators Barriers Content Relevancy (CBT) Technology	She really likes the SOS function. She said the site is good, but would prefer more stress/coping related SOS than food related. She feels the site worked and got her to reach out to her doctor’s assistant when needing some support
224	Facilitators Content Relevancy (CBT) Technology	She really likes the relaxation exercises. She is doing the exercises pretty regularly, likes the breathing and muscle relaxation better than visualization. She got into the next part of content and liked the breathing but thinks retraining thoughts is what will really helped, important. At times, she used it this week, saying “it’s really helpful.” She likes the information about health and fatigue from medications and deep breathing and exercises. She finds self doing it even when on phone with insurance company before making the call. She is having trouble falling asleep at night, so breathing and PMR really helps to focus and get into a better frame of mind. The site is just so easy to use, and she plans on using the SOS feature next week when she has a doctor’s appointment. She is enjoying the site very much, so she is glad she participated in the research

*CBT* Cognitive Behavioral Therapy, *HMC* Health Management Content, *TEC* Telecoaching, *SOS* Feature to provide immediate reminders of strategies to cope with fear of recurrence, *PMR* Progressive Muscle Relaxation

FoR requires some focus on FoR, we were encouraged that BCS with avoidance coping were able to overcome their avoidance to utilize the FoRtitude intervention and interact with telecoaches. It is possible the remote and asynchronous nature of the FoRtitude eHealth site provided access to intervention content using a medium that was more palatable to BCS with avoidance coping. Our qualitative findings confirmed that BCS with avoidance coping reported benefit

from learning intervention content, including CBT techniques and health management content, and their FoRtitude engagement was motivated by relevance of the FoRtitude content to managing FoR and associated distress. eHealth interventions targeting FoR among BCS with elevated FoR may offer a viable strategy to engage BCS with avoidance coping who are vulnerable to poorer outcomes.



eHealth interventions are well-suited to engage BCS who may be reluctant to utilize traditional mental healthcare due to triggers of anxiety (e.g., cancer center, medical facility). eHealth may help avoidant BCS stay engaged in behavioral interventions that focus on treating cancer-related sequelae, including FoR and health risk behaviors that might increase the risk for poor clinical outcomes (e.g., alcohol use, physical activity) (Mowls et al., 2016). Engagement is especially important given the practice of “exposure therapy” common to most CBT interventions for FoR that teach patients to practice tolerating—rather than avoiding—waves of anxiety in response to stressful stimuli (Moorey & Greer, 2002). eHealth platforms also offer an opportunity to target avoidance coping by tailoring CBT skills based on survivors’ coping style. For instance, cancer survivors with avoidance coping could be taught strategies to “avoid avoiding” or engage in “opposite action” when noticing an urge to socially isolate, suppress their fears, or not adhere to recommended medical surveillance. Cognitive techniques could also target maladaptive beliefs underlying avoidance (e.g., “thinking about my cancer might make it recur” or “I can’t cope with anxiety, so I’ll avoid thinking about cancer altogether”). Moreover, eHealth FoR interventions that incorporate synchronous sessions could offer real-time tailoring of skills to address avoidance coping (Hall et al., 2022). In non-cancer populations, avoidance coping has been associated with lower utilization of potentially life-saving healthcare (Wolf & Mori, 2009), including mental health services (Adams et al., 2018). Our findings overall point to eHealth approaches as a promising, scalable strategy to engage BCS at elevated risk of receiving inadequate survivorship care due to avoidance of health care and who are thus at elevated risk of poor long-term outcomes.

This study had several limitations worth noting. Avoidance coping was assessed with a single item from the validated FCRI scale at baseline. Although we examined convergent validity with IES-R avoidance coping subscale scores and IES-R total scores, using a single item precluded our ability to assess internal reliability for this item. Our comparisons of sociodemographic factors by avoidance coping used cross-sectional data, and longitudinal assessments are needed to determine directionality (e.g., between employment and avoidance coping). The use of telecoaching session notes to obtain qualitative insights into participants’ facilitators and barriers to FoRtitude engagement was limited by the nature of session notes, which were documented by the telecoaches, thus were not obtained from participants firsthand. Future research aimed at tailoring eHealth FoR interventions to avoidant coping BCS would benefit from utilizing different qualitative methods that elicit needs and attitudes in participants’ own words. Finally, we recognize that although BCS with avoidance coping were willing to enroll in the parent trial, it is possible that some BCS with

high levels of avoidance may have avoided learning about the study or enrolling (Simard & Savard, 2015). Prospective observational studies may be needed to evaluate avoidance coping among cancer survivors who are not willing to engage in clinical trials.

In summary, we identified avoidance coping in approximately one-fifth of BCS enrolled in a large, eHealth intervention targeting FoR. Although BCS with avoidance coping had more severe posttraumatic stress symptoms and poorer mental health, they engaged in the eHealth intervention at similar levels. Findings from this report suggest that eHealth delivery is a promising modality for engaging survivors with avoidance coping in FoR interventions.

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**Data availability** Requests for data that support the findings of this study may be directed to the corresponding author.

**Declarations**

**Conflict of interest** David C. Mohr, Ph.D. has accepted honoraria and consulting fees from Apple, Inc., Otsuka Pharmaceuticals, Pear Therapeutics, and the One Mind Foundation, and has an ownership interest in Adaptive Health, Inc. Frank Penedo, Ph.D. is a paid consultant for Blue Note Therapeutics. All other authors have confirmed no conflicts of interest.

**Consent to participate** Informed consent was obtained from all individual participants included in the study.

**Human and animal rights and informed consent** All human study activities have been approved by the appropriate ethics committee and were performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments.

**Consent for publication** Patients signed informed consent regarding publishing their data.

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