HHS Public Access

Author manuscript

Psychooncology. Author manuscript; available in PMC 2019 November 22.

Published in final edited form as:

Psychooncology. 2019 May ; 28(5): 980–988. doi:10.1002/pon.5059.

A Randomized Controlled Intervention to Promote Readiness to Genetic Counseling for Breast Cancer Survivors

Monica L. Kasting[1], **Claire C. Conley**[2], **Aasha I. Hoogland**[2], **Courtney L. Scherr**[3], **Jongphil Kim**[4], **Ram Thapa**[4], **Maija Reblin**[2], **Cathy D. Meade**[2], **M. Catherine Lee**[5], **Tuya Pal**[6], **Gwendolyn P. Quinn**[7,8], **Susan T. Vadaparampil**[2,*]

[1]Purdue University, Department of Health and Kinesiology, West Lafayette, IN

[2]Moffitt Cancer Center, Department of Health Outcomes and Behavior, Tampa, FL

[3]Northwestern University, Department of Communication Studies, Evanston, IL

[4]Moffitt Cancer Center, Division of Biostatistics and Bioinformatics, Tampa, FL

[5]Moffitt Cancer Center, Comprehensive Breast Program, Tampa, FL

[6]Vanderbilt University Medical Center, Department of Medicine, Nashville, TN

[7]New York University, Department of Obstetrics and Gynecology, New York, NY

[8]Perlumutter Cancer Center, New York University, New York, NY.

Abstract

Objective: Breast cancer (BC) survivors with a **genetic** mutation are at higher risk for subsequent cancer; knowing **genetic risk** status could help survivors make decisions about follow-up screening. Uptake of genetic counseling and testing (GC/GT) to determine *BRCA* status is low among high risk BC survivors. This study assessed feasibility, acceptability, and preliminary efficacy of a newly developed psychoeducational intervention (PEI) for GC/GT.

Methods: High risk BC survivors (N=119) completed a baseline questionnaire and were randomized to the intervention (PEI video/booklet) or control (factsheet) group. Follow-up questionnaires were completed 2 weeks after baseline (T2), and 4 months after T2 (T3). We analyzed recruitment, retention (feasibility), whether the participant viewed study materials (acceptability), intent to get GC/GT (efficacy), and psychosocial outcomes (e.g. perceived risk, Impact of Events Scale [IES]). T-tests or chi-square tests identified differences between intervention groups at baseline. Mixed models examined main effects of group, time, and group-by-time interactions.

Results: Groups were similar on demographic characteristics (p≥.05). Of participants who completed the baseline questionnaire, 91% followed through to study completion and 92% viewed study materials. A higher percentage of participants in the intervention group moved toward

*Corresponding Author Susan T. Vadaparampil, PhD, Moffitt Cancer Center, 4115 East Fowler Avenue, Tampa, FL 33617, Phone: 813-745-1997, Susan.Vadaparampil@moffitt.org.

Conflicts of Interest

STV has received research funding from Myriad Genetics Laboratory. The rest of the coauthors have no conflicts of interest to declare.

GC/GT (28% vs. 8%; p=0.027). Mixed models demonstrated significant group-by-time interactions for perceived risk (p=0.029), IES (p=0.027), and IES avoidance subscale (p=0.012).

Conclusions: The PEI was feasible, acceptable, and efficacious. Women in the intervention group reported greater intentions to pursue GC, greater perceived risk, and decreased avoidance. Future studies should seek to first identify system-level barriers and facilitators before aiming to address individual-level barriers.

Keywords

BRCA; Hereditary breast cancer; Educational intervention; Genetic counseling; Genetic testing; Stages of Change; Cancer; Oncology

Introduction

Breast cancer (BC) survivors with a **genetic mutation, such as a** *BRCA* mutation, are at substantially elevated risk for contralateral breast and ovarian cancer compared to patients without a mutation (44% ovarian cancer risk **for *BRCA* carriers** vs. ~2% risk for non-carriers).[1] The National Comprehensive Cancer Network's medical management recommendations vary significantly in intensity and modality for BC survivors with and without a *BRCA* mutation.[2] Medical management may include contralateral prophylactic mastectomy,[3] surveillance with biannual Magnetic Resonance Imaging alternating with mammography,[4] or even prophylactic bilateral salpingo oophorectomy (PBSO). [5,6] Thus, BC patients with specific risk factors may benefit from genetic counseling (GC) and genetic testing (GT) to manage future cancer risk if they are found to have a **genetic** mutation.

