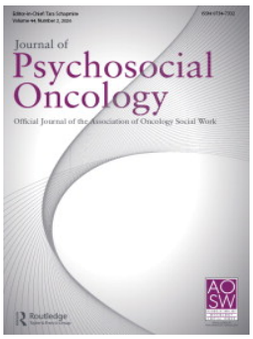

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Journal of Psychosocial Oncology

ISSN: 0734-7332 (Print) 1540-7586 (Online) Journal homepage: www.tandfonline.com/journals/wjpo20

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**To cite this article:** Han-Wei V. Wu, Kevin C. Oeffinger, Joanne F. Chou, Tara O. Henderson, Melissa M. Hudson, Lisa R. Diller, Aaron J. McDonald, James Ford, Nidha Z. Mubdi, Dayton Rinehart, Christopher Vukadinovich, Elena B. Elkin, Wendy M. Leisenring, Gregory T. Armstrong, Jennifer S. Ford & Chaya S. Moskowitz (19 Nov 2025): Assessing delivery of and attitudes toward a randomized intervention to increase mammography uptake among childhood cancer survivors: A report from the Childhood Cancer Survivor Study, Journal of Psychosocial Oncology, DOI: 10.1080/07347332.2025.2586559

**To link to this article:** https://doi.org/10.1080/07347332.2025.2586559

JOURNAL OF PSYCHOSOCIAL ONCOLOGY
https://doi.org/10.1080/07347332.2025.2586559

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BRIEF REPORT



# Assessing delivery of and attitudes toward a randomized intervention to increase mammography uptake among childhood cancer survivors: A report from the Childhood Cancer Survivor Study

Han-Wei V. Wu, MD, MBA, MPH[a], Kevin C. Oeffinger, MD[b], Joanne F. Chou, MPH[c], Tara O. Henderson, MD, MPH[d], Melissa M. Hudson, MD[e], Lisa R. Diller, MD[f], Aaron J. McDonald, PhD[g], James Ford, PhD[g], Nidha Z. Mubdi, MPH[h], Dayton Rinehart, MBA[g], Christopher Vukadinovich, MS[g], Elena B. Elkin, PhD[i], Wendy M. Leisenring, ScD[j], Gregory T. Armstrong, MD, MSCE[g], Jennifer S. Ford, PhD[k#] and Chaya S. Moskowitz, PhD[c#]

[a]Department of Pediatrics, Memorial Sloan Kettering Cancer Center, New York, NY, USA; [b]Department of Medicine, Duke University School of Medicine and Duke Cancer Institute, Durham, NC, USA; [c]Department of Epidemiology and Biostatistics, Memorial Sloan Kettering Cancer Center, New York, NY, USA; [d]Department of Pediatrics, Ann & Robert H. Lurie Children's Hospital, Chicago, IL, USA; [e]Cancer Survivorship Division, Department of Oncology, St. Jude Children's Research Hospital, Memphis, TN, USA; [f]Department of Pediatric Oncology, Dana-Farber Cancer Institute, Boston, MA, USA; [g]Department of Epidemiology and Cancer Control, St. Jude Children's Research Hospital, Memphis, TN, USA; [h]Research Service Centers, Memorial Sloan Kettering Cancer Center, New York, NY, USA; [i]Department of Health Policy and Management, Columbia University Mailman School of Public Health, New York, NY, USA; [j]Clinical Research Division, Fred Hutchinson Cancer Center, Seattle, WA, USA; [k]Department of Psychology, Hunter College and The Graduate Center, City University of New York, New York, NY, USA

## ABSTRACT

**Objective:** This study characterizes utilization of, and attitudes toward, a two-part intervention of (1) mailed materials, including educational laminated cards for patients and healthcare providers, and (2) telephone counseling, that aimed to increase screening mammography uptake among adult female survivors of childhood cancer compared to attention controls.

**Methods:** Participants ($n=136$, median age 35 years, range 25–49 years) were diagnosed with cancer between 1976 and 1999 before age 21 years and had been treated with chest radiation. At study end, participants completed a questionnaire asking about their use of and attitudes toward the intervention components. Fisher's exact tests assessed associations.

**Results:** Among 130 survivors who completed the survey, 45 (35%) received a mammogram. Eighty-five (65%) survivors recalled receiving both intervention components; about half ($n=73$, 56%) found the laminated cards helpful and/or described the telephone counseling as positive or activating ($n=81$, 62%). Of the 96 women who provided responses, approximately two-thirds ($n=64$, 67%) reported little to no fear/anxiety regarding the intervention. Women were more likely to obtain a mammogram if they remembered receiving

**KEYWORDS**
Survivorship; intervention fidelity; childhood cancer survivors; breast cancer screening; mammography uptake; health behavior intervention

**CONTACT** Chaya S. Moskowitz, PhD moskowc1@mskcc.org Department of Epidemiology and Biostatistics, Memorial Sloan Kettering Cancer Center, 633 3rd Avenue, 3rd Floor, New York, NY10017, USA.
[#]Co-senior authors.

both intervention components compared to women who reported receiving one or no components (45% vs. 24%, $p=0.050$), reported using the laminated card to discuss screening with a healthcare provider (72% vs. 51%, $p=0.086$), or found the telephone counseling motivational (61% vs. 30%, $p=0.003$).
**Conclusions:** In summary, the two-part intervention was well-received and elicited minimal fear/anxiety. Receiving intervention messaging in multiple forms and sharing it with a healthcare provider was associated with intervention efficacy.