There are multiple points in the cancer diagnosis, treatment, and survivorship continuum where GC can be an important information source for high-risk BC patients. For patients who have completed definitive surgery, the focus of GC shifts from surgical treatment decision-making to prevention of future malignancies and implications for at-risk family members. Referral to a cancer genetic professional (i.e., for pretest GC) prior to GT is strongly encouraged by health and professional organizations.[7] Available studies found varying rates of GC referral in the oncology care setting.[8,9] However, even when a patient is appropriately referred for GC, completion rates remain low.[10]

One approach to increase GC uptake is a Psychoeducational Intervention (PEI). PEIs, such as printed and video materials, represent a commonly used and effective approach to implement theoretically-based individual-level interventions.[11] These materials serve as important information sources for the general public, cancer patients, and survivors from a variety of backgrounds, including populations with limited health literacy.[12,13] Multimedia educational materials, such as videos delivering educational information through both audio and video mechanisms, offer advantages over traditional print materials, especially in populations with low literacy.[14]

The present study assessed the feasibility, acceptability, preliminary efficacy, and potential processes of a newly developed PEI,[15] grounded in the Health Belief Model (HBM).[16] The HBM postulates people will take action if they: 1) perceive the illness is serious (perceived

severity); 2) carry personal risk for the illness (perceived susceptibility); 3) think the actions available to control the illness are effective (perceived benefits) relative to the impediments (perceived barriers). The PEI incorporated aspects of these HBM constructs to impact participants' readiness for GC. The Transtheoretical Model of Behavior suggests people move through Stages of Change when changing a behavior (precontemplation, contemplation, preparation, action, and maintenance).[17] Readiness for GC was derived from the Transtheoretical Model; as such, our PEI aimed to facilitate participants' movement through the Stages of Change.

Specifically, our hypotheses were as follows: (1) To demonstrate PEI efficacy, participants in the intervention group would be more likely than participants in the control group to move through the Stages of Change toward GC. (2) The mechanism of PEI constructs would be demonstrated by differences between groups in GC knowledge and HBM constructs over time. Exploratory analyses also examined the effect of the PEI on pertinent psychosocial outcomes, including cancer worry and cancer-related distress.

Methods

Procedures and Participants

Eligible participants were: (1) post-surgical female BC patients; (2) considered "high risk"; and (3) met 2014 clinical criteria for referral to GC, but had *not* been seen by a GC. We defined "high risk" participants as those who: (1) were diagnosed ≤ age 50; (2) had ≥ 2 female relatives diagnosed with BC; (3) had any male relative diagnosed with BC; or (4) had any relative ever diagnosed with ovarian cancer. Recruitment is detailed elsewhere.[18] In brief, participants were recruited between March 2015 and September 2015 from: an institutional genetic referral database; flyers in BC waiting areas at our institution; survivorship support groups across the state of Florida; local email listservs; and a press release from our media team. This study received Insitutional Review Board approval (protocol #00005333).

Study Design and Intervention

Following consent, participants completed a baseline (T1) interview assessing sociodemographic and health-related variables. Upon completion, participants were randomized to intervention or control groups using sealed envelopes with random group assignment sheets produced from a block randomization schedule. Intervention group participants were mailed a PEI DVD and booklet developed for this project. As previously described,[15] the video was 12-minutes long and featured two BC survivors, a surgical oncologist, a medical oncologist, and a genetic counselor. **The video and the booklet contained information regarding genetic risk, GC, and GT. This included information on hereditary breast cancer, the benefits of GC, a description of GC and GT, patient testimonials, and a list of resources.** Participants were able to call the study phone number if they had trouble viewing the video. The control group received a **one-page** factsheet with frequently asked questions **(e.g. "What is hereditary cancer?" and "What is genetic counseling?"),** information about **GC, and information about how to schedule an appointment with a genetics professional.** Participants had two weeks to review their

materials and then completed a follow-up questionnaire (T2) to provide feedback. Four months after T2, participants self-reported GC uptake in a final questionnaire (T3). Stage of Change, intervention process variables, and psychosocial outcomes were assessed at all three time points (T1, T2, and T3).

Measures

PEI Feasibility and Acceptability was demonstrated by study recruitment and retention. Acceptability was assessed by the participant self-reporting whether they had viewed the PEI or control factsheet.

Intervention Efficacy was measured by whether a participant progressed in their Stage of Change as indicated by the Transtheoretical Model.[17] At each study time point, participants were asked to indicate their readiness for GC uptake along a continuum with items corresponding to TTM stages: (1) I am not considering genetic counseling, and I do not plan to attend (precontemplation); (2) I am considering genetic counseling and plan to schedule an appointment in the next 6 months (contemplation); (3) I am considering genetic counseling and plan to schedule an appointment in the next 30 days (contemplation); (4) I have scheduled an appointment for genetic counseling, but have not yet attended (action); (5) I have attended genetic counseling (completion). Research suggests people can transition through the Stages of Change in either direction and may pass over some stages.[19] To capture this bidirectional movement across the Stages of Change, we examined differences between the intervention and control groups on whether a participant moved toward GC (from a lower to a higher number) or away from getting GC (from a higher number to a lower number).

Process Variables.—Hypothesized intervention mechanisms included GC-related knowledge and health beliefs. We assessed GC-related knowledge on a 9-item validated scale (score range: 0–9).[20] HBM variables were assessed at each time point using previously validated scales where possible. This included perceived susceptibility (5-items) and perceived severity (2-items), both of which were adapted from Champion's HBM scale.[21] Perceived risk was assessed with a single item: "On a scale from 0–100, where 0 is no chance at all and 100 is absolutely certain, what do you think are the chances that you will get breast cancer sometime during your lifetime?"[22] Perceived benefits (6-items) and perceived barriers (13-items) were assessed using scales developed for the current study. All items were rated on a 5-point Likert scale where lower scores indicated fewer perceived benefits/barriers. Perceived self-efficacy (5-items) was assessed using an adapted version of the Champion Self-Efficacy Scale.[23]

Psychosocial outcomes.—We assessed cancer worry with the 3-item Lerman Cancer Worry Scale.[24] Finally, we used the 15-item Impact of Events Scale (IES)[25]and its two subscales, intrusiveness (7-items) and avoidance (8-items), to assess subjective cancer-related distress.

Analysis

First, **the entire sample of the** intervention and control groups were compared on demographic data using either t-tests or chi-square tests as appropriate. **We then excluded anyone who reported they did not view the PEI video or the factsheet (n=10)** to **accurately assess the effect of the intervention and** compare the intervention and control groups effectively. We then compared groups on mean scores for each of the psychosocial variables. The psychosocial variables that significantly differed between groups at baseline were included as covariates in analyses of group differences. Because Stages of Change is an ordinal variable, we compared the intervention and control groups to assess bidirectional movement along the Stages of Change. We then compared the intervention and control group based on which direction participants moved.

Main effects and group-by-time interactions were used to examine group differences on psychosocial variables. These analyses were conducted using linear mixed models using PROC MIXED in SAS (version 9.4; SAS Institute Inc., Cary, NC).

Results

The Study Flow Diagram is shown in Figure 1 (see online supplemental materials). The analytic sample included 109 BC survivors (intervention group n=53; control group n=56). Mean age was 62.9 (*SD*=10.4), 91.6% were White, 96.5% were non-Hispanic, and 54.6% were married. The intervention and control groups did not differ on any demographic characteristic ($p \geq .05$) and a complete list can be found in Table 1.

Baseline characteristics for the entire sample have been previously described.[18] The intervention (n=60) and control (n=59) groups differed on two psychosocial variables at baseline: knowledge score ($p=0.041$) and IES avoidance subscale ($p=0.009$) (Table 2). Therefore, these two variables were controlled for in the subsequent mixed models of the other variables with one exception: because avoidance is an IES subscale, it was not controlled for in the mixed model for IES total score.

PEI feasibility was demonstrated by study recruitment and retention. Of the 233 participants screened for eligibility, 146 (63%) met eligibility requirements, and 119 enrolled and completed a baseline questionnaire. Two weeks after PEI materials were mailed, 115 (97%) participants completed the T2 questionnaire. Four months after PEI materials were mailed, 105 (91%) participants completed the T3 questionnaire. Thus, 72% of participants meeting eligibility requirements completed all study-related tasks.

Acceptability was assessed by the participant self-reporting whether or not she had viewed the PEI or control factsheet. Of the 119 participants who completed the baseline questionnaire, 6 (5%) reported they had not viewed either the PEI or the factsheet, and 4 (3%) did not answer the question. Thus, 109 (92%) participants reported they viewed either the PEI video or control factsheet. When considering the intervention and control groups separately, 53 of the 60 participants in the intervention group (88%) viewed the PEI video. In the control group, 56 of 59 participants (95%) viewed the factsheet **(p=0.196)**.