## Background

Adult female survivors of childhood cancer treated with chest radiotherapy have a high risk of breast cancer, with cumulative incidence by age 50 estimated to be near 30%.[1,2] Despite multiple guidelines[3–5] recommending regular breast cancer screening for this population, previous studies have found that as high as approximately 70% of this population are nonadherent to these recommendations.[6–9] Reasons for this nonadherence are multifactorial and include care transition difficulties, limited provider awareness of high-risk screening guidelines, and financial and logistical barriers, all potentially compounded by psychosocial factors such as fear of results or competing health priorities.[7,8,10–14] The EMPOWER study (ClinicalTrials.gov identifier: NCT01579552) was a randomized clinical trial designed to evaluate an intervention aimed at increasing screening mammography uptake among these high-risk women.[10]

Guided by the Health Belief[15–17] and Transtheoretical Models,[18–22] the intervention consisted of mailed educational materials followed by a telephone-delivered, brief motivational interview. The intervention significantly increased mammography uptake relative to the attention control arm (33.1% vs. 17.6%). Nevertheless, the proportion of survivors who received the intervention and obtained a mammogram within 12 months, the trial's primary outcome, remained less than 40%.[10] While major barriers identified were imaging costs, lack of physician recommendation, survivors' deferred actions, and symptom absence,[10] the intervention's delivery, utilization, and acceptance have not previously been reported and may help explain this less than ideal rate. Evaluating participants' experiences following a randomized multi-component intervention may help better understand which elements modify participants' behavior and how to translate an evidence-based intervention into clinical practice. This analysis evaluated the 130 of 136 participants in the EMPOWER study's intervention arm who completed a post-intervention survey to characterize utilization of, and attitudes toward, the delivered intervention, and associations with completing a mammogram.

## Methods

### Participants

EMPOWER was nested within the Childhood Cancer Survivor Study (CCSS), a multi-institution retrospective cohort with longitudinal follow-up of five-year survivors of childhood cancer diagnosed before age 21 years between 1970 and 1999 at one of 31 institutions in North America.[23,24] Female participants in CCSS who were recommended to obtain an annual mammogram and breast magnetic resonance imaging (MRI) per Children's Oncology Group guidelines[25] and met the following eligibility criteria were enrolled in EMPOWER from October 2010 through April 2014: (1) treated with chest radiotherapy (20 Gy or greater), (2) at least 8 years from chest radiation, (3) age 25–50 years at enrollment, (4) English-speaking, (5) no history of breast cancer or myocardial infarction, and (6) no mammogram or breast imaging in the previous 24 months.[4,10] Institutional review board and informed consent were obtained.

### Components of intervention

Shown in Figure 1, the intervention had two components.[10] The mailed materials (see Supplement in Oeffinger et al.[10]) included two laminated cards highlighting breast cancer screening recommendations (one for the participant; one to share with her healthcare provider). The materials also included a one-page "Potential Benefits and Other Considerations of Breast

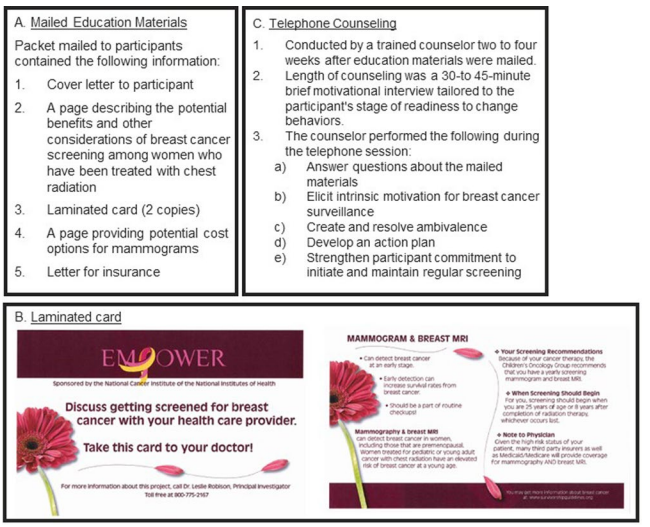


**Figure 1.** (A) Mailed education materials in packet sent to participants in the intervention arm, (B) picture of laminated card included in mailed packet-one copy for the participant to keep and another copy to be given to their healthcare provider, (C) telephone counseling description and the counselor's discussion points.

Screening," a templated letter for breast MRI pre-authorization, and sources of low-cost imaging. The telephone motivational interview was based on the Transtheoretical Model.[19,20]

### *EMPOWER study outcome and questionnaire*

EMPOWER's primary outcome was self-reported completion of a mammogram by 12 months after randomization. At follow-up, participants were asked to complete a questionnaire that elicited breast cancer screening uptake, descriptive data on physician visits, and receipt of intervention components. Participants could provide open-ended responses and ratings using a five-point Likert scale to questions focused on attitudes toward intervention components.

## Analysis

Qualitative analyses used content analysis with an inductive, data-driven approach.[26,27] Open-ended responses were coded by three research team members (H.V.W., J.S.F, C.S.M.) to establish uniformity in coding.[28] The coded data were categorized for summary and an examination of frequency. Associations between questionnaire responses and mammogram completion by 12 months were evaluated using one-sided Fisher's exact tests with $p \leq 0.05$. All statistical analyses were performed using StataSE 18.0 for Windows (STATA, College Station, TX; Computing Resource Center, Santa Monica, CA).

## Results

Among the 130 women who completed the 12-month questionnaire, 15% were a racial/ethnic minority, 71% were diagnosed with a childhood cancer between 10 and 20 years old, and Hodgkin lymphoma (65%) was the most common cancer. At trial enrollment, 75% were between 25 and 39 years old and 25% were between 40 and 50 years old. Most (85%) reported having health insurance or were a Canadian resident. Telephone counseling was successfully delivered to 107 participants. Of the 130 women, 45 (35%) reported obtaining a mammogram (Table 1).

### *Interventions received by participants*

Of the 130 questionnaire respondents, 101 (78%) reported receiving the mailed education materials, 96 (74%) said they received the telephone counseling, with 85 (65%) receiving both intervention components. Women were more likely to obtain a mammogram if they reported receiving both

**Table 1.** Demographic characteristics of women in the EMPOWER randomized controlled trial who received the intervention arm and completed the survey.

| Age at time of childhood cancer diagnosis | Count ($n = 130$) | |
|---|---|---|
| 0–9 years old | 38 | 29.2% |
| 10–20 years old | 92 | 70.8% |
| **Age at assessment and intervention** | | |
| 25–39 years old | 97 | 74.6% |
| 40–50 years old | 33 | 25.4% |
| **Race and Ethnicity** | | |
| White, non-Hispanic | 111 | 85.4% |
| Other | 19 | 14.6% |
| Black/African American | 5 | 3.8% |
| Hispanic | 11 | 8.5% |
| Asian, Pacific Islander, or Native American | 3 | 2.3% |
| **Diagnosis** | | |
| Leukemia | 4 | 3.1% |
| Hodgkin lymphoma | 85 | 65.4% |
| Non-Hodgkin lymphoma | 9 | 6.9% |
| Kidney (Wilms) | 6 | 4.6% |
| Neuroblastoma | 11 | 8.5% |
| Soft tissue sarcoma | 5 | 3.8% |
| Bone cancer | 10 | 7.7% |
| **Insurance status** | | |
| Have insurance or a Canadian resident | 110 | 84.6% |
| No insurance | 19 | 14.6% |
| Unknown | 1 | 0.8% |

intervention components compared to women who reported receiving one or no components (45% vs. 24%, $p = 0.050$).

### *Attitudes to the laminated card component of the intervention*

Ninety-five participants (73%) indicated they read the laminated card (Table 2). Sixty-nine women (53%) reported the card made them want to find out more about their risks as long-term survivors. Fifty-seven (44%) reported the information was new. Attitudes were primarily positive; more than half (56%) reported it was "helpful." Of the 96 women who responded to the question inquiring whether the card caused fear/anxiety, approximately two-thirds endorsed little to no fear/anxiety. However, among those who reported feelings of fear/anxiety, mammogram completion was high (66%). Forty-one women provided written responses of their reactions. Of these, 34 reported an activating response: made me more vigilant (15), felt anxious/fearful (11), and made me more informed (8). Women were more likely to have obtained a mammogram when they indicated the card made them want to find out more information about their health risks compared to women who reported it did not (49% vs. 29%, $p = 0.049$).

### *Healthcare provider interactions*

Twenty-five women reported using the laminated card in discussions with their healthcare provider (Table 2). Among them, the majority (85%) noted

**Table 2.** Attitudes and responses of women to components of the EMPOWER intervention overall and among survivors who did and did not complete mammography screening.