Preliminary efficacy was measured by whether a participant progressed in her Stage of Change as indicated by the Transtheoretical Model.[17] At baseline, 60 participants (55%) reported being in pre-contemplation; 42 (39%) were contemplating GC (see Figure 2 in online supplemental materials). Patient-reported Stages of Change at T2 and T3 are reported by group in Table 3. We examined which direction each participant moved from T1 to T3 (e.g., toward GC or away from GC) and compared differences between groups. Overall, most participants (68.6%; n=70) stayed the same, while some (17.6%; n=18) moved toward action, and an even smaller proportion moved away from action (13.7%; n=14). Consistent with our hypotheses, this differed by group (p=0.027) and a higher percentage of intervention participants moved toward action as compared to the control group (28.0% vs. 7.7%) (Table 4). Furthermore, there was a significant group-by-time interaction for Stage of Change (p=0.010), such that women in the intervention group reported greater postitive change in GC intentions (e.g., moving towards change) over time. Finally, it should be noted, all participants who did attend GC were in the intervention group (n=3; 3%), precluding comparisons of GC attendance by group.

Hypothesized process variables for intervention mechanisms included GC-related knowledge and health beliefs; thus, main effects and group-by-time interactions were examined for these variables (Table 2). GC-related knowledge increased over time (p=0.001), there were not significant differences by group at baseline (p=0.13) or in the group-by-time interaction (p=0.90). Regarding health beliefs, perceived susceptibility significantly increased over time (p=0.049) but it did not differ in the group-by-time interaction (p=0.31). Finally, perceived risk significantly decreased from T1 to T3 (p=0.004). Though perceived risk did not differ by group at baseline (p=0.62), the group-by-time interaction was significant (p=0.029; Figure 3a in online supplemental materials), and women in the control group reported greater decreases in perceived risk over time. No significant main or interaction effects were found for perceived severity, perceived benefits, perceived barriers, or perceived self-efficacy (all p's > 0.14).

Pertinent psychosocial outcomes, including cancer worry and cancer-related distress, were examined through exploratory analyses. Mixed models demonstrated no statistically significant main or interaction effects for cancer worry. Across groups, IES total scores and scores on the intrusion subscale did not change over time, but IES avoidance significantly decreased from T1 to T3 (p=0.012). There were also significant group-by-time interactions for total IES score (p=0.027; Figure 3b in online supplemental materials) and the IES avoidance subscale (p=0.012; Figure 3c in online supplemental materials) and women in the intervention group reported greater decreases in overall distress and avoidance over time.

Discussion

Despite the significant benefit conferred by *BRCA* GC for high risk BC survivors, uptake remains low.[10] There are gaps along the GC continuum-of-care beginning with physician referral and continuing through to patient completion.[8] Even when patients are referred, they may still not receive GC due to lack of awareness or understanding, concern about cost, or other reasons.[26] To address this gap, the present study examined whether a newly developed, theoretically based, brief PEI could affect patient intentions for GC. The data presented

establish feasibility, acceptability, and preliminary efficacy of the PEI in a sample of BC survivors.

First, the PEI met the criteria we had established a priori to determine feasibility and acceptability. Given 72% of eligible participants in the present study not only participated, but completed all study activities, the data demonstrate the feasibility**. Given that 88% of participants in the intervention group viewed the video and this was not significantly different from the control group, this demonstrate the** acceptability of the PEI among BC survivors. Second, our hypothesis regarding the preliminary efficacy was supported, as women in the intervention group were more likely to move through the Stages of Change toward GC. It is notable this PEI is brief (12-minutes). Thus, it was relatively low cost and time-efficient. In addition, the intervention was made available to patients in their homes, increasing the reach of PEI beyond clinic or community settings. The efficacy of the PEI has remarkable implications for future clinical interventions, and may indicate a significant impact on intentions for GC can be achieved even with minimal time and resources. These findings add to the growing literature on the efficacy of PEIs for a cancer survivors.[12]

By providing an opportunity for BC survivors to learn more about their risk, GC may reduce anxiety and cancer-related distress.[27] Thus, we were interested in whether a brief PEI would have similar psychosocial outcomes. Exploratory analyses examining the PEI's impact on psychosocial outcomes demonstrated women in the intervention group reported greater decreases in total IES and the IES avoidance subscale over the course of the study. Given avoidance contributed to total IES scores, it appears the change in IES over time in the intervention group is primarily driven by change in avoidance. At baseline, the intervention and control groups differed on IES avoidance subscale scores, such that women in the intervention group reported significantly higher levels of avoidance. In essence, the change in the intervention group observed over the course of the study resulted in a mean level of avoidance comparable to the control group.