| | Total[a] | Completed mammogram[b] | | | | |
|---|---|---|---|---|---|---|
| | *N* | No | | Yes | | *p* |
| Number of participants who responded to survey | 130 | 85 | (65.4%) | 45 | (34.6%) | |
| **Interventions received (self-reported)** | | | | | | |
| Both components | 85 | 47 | (55.3%) | 38 | (44.7%) | 0.050 |
| One or none | 25 | 19 | (76.0%) | 6 | (24.0%) | |
| **Laminated card** | | | | | | |
| Received packet, including laminated card | 101 | 60 | (59.4%) | 41 | (40.6%) | |
| Read the card | | | | | | |
| Yes | 95 | 54 | (56.8%) | 41 | (43.2%) | 0.201 |
| No | 6 | 5 | (83.3%) | 1 | (16.7%) | |
| Reason why card was not read | | | | | | |
| I already discussed with my doctor | 1 | 1 | (100%) | 0 | (0.0%) | 0.857 |
| I did not receive it/I do not remember | 6 | 5 | (83.3%) | 1 | (16.7%) | |
| Information on card was new | | | | | | |
| Yes, new information to me | 57 | 28 | (49.1%) | 29 | (50.9%) | 0.049 |
| No | 38 | 26 | (68.4%) | 12 | (31.6%) | |
| Feelings toward information on the card | | | | | | |
| Helpful | 73 | 37 | (50.7%) | 36 | (49.3%) | 0.293 |
| Unhelpful or elicited a negative emotion | 9 | 6 | (66.7%) | 3 | (33.3%) | |
| Card caused feelings of anxiety and fear | | | | | | |
| Yes | 32 | 11 | (34.4%) | 21 | (65.6%) | 0.002 |
| No | 64 | 43 | (67.2%) | 21 | (32.8%) | |
| Response to the card | | | | | | |
| Activating response | 34 | 17 | (50.0%) | 17 | (50.0%) | 0.222 |
| Feel anxious or fearful | 11 | 6 | (54.5%) | 5 | (45.5%) | |
| Made me more vigilant | 15 | 6 | (40.0%) | 9 | (60.0%) | |
| Made me more informed | 8 | 5 | (62.5%) | 3 | (37.5%) | |
| Non-activating response | 5 | 4 | (80.0%) | 1 | (20.0%) | |
| Card made you want to find out more information | | | | | | |
| Yes | 69 | 35 | (50.7%) | 34 | (49.3%) | 0.049 |
| No | 28 | 20 | (71.4%) | 8 | (28.6%) | |
| Desire to get more information about health risks | | | | | | |
| Yes, more information | 7 | 5 | (71.4%) | 2 | (28.6%) | 0.462 |
| No | 17 | 14 | (82.4%) | 3 | (17.6%) | |
| **Healthcare provider interactions** | | | | | | |
| Saw a healthcare provider | 81 | 44 | (54.3%) | 37 | (45.7%) | |
| Saw a primary care provider/ internist | | | | | | |
| Yes | 58 | 32 | (55.2%) | 26 | (44.8%) | 0.256 |
| No | 44 | 28 | (63.6%) | 16 | (36.4%) | |
| Saw an obstetrician/gynecologist | | | | | | |
| Yes | 35 | 16 | (45.7%) | 19 | (54.3%) | 0.042 |
| No | 67 | 44 | (65.7%) | 23 | (34.3%) | |
| Saw an oncologist | | | | | | |
| Yes | 14 | 7 | (50.0%) | 7 | (50.0%) | 0.330 |
| No | 88 | 53 | (60.2%) | 35 | (39.8%) | |
| Saw a provider in another field (i.e. dermatologist, endocrinologist, etc.) | | | | | | |
| Yes | 29 | 13 | (44.8%) | 16 | (55.2%) | 0.057 |
| No | 73 | 47 | (64.4%) | 26 | (35.6%) | |

(*Continued*)

**Table 2.** Continued.

| | Total[a] | Completed mammogram[b] | | | | |
|---|---|---|---|---|---|---|
| | *N* | No | | Yes | | *p* |
| Used card to discuss breast cancer screening | | | | | | |
| Yes | 25 | 7 | (28.0%) | 18 | (72.0%) | 0.086 |
| No | 37 | 18 | (48.6%) | 19 | (51.4%) | |
| Response of healthcare provider to card | | | | | | |
| Showed interest | 23 | 5 | (21.7%) | 18 | (78.3%) | 0.269 |
| No interest | 4 | 2 | (50.0%) | 2 | (50.0%) | |
| Reasons card was not used to discuss screening | | | | | | |
| Information was already discussed | 11 | 4 | (36.4%) | 7 | (63.6%) | 0.352 |
| Did not have card | 24 | 12 | (50.0%) | 12 | (50.0%) | |
| Physician recommended a mammogram | | | | | | |
| Yes | 42 | 20 | (47.6%) | 22 | (52.4%) | 0.033 |
| No | 70 | 47 | (67.1%) | 23 | (32.9%) | |
| **Telephone counseling session** | | | | | | |
| Received session | 107 | 65 | (60.7%) | 42 | (39.3%) | |
| Remembered session | | | | | | |
| Yes | 96 | 55 | (57.3%) | 41 | (42.7%) | 0.110 |
| No | 17 | 13 | (76.5%) | 4 | (23.5%) | |
| Feelings toward overall conversation | | | | | | |
| Positive | 81 | 45 | (55.6%) | 36 | (44.4%) | 0.227 |
| Negative/do not remember | 11 | 8 | (72.7%) | 3 | (27.3%) | |
| Thoughts about the counselor | | | | | | |
| Positive experience | 82 | 45 | (54.9%) | 37 | (45.1%) | 0.169 |
| Negative experience/do not remember | 9 | 7 | (77.8%) | 2 | (22.2%) | |
| Feelings toward discussion content | | | | | | |
| Positive or activating feeling | 63 | 33 | (52.4%) | 30 | (47.6%) | 0.265 |
| Negative feeling/do not remember | 17 | 11 | (64.7%) | 6 | (35.3%) | |
| Counselor was knowledgeable about packet* | | | | | | |
| Yes | 90 | 51 | (56.7%) | 39 | (43.3%) | 0.605 |
| No/not really | 3 | 2 | (66.7%) | 1 | (33.3%) | |
| Felt comfortable with the counselor* | | | | | | |
| Yes | 77 | 44 | (57.1%) | 33 | (42.9%) | 0.479 |
| No/not really | 17 | 9 | (52.9%) | 8 | (47.1%) | |
| Discussion changed thoughts about mammography* | | | | | | |
| Changed | 62 | 35 | (56.5%) | 27 | (43.5%) | 0.531 |
| No/not really | 31 | 18 | (58.1%) | 13 | (41.9%) | |
| Discussion motivated me to get a mammogram* | | | | | | |
| Yes | 41 | 16 | (39.0%) | 25 | (61.0%) | 0.003 |
| No/not really | 53 | 37 | (69.8%) | 16 | (30.2%) | |
| Discussion made me fearful of getting breast cancer* | | | | | | |
| Yes | 13 | 8 | (61.5%) | 5 | (38.5%) | 0.463 |
| No/not really | 81 | 45 | (55.6%) | 36 | (44.4%) | |
| Discussion helped me create plan for screening* | | | | | | |
| Yes | 31 | 12 | (38.7%) | 19 | (61.3%) | 0.016 |
| No/not really | 62 | 40 | (64.5%) | 22 | (35.5%) | |
| Counselor was not helpful** | | | | | | |
| Helpful | 91 | 50 | (54.9%) | 41 | (45.1%) | 0.175 |
| Not helpful | 3 | 3 | (100%) | 0 | (0%) | |

(*Continued*)

**Table 2.** Continued.

| | Total[a] | Completed mammogram[b] | | | | |
|---|---|---|---|---|---|---|
| | *N* | No | | Yes | | *p* |
| Counselor was personable* | | | | | | |
| Yes | 80 | 42 | (52.5%) | 38 | (47.5%) | 0.061 |
| No/not really | 14 | 11 | (78.6%) | 3 | (21.4%) | |
| Counselor was easy to talk to* | | | | | | |
| Yes | 83 | 46 | (55.4%) | 37 | (44.6%) | 0.428 |
| No/not really | 11 | 7 | (63.6%) | 4 | (36.4%) | |
| Counselor had a positive attitude* | | | | | | |
| Yes | 88 | 48 | (54.5%) | 40 | (45.5%) | 0.173 |
| No/not really | 6 | 5 | (83.3%) | 1 | (16.7%) | |
| Counselor was trying to help me* | | | | | | |
| Yes | 85 | 46 | (54.1%) | 39 | (45.9%) | 0.157 |
| No/not really | 9 | 7 | (77.8%) | 2 | (22.2%) | |
| Counselor made me upset* | | | | | | |
| Yes | 3 | 3 | (100%) | 0 | (0%) | 0.175 |
| Not/not really | 91 | 50 | (54.9%) | 41 | (45.1%) | |
| Understood what counselor was saying* | | | | | | |
| Yes | 88 | 49 | (55.7%) | 39 | (44.3%) | 0.468 |
| No/not really | 6 | 4 | (66.7%) | 2 | (33.3%) | |
| Trust the counselor* | | | | | | |
| Yes | 67 | 37 | (55.2%) | 30 | (44.8%) | 0.451 |
| No/not really | 27 | 16 | (59.3%) | 11 | (40.7%) | |

[a]Numbers do not sum to total due to missing/unknown responses. [b]Percentages in parentheses represent row percentages. *Attitudes were elicited *via* a Likert scale (1 = Not at all, 2= A little bit, 3 = Moderately, 4 = Quite a bit, 5 = Extremely). Responses of "1 = Not at all" or "2 = A little bit" were grouped as "No/not really." Responses of "3 = Moderately," "4 = Quite a bit," or "5 = Extremely" were grouped as an agreement response ("Yes" or "Changed"). **This attitude's Likert scale responses were grouped as the following due to being a negatively worded survey item: "Helpful" (1 = Not at all or 2 = A little bit) and "Not helpful" (3 = Moderately, 4 = Quite a bit, or 5 = Extremely).

their provider "showed interest." Thirty-five women explained why they did not use the card with their provider: 24 participants' responses suggested they did not bring it to their appointment, the remainder indicated the information had already been discussed. While not statistically significant, women were more likely to obtain a mammogram if they reported using the card to discuss screening with a provider compared to women who did not (72% vs. 51%, $p = 0.086$). The proportions were similar across provider types: among participants who visited a primary care provider, 45% obtained a mammogram, an obstetrician/gynecologist, 54%, , and anoncologist, 50%. Notably, only forty-two (32%) women reported that their provider recommended a screening mammography, despite all women being at risk and eligible for mammography based on current guidelines (Table 3). Women were more likely to obtain a mammogram if their provider recommended a screening mammography compared to women whose provider did not (52% vs. 33%, $p = 0.033$).

### *Attitudes toward telephone counseling*

Ninety-six (74%) participants reported remembering their telephone counseling session (Table 2). Reactions were primarily favorable: 62% had

positive feelings toward the overall conversation, 63% reported positive counselor experiences, and 48% described discussion content as positive. Most participants described favorable traits for the counselor: knowledgeable (69%), had a positive attitude (68%), and did not make me upset (70%). Of the 94 women who responded to the question about whether counseling made them fearful of getting breast cancer, 62% reported it did not. Women were more likely to obtain a mammogram if they found the counseling motivational compared to women who did not (61% vs. 30%, $p = 0.003$), and if it helped them create a screening plan compared to women who reported it did not (61% vs. 36%, $p = 0.016$).