The lack of PEI impact on perceived barriers and cancer worry is particularly notable, as prior work has identified perceived barriers and cancer worry as primary factors associated with women's contemplation.[18] Given the implication that both worry and a lack of barriers may be important for behavior change, the absence of PEI effects on these variables may explain the fact that, in contrast with the movement of women in the intervention group through the Stages of Change towards GC, only 3 (3%) attended a GC appointment.

In particular, the stability in perceived barriers may reflect the systemic issues affecting access to GC. Prior studies have shown transportation, insurance coverage, and other life obligations are common concerns for eligible BC patients, and often prevent them from pursuing or completing GC.[28] A 2015 study of a population-based sample of young Black BC survivors found a significant association between receipt of GC/GT and socioeconomic status, education level, and health insurance status.[29] Furthermore, a meta-analysis of 9 studies identified inadequate coordination of referral and long wait times for genetics services as additional system-level barriers to GC.[30] Our study, mirroring the clinical reality of these patients, encouraged them to pursue GC but did not address these systemic barriers by providing access to GC. As such, the results of the present study, **where the majority of**

participants stayed the same with regarding to pursuit of GC, accentuate the limitations of targeting intentions for behavioral change without addressing the system-level barriers that prevent said change. **This will likely be facilitated by the increasing access to GC via technological advances to circumvent some of these systems-level barriers (e.g., telehealth modalities).**[31]

Study Limitations

This study is among the first to use a randomized control design to test the effects of a PEI on high risk BC survivors. The results are novel and add to the existing literature on behavior change for GC. However, results should be interpreted in light of some limitations that may limit generalizability. First, all data were collected via self-report, and may be subject to demand characteristics, recall bias, and social desirability. This is limiting in terms of intervention use; as participants self-reported whether or not they viewed the PEI video or control factsheet, our ability to determine intervention fidelity is limited. Second, this was a convenience sample of patients from institutional and community sources. Thus, the sample may be subject to selection bias; participants who choose to enroll in a study of GC may be more positive towards BC than the average population. Finally, minority women are under-represented in studies of GC.[32] Like much of the prior research, this sample was predominantly White, non-Hispanic, and educated. The generalizability of the findings to other ethnic and minority groups, to those with less education, or to the underserved is unknown.

Clinical Implications

While prior studies have demonstrated provider referral is an important facilitator of GC/GT uptake, our study suggests providers may also need to evaluate patients' readiness. Importantly, the use of supplementary education materials can be used to increase readiness for these services.

Conclusions

The trial serves as preliminary evidence for a HBM-based PEI for GC among high risk BC survivors. The PEI was feasible to deliver and acceptable to patients. Compared to women in the control group, women who received the intervention reported greater intentions to pursue GC, greater perceived risk, and reduced avoidance of distressing stimuli. Future studies aiming to identify individual-level barriers and facilitators should seek to first address system-level barriers by making GC available to patients.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgements

This work was supported by funding from the National Human Genome Research Institute of the National Institutes of Health (1 R21 HG006415). It has also been supported, in part, by the Biostatistics Core Facility at the Moffitt Cancer Center & Research Institute; a National Cancer Institute designated Comprehensive Cancer Center (5P30CA076292). While working on this manuscript, Drs. Kasting, Hoogland, and Conley were all supported by

the National Cancer Institute of the National Institutes of Health (R25-CA090314; PI: Brandon). Dr. Kasting is further supported by the NIH/NCI-funded Center for Infection Research in Cancer (K05-CA181320; PI: Giuliano).