## Discussion

Our study provided insights to childhood cancer survivors' reception of, and attitudes toward, a multi-component intervention designed to increase cancer screening uptake. Women were more likely to obtain a mammogram if they reported receiving both intervention components, indicated materials made them want to find out more information about health risks, found telephone counseling motivational, and/or reported the counseling helped create a screening plan. The intervention did not appear to be associated with increased anxiety/fear among most participants. From participants' perspectives, healthcare provider feedback about the laminated card was positive. Participants' positive experiences combined with lack of worry/fear elicited suggests intervention components motivated participants to pursue recommended screening.

These results align with previous studies[29–31] demonstrating the effectiveness of multi-component/combination interventions in increasing cancer screening, such as Bloom et al.'s RCT[29] where an informative letter followed by telephone counseling increased mammography screening in Hodgkin lymphoma survivors who had received chest radiotherapy. Unique to our study is including two identical laminated cards highlighting screening recommendations in the mailed materials; participants were encouraged to bring the additional card to their healthcare provider for discussion. We found that provider-participant interactions due to the laminated card was an important component to promoting health behavior.

Our findings emphasize the critical role of healthcare provider interactions in influencing mammography uptake. Previous studies have shown the positive influence of healthcare provider communication on promoting healthy behavioral changes,[32,33] such as smoking cessation and endorsing breast cancer screenings.[7,34,35] Here, women were more likely to obtain a mammogram if they reported using the laminated card to discuss screening with a provider or if their provider recommended a screening mammogram. These findings emphasize the positive priming effect healthcare

**Table 3.** Attitudes and responses of women to components of the EMPOWER intervention overall among participants for whom a healthcare provider recommended a mammogram and among survivors who did and did not complete mammography screening.

| | Total[c] | Completed mammogram[d] | | | | |
|---|---|---|---|---|---|---|
| | | No | | Yes | | *P* |
| | 42 | 20 | (47.6%) | 22 | (52.4%) | |
| **Interventions received (self-reported)** | | | | | | |
| Both components | 32 | 15 | (46.9%) | 17 | (53.1%) | 0.466 |
| One or none | 9 | 5 | (55.6%) | 4 | (44.4%) | |
| **Laminated card** | | | | | | |
| Received packet, including laminated card | 37 | 18 | (48.6%) | 19 | (51.4%) | |
| Read the card | | | | | | |
| Yes | 36 | 16 | (44.4%) | 20 | (55.6%) | 0.218 |
| No | 2 | 2 | (100%) | 0 | (0.0%) | |
| Reason why card was not read | | | | | | |
| I already discussed with my doctor | 0 | 0 | (0.0%) | 0 | (0.0%) | – |
| I did not receive it/I do not remember | 2 | 2 | (100%) | 0 | (0.0%) | |
| Information on card was new | | | | | | |
| Yes, new information to me | 23 | 11 | (47.8%) | 12 | (52.2%) | 0.519 |
| No | 14 | 6 | (42.9%) | 8 | (57.1%) | |
| Feelings toward information on the card | | | | | | |
| Helpful | 26 | 10 | (38.5%) | 16 | (61.5%) | 0.321 |
| Unhelpful or elicited a negative emotion | 7 | 4 | (57.1%) | 3 | (42.9%) | |
| Card caused feelings of anxiety and fear | | | | | | |
| Yes | 17 | 7 | (41.2%) | 10 | (58.8%) | 0.419 |
| No | 20 | 10 | (50.0%) | 10 | (50.0%) | |
| Response to the card | | | | | | |
| Activating response | 16 | 10 | (62.5%) | 6 | (37.5%) | 0.548 |
| Feel anxious or fearful | 6 | 4 | (66.7%) | 2 | (33.3%) | |
| Made me more vigilant | 8 | 4 | (50.0%) | 4 | (50.0%) | |
| Made me more informed | 2 | 2 | (100%) | 0 | (0.0%) | |
| Non-activating response | 4 | 3 | (75.0%) | 1 | (25.0%) | |
| Card made you want to find out more information | | | | | | |
| Yes | 25 | 10 | (40.0%) | 15 | (60.0%) | 0.243 |
| No | 12 | 7 | (58.3%) | 5 | (41.7%) | |
| Desire to get more information about health risks | | | | | | |
| Yes, more information | 6 | 4 | (66.7%) | 2 | (33.3%) | 0.548 |
| No | 4 | 2 | (50.0%) | 2 | (50.0%) | |
| **Healthcare provider interactions** | | | | | | |
| Saw a healthcare provider | 33 | 15 | (45.5%) | 18 | (54.5%) | |
| Saw a primary care provider/internist | | | | | | |
| Yes | 24 | 12 | (50.0%) | 12 | (50.0%) | 0.465 |
| No | 14 | 6 | (42.9%) | 8 | (57.1%) | |
| Saw an obstetrician/gynecologist | | | | | | |
| Yes | 12 | 2 | (16.7%) | 10 | (83.3%) | 0.012 |
| No | 26 | 16 | (61.5%) | 10 | (38.5%) | |
| Saw an oncologist | | | | | | |
| Yes | 7 | 2 | (28.6%) | 5 | (71.4%) | 0.249 |
| No | 31 | 16 | (51.6%) | 15 | (48.4%) | |
| Saw a provider in another field (i.e. dermatologist, endocrinologist, etc.) | | | | | | |
| Yes | 17 | 6 | (35.3%) | 11 | (64.7%) | 0.155 |
| No | 21 | 12 | (57.1%) | 9 | (42.9%) | |
| Used card to discussing breast cancer screening | | | | | | |
| Yes | 10 | 4 | (40.0%) | 6 | (60.0%) | 0.597 |
| No | 21 | 9 | (42.9%) | 12 | (57.1%) | |
| Response of healthcare provider to card | | | | | | |
| Showed interest | 9 | 3 | (33.3%) | 6 | (66.7%) | 0.745 |
| No interest | 3 | 1 | (33.3%) | 2 | (66.7%) | |

(*Continued*)

**Table 3.** Continued.

| | Total[c] | Completed mammogram[d] | | | | |
|---|---|---|---|---|---|---|
| | | No | | Yes | | *P* |
| | 42 | 20 | (47.6%) | 22 | (52.4%) | |
| Reasons card was not used to discuss screening | | | | | | |
| Information was already discussed | 6 | 1 | (16.7%) | 5 | (83.3%) | 0.148 |
| Did not have card | 15 | 8 | (53.3%) | 7 | (46.7%) | |
| **Telephone counseling session** | | | | | | |
| Received session | 40 | 20 | (50.0%) | 20 | (50.0%) | |
| Remembered session | | | | | | |
| Yes | 35 | 17 | (48.6%) | 18 | (51.4%) | 0.556 |
| No | 7 | 3 | (42.9%) | 4 | (57.1%) | |
| Feelings toward overall conversation | | | | | | |
| Positive | 30 | 14 | (55.6%) | 16 | (44.4%) | 0.301 |
| Negative/do not remember | 4 | 3 | (75.0%) | 1 | (25.0%) | |
| Thoughts about the counselor | | | | | | |
| Positive | 31 | 14 | (45.2%) | 17 | (54.8%) | 0.114 |
| Negative/do not remember | 3 | 3 | (100%) | 0 | (0.0%) | |
| Feelings toward discussion content | | | | | | |
| Positive or activating feeling | 25 | 10 | (40.0%) | 15 | (60.0%) | 0.072 |
| Negative feeling/do not remember | 6 | 5 | (83.3%) | 1 | (16.7%) | |
| Counselor was knowledgeable about packet* | | | | | | |
| Yes | 35 | 17 | (48.6%) | 18 | (51.4%) | -- |
| No/not really | 0 | 0 | (0.0%) | 0 | (0.0%) | |
| Felt comfortable with the counselor* | | | | | | |
| Yes | 31 | 15 | (48.4%) | 16 | (51.6%) | 0.677 |
| No/not really | 4 | 2 | (50.0%) | 2 | (50.0%) | |
| Discussion changed thoughts about mammography* | | | | | | |
| Changed | 22 | 11 | (50.0%) | 11 | (50.0%) | 0.640 |
| No/not really | 12 | 6 | (50.0%) | 6 | (50.0%) | |
| Discussion motivated me to get a mammogram* | | | | | | |
| Yes | 22 | 9 | (40.9%) | 13 | (59.1%) | 0.204 |
| No/not really | 13 | 8 | (61.5%) | 5 | (38.5%) | |
| Discussion made me fearful of getting breast cancer* | | | | | | |
| Yes | 6 | 4 | (66.7%) | 2 | (33.3%) | 0.301 |
| No/not really | 29 | 13 | (44.8%) | 16 | (55.2%) | |
| Discussion helped me create plan for screening* | | | | | | |
| Yes | 16 | 6 | (37.5%) | 10 | (62.5%) | 0.194 |
| No/not really | 19 | 11 | (57.9%) | 8 | (42.1%) | |
| Counselor was not helpful** | | | | | | |
| Helpful | 33 | 15 | (45.5%) | 18 | (54.5%) | 0.229 |
| Not helpful | 2 | 2 | (100%) | 0 | (0%) | |
| Counselor was personable* | | | | | | |
| Yes | 32 | 14 | (43.8%) | 18 | (56.2%) | 0.104 |
| No/not really | 3 | 3 | (100%) | 0 | (0%) | |
| Counselor was easy to talk to* | | | | | | |
| Yes | 32 | 15 | (46.9%) | 17 | (53.1%) | 0.478 |
| No/not really | 3 | 2 | (66.7%) | 1 | (33.3%) | |
| Counselor had a positive attitude* | | | | | | |
| Yes | 33 | 15 | (45.5%) | 18 | (54.5%) | 0.229 |
| No/not really | 2 | 2 | (100%) | 0 | (0%) | |
| Counselor was trying to help me* | | | | | | |
| Yes | 33 | 15 | (45.5%) | 18 | (54.5%) | 0.229 |
| No/not really | 2 | 2 | (100%) | 0 | (0%) | |
| Counselor made me upset* | | | | | | |
| Yes | 3 | 3 | (100%) | 0 | (0%) | 0.104 |
| No/not really | 32 | 14 | (43.8%) | 18 | (56.2%) | |