References

1. Brekelmans CT, Tilanus-Linthorst MM, Seynaeve C, et al. Tumour characteristics, survival and prognostic factors of hereditary breast cancer from BRCA2-, BRCA1- and non-BRCA1/2 families as compared to sporadic breast cancer cases. Eur J Cancer. 2007;43(5):867–876. [PubMed: 17307353]
2. Daly MB, Pilarski R, Berry M, et al. NCCN Guidelines Insights: Genetic/Familial High-Risk Assessment: Breast and Ovarian, Version 2.2017. J Natl Compr Canc Netw. 2017;15(1):9–20. [PubMed: 28040716]
3. Domchek SM, Friebel TM, Singer CF, et al. Association of risk-reducing surgery in BRCA1 or BRCA2 mutation carriers with cancer risk and mortality. JAMA.304(9):967–975. [PubMed: 20810374]
4. Daly M, Axilbund JE, Bryant E, et al. The NCCN Genetic/Familial High-Risk Assessment: Breast and Ovarian Clinical Practice Guideline, version 1.2009. Available at http://www.nccn.org/professionals/physician_gls/PDF/genetics_screening.pdf. To view most recent and complete version of guideline, to www.nccn.org. 2009 Accessed April 22nd, 2009.
5. Rebbeck TR, Friebel T, Lynch HT, et al. Bilateral prophylactic mastectomy reduces breast cancer risk in BRCA1 and BRCA2 mutation carriers: the PROSE Study Group. J Clin Oncol. 2004;22(6):1055–1062. [PubMed: 14981104]
6. Rebbeck TR, Levin AM, Eisen A, et al. Breast cancer risk after bilateral prophylactic oophorectomy in BRCA1 mutation carriers. J Natl Cancer Inst. 1999;91(17):1475–1479. [PubMed: 10469748]
7. Daly M, Pilarski RT, Axilbund JE, et al. The NCCN Genetic/Familial High-Risk Assessment: Breast and Ovarian Clinical Practice Guideline, version 1.2019. Available at http://www.nccn.org/professionals/physician_gls/PDF/genetics_screening.pdf. To view most recent and complete version of guideline, to www.nccn.org 2019 Accessed May 9, 2009.
8. Chen WY, Garber JE, Higham S, et al. BRCA1/2 genetic testing in the community setting. J Clin Oncol. 2002;20(22):4485–4492. [PubMed: 12431973]
9. Wood M, Kadlubek P, Lu KH, et al. Quality of cancer family history and referral for genetic counseling and testing among oncology practices: A pilot test of quality measures as part of the ASCO Quality Oncology Practice Initiative (QOPI). Journal of Clinical Oncology. 2012;30(18_suppl):CRA1505-CRA1505.
10. O'Neill SM, Peters JA, Vogel VG, Feingold E, Rubinstein WS. Referral to cancer genetic counseling: are there stages of readiness? American journal of medical genetics. 2006;142C(4):221–231. [PubMed: 17068804]
11. NCI. Theory at a Glance. National Institutes of Health;2005.
12. Ankem K. Use of information sources by cancer patients: Results of a systematic review of the reserach literature. Information Research. 2006;11(3):1–21.
13. Talosig-Garcia M, Davis SW. Information-seeking behavior of minority breast cancer patients: an exploratory study. Journal of health communication. 2005;10 Suppl 1:53–64. [PubMed: 16377600]
14. Wofford J, Currin D, Michielutte R, Wofford M. The multimedia computer for low-literacy patient education: a pilot project of cancer risk perceptions. MedGenMed: Medscape general medicine. 2001;3(2):23–23. [PubMed: 11549972]
15. Scherr CL, Nam K, Augusto B, et al. Assessment of a narrative intervention to promote genetic counseling for breast cancer survivors. Health Comunication. 2018;Under Review.
16. Janz NK, Champion VL, Strecher VJ, ed The Health Belief Model. San Francisco, CA: Jossey-Bass; 2002 K. Glanz BKR, F.M. Lewis, ed. Health Behavior and Health Education.
17. Prochaska JO, Velicer WF. The Transtheoretical Model of Health Behavior Change. American Journal of Health Promotion. 1997;12(1):38–48. [PubMed: 10170434]
18. Reblin M, Kasting M, Nam K, et al. Heath beliefs associated with readiness for genetic counseling among high risk breast cancer survivors. The Breast Journal. in press.

19. Schwarzer R. Modeling Health Behavior Change: How to Predict and Modify the Adoption and Maintenance of Health Behaviors. Applied Psychology. 2008;57(1):1–29.
20. Scherr CL, Christie J, Vadaparampil ST. Breast Cancer Survivors' Knowledge of Hereditary Breast and Ovarian Cancer following Genetic Counseling: An Exploration of General and Survivor-Specific Knowledge Items. Public health genomics. 2016;19(1):1–10.
21. Champion VL. Revised susceptibility, benefits, and barriers scale for mammography screening. Research in nursing & health. 1999;22(4):341–348. [PubMed: 10435551]
22. Lipkus IM, Kuchibhatla M, McBride CM, et al. Relationships among breast cancer perceived absolute risk, comparative risk, and worries. Cancer epidemiology, biomarkers & prevention : a publication of the American Association for Cancer Research, cosponsored by the American Society of Preventive Oncology. 2000;9(9):973–975.
23. Champion V, Skinner CS, Menon U. Development of a self-efficacy scale for mammography. Research in nursing & health. 2005;28(4):329–336. [PubMed: 16028267]
24. Lerman C, Trock B, Rimer BK, Boyce A, Jepson C, Engstrom PF. Psychological and behavioral implications of abnormal mammograms. Annals of internal medicine. 1991;114(8):657–661. [PubMed: 2003712]
25. Horowitz M, Wilner N, Alvarez W. Impact of Event Scale: a measure of subjective stress. Psychosomatic medicine. 1979;41(3):209–218. [PubMed: 472086]
26. Rosenberg SM, Ruddy KJ, Barry WT, et al. Patterns and predictors of BRCA 1/2 testing in young breast cancer survivors. 2016;34(15_suppl):1514–1514.
27. Madlensky L, Trepanier AM, Cragun D, Lerner B, Shannon KM, Zierhut H. A rapid systematic review of outcomes studies in genetic counseling. Journal of genetic counseling. 2017;26(3):361–378. [PubMed: 28168332]
28. Anderson B, McLosky J, Wasilevich E, Lyon-Callo S, Duquette D, Copeland G. Barriers and facilitators for utilization of genetic counseling and risk assessment services in young female breast cancer survivors. Journal of cancer epidemiology. 2012;2012.
29. Cragun D, Bonner D, Kim J, et al. Factors associated with genetic counseling and BRCA testing in a population-based sample of young Black women with breast cancer. Breast cancer research and treatment. 2015;151(1):169–176. [PubMed: 25868867]
30. Delikurt T, Williamson GR, Anastasiadou V, Skirton H. A systematic review of factors that act as barriers to patient referral to genetic services. European Journal of Human Genetics. 2015;23(6): 739. [PubMed: 25205405]
31. Kinney AY, Butler KM, Schwartz MD, et al. Expanding access to BRCA1/2 genetic counseling with telephone delivery: a cluster randomized trial. JNCI: Journal of the National Cancer Institute. 2014;106(12).
32. Halbert CH, Harrison BW. Genetic counseling among minority populations in the era of precision medicine. Paper presented at: American Journal of Medical Genetics Part C: Seminars in Medical Genetics2018.

Table 1.

Sample Characteristics at Baseline

	Total Sample (N=119)	Control (n=59)	Intervention (n=60)	p-value for group differences at baseline
Mean Age (SD)	62.9(10.4)	62.3(10.2)	63.6(10.6)	0.50
Hispanic n(%)				0.36
Yes	4(3.5)	1(1.7)	3(5.3)	
No	111(96.5)	57(98.3)	54(94.7)	
Missing	4			
Race n(%)				0.61
White	109(91.6)	55(93.2)	54(90.0)	
Black	4(3.4)	1(1.7)	3(5.0)	
Other	6(5.0)	3(5.1)	3(5.0)	
Marital Status n(%)				0.59
Single	6(5.0)	2(3.4)	4(6.7)	
Married/Partnered/Other	65(54.6)	35(59.3)	30(50.0)	
Divorced/Separated	30(25.2)	15(25.4)	15(25.0)	
Widowed	18(15.1)	7(11.9)	11(18.3)	
Education n(%)				0.61
Up to GED/Diploma	31(26.1)	13(22.0)	18(30.0)	
Some College	37(31.1)	19(32.2)	18(30.0)	
College grad or beyond	51(42.9)	27(45.8)	24(40.0)	
Employment Status n(%)				0.34
Not employed	17(14.5)	7(11.9)	10(17.2)	
Employed	48(41.0)	28(47.5)	20(34.5)	
Retired/Other	52(44.4)	24(40.7)	28(48.3)	
Missing	2			
Income n(%)				0.88
$0–34,999	47(41.6)	23(41.1)	24(42.1)	
$35,000–74,999	40(35.4)	21(37.5)	19(33.3)	
$75,000+	26(23.0)	12(21.4)	14(24.6)	
Missing	6			
Insurance n(%)				0.78
Private	61(53.0)	31(54.4)	30(51.7)	
Public	54(47.0)	26(45.6)	28(48.3)	
Missing	4			
Stage at diagnosis n(%)				0.26
DCIS	20(17.1)	11(19.3)	9(15.0)	
Stage 1	27(23.1)	16(28.1)	11(18.3)	
Stage 2	36(30.8)	19(33.3)	17(28.3)	
Stage 3	14(12.0)	3(5.3)	11(18.3)	
Stage 4	7(6.0)	3(5.3)	4(6.7)	

	Total Sample (N=119)	Control (n=59)	Intervention (n=60)	p-value for group differences at baseline
Don’t know	13(11.1)	5(8.8)	8(13.3)	
Missing	2			
Mean (SD) time since diagnosis (months; range: 2–624 months)	**109.8 (116.0)**	**115.5 (123.9)**	**104.1 (108.4)**	**0.59**

Table 2.