(*Continued*)

**Table 3.** Continued.

| | Total[c] | Completed mammogram[d] | | | | |
|---|---|---|---|---|---|---|
| | | No | | Yes | | *P* |
| | 42 | 20 | (47.6%) | 22 | (52.4%) | |
| Understood what the counselor was saying* | | | | | | |
| Yes | 34 | 17 | (50.0%) | 17 | (50.0%) | 0.514 |
| No/not really | 1 | 0 | (0%) | 1 | (100%) | |
| Trust the counselor* | | | | | | |
| Yes | 28 | 13 | (46.4%) | 15 | (53.6%) | 0.466 |
| No/not really | 7 | 4 | (57.1%) | 3 | (42.9%) | |

[a]Numbers do not sum to total due to missing/unknown responses. [b]Percentages in parentheses represent row percentages. *Attitudes were elicited *via* a Likert scale (1 = Not at all, 2 = A little bit, 3 = Moderately, 4 = Quite a bit, 5 = Extremely). Responses of "1 = Not at all" or "2 = A little bit" were grouped as "No/not really." Responses of "3 = Moderately," "4 = Quite a bit," or "5 = Extremely" were grouped as an agreement response ("Yes" or "Changed"). **This attitude's Likert scale responses were grouped as the following due to being a negatively worded survey item: "Helpful" (1 = Not at all or 2 = A little bit) and "Not helpful" (3 = Moderately, 4 = Quite a bit, or 5 = Extremely).

provider actions can have on patients in behavioral change interventions. Additionally, the findings highlight that putting information in the hands of young adults who survived a childhood cancer does not guarantee they will give this information to their healthcare provider. In this study, the laminated card's impact appeared to be greatest when participants physically brought it to their appointment. Thus, if an intervention promotes participants to bring the received information to their healthcare provider, it could help enhance its intended impact. However, 55% of participants who received both intervention components did not obtain mammograms, reflecting other barriers noted by participants including imaging costs and being too busy, as we previously reported.[10] In addition, it is possible that the laminated cards did not evoke a sense of urgency to get screened as initially intended.

Study limitations include those inherent to survey research: response and recall bias, inability to clarify responses further, and missing data. Although 96% of intervention arm participants returned the questionnaire, some responses were incomplete or missing written responses. Women who did not obtain a mammogram were less likely to provide responses to survey items than study participants who did report obtaining a mammogram, and women who proactively brought the laminated cards to their appointments may already have been more motivated to discuss screenings with their provider, both of which could introduce bias into the results. Further, study participants were from a fairly well-educated, predominately White cohort who receive regular newsletters and tend to have healthcare providers. Additionally, we did not compare outcomes by insurance type (private vs. public). These factors may limit generalizability, underscoring the importance of ensuring future interventions recruit a diverse population.

## Conclusion

Receiving multiple forms of messaging and sharing information with healthcare providers is associated with behavior changes in childhood cancer survivors. Interventions aimed at increasing breast cancer screening uptake among high-risk survivors can be implemented with minimal fear/anxiety. Further, engaging and educating healthcare providers is critical to changing patient behavior and improving health outcomes. Future interventions targeting high-risk survivors should strongly consider incorporating multi-component interventions and actively involving healthcare providers. Priority should be given to educating healthcare providers about the serious risk of late effects faced by childhood cancer survivors, including through disseminating guidelines and enabling quick, accurate search engine results.

## Disclosure statement

No potential conflict of interest was reported by the author(s).

## Funding

This work was supported by the National Cancer Institute (R01-CAA3477, K.C. Oeffinger, Principal Investigator; U24-CA55727, G.T. Armstrong, Principal Investigator; P30-CA008748, S. Vickers, Principal Investigator; P30-CA21765, C.W. Roberts, Principal Investigator) and by the Meg Berté Owen Fund. H.V. Wu was also supported by the National Cancer Institute training grant, T32 CA275764 (Principal Investigators: K.S. Panageas, J.L. Bernstein, J.J. Mao, D. Schrag). Support to St. Jude Children's Research Hospital was also provided by the American Lebanese-Syrian Associated Charities (ALSAC).

## Data availability statement

The Childhood Cancer Survivor Study is a US National Cancer Institute funded resource (U24 CA55727) to promote and facilitate research among long-term survivors of cancer diagnosed during childhood and adolescence. CCSS data are publicly available on dbGaP at https://www.ncbi.nlm.nih.gov/gap/ through its accession number phs001327.v2.p1. and on the St Jude Survivorship Portal within the St. Jude Cloud at https://survivorship.stjude.cloud/. In addition, utilization of the CCSS data that leverages the expertise of CCSS Statistical and Survivorship research and resources will be considered on a case-by case basis. For this utilization, a research Application Of Intent followed by an Analysis Concept Proposal must be submitted for evaluation by the CCSS Publications Committee. Users interested in utilizing this resource are encouraged to visit http://ccss.stjude.org. Full analytical data sets associated with CCSS publications since January of 2023 are also available on the St. Jude Survivorship Portal at https://viz.stjude.cloud/community/cancer-survivorship-community~4/publications.

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