Intervention Process Variables and Psychosocial Outcomes of Those who Viewed the Video or Factsheet

		M (SD)			T-tests	Mixed Models		
	Possible Range	**Total (N=109)**	**Control (n=56)**	**Intervention (n=53)**	**p-value *group differences at each time point***	**p-value *group effect***	**p-value *time effect***	**p-value *group-by-time interaction***
Intervention Process Variables								
GC-related knowledge	0–9					0.13	**0.001**	0.90
T1		5.07(2.16)	5.49(2.12)	4.64(2.13)	**0.041**			
T2		5.99(2.15)	6.14(2.07)	5.82(2.56)	0.44			
T3		6.29(1.98)	6.67(1.72)	5.92(2.14)	0.057			
Perceived susceptibility	1–5					0.54	**0.049**	0.31
T1		3.04(0.83)	3.01(0.87)	3.08(0.80)	0.69			
T2		3.14(0.84)	3.16(0.81)	3.12(0.87)	0.79			
Perceived severity	1–5					0.67	0.94	0.89
T1		3.25(1.07)	3.19(1.06)	3.31(1.09)	0.56			
T2		3.28(0.94)	3.22(0.90)	3.34(0.99)	0.52			
Perceived risk	0–100					0.62	**0.004**	**0.029**
T1		40.80(28.55)	39.02(27.25)	42.68(30.01)	0.51			
T2		42.00(27.26)	43.00(25.71)	40.94(29.03)	0.70			
T3		37.61(25.21)	33.02(22.20)	42.11(27.32)	0.064			
Perceived benefits	1–5					0.34	0.85	0.76
T1		3.73(0.83)	3.80(0.80)	3.66(0.86)	0.38			
T2		3.71(0.88)	3.82(0.82)	3.61(0.93)	0.22			
Perceived barriers	1–5					0.66	0.97	0.51
T1		2.74(0.61)	2.72(0.62)	2.77(0.60)	0.64			
T2		2.71(0.60)	2.74(0.57)	2.68(0.64)	0.59			
Perceived self-efficacy	1–5					0.14	0.84	0.71
T1		3.85(0.53)	3.80(0.55)	3.91(0.50)	0.28			
T2		3.83(0.60)	3.79(0.59)	3.86(0.62)	0.56			

		M (SD)			T-tests	Mixed Models		
	Possible Range	**Total (N=109)**	**Control (n=56)**	**Intervention (n=53)**	**p-value *group differences at each time point***	**p-value *group effect***	**p-value *time effect***	**p-value *group-by-time interaction***
Psychosocial Outcomes								
Cancer worry	1–4					0.47	0.17	0.88
T1		1.91(0.66)	1.84(0.66)	1.99(0.67)	0.24			
T2		1.97(0.72)	1.96(0.70)	1.97(0.75)	0.89			
T3		2.01(0.66)	1.96(0.68)	2.05(0.65)	0.50			
IES total stress	0–75					0.097	0.86	**0.027**
T1		19.13(16.02)	16.19 (14.64)	22.08 (16.91)	0.061			
T2		18.74(15.21)	17.31(15.08)	20.31(15.35)	0.32			
T3		15.96(13.49)	15.17(13.56)	16.80(13.50)	0.56			
IES intrusion subscale	0–35					0.094	0.75	0.20
T1		7.90(8.39)	7.17(8.05)	8.62(8.73)	0.38			
T2		7.67(7.16)	8.13(7.99)	7.18(6.16)	0.50			
T3		6.77(6.85)	6.94(7.19)	6.62(6.59)	0.81			
IES avoidance subscale	0–40					**0.012**	0.81	**0.012**
T1		11.13(9.16)	8.85(7.98)	13.50(9.76)	**0.009**			
T2		11.01(9.36)	9.43(8.49)	12.88(9.98)	0.058			
T3		9.50(8.48)	8.75(8.45)	10.36(8.53)	0.36			

Table 3.

Stages of change frequency at T2 and T3 by intervention group

	Intervention Group (n=53)		Control Group (n=56)	
	T2	**T3**	**T2**	**T3**
Stage of Change				
Precontemplation	25(47%)	24(45%)	28(50%)	34(61%)
Contemplation	25(47%)	24(45%)	26(46%)	17(30%)
Preparation	0(0%)	0(0%)	0(0%)	0(0%)
Action	0(0%)	3(6%)	0(0%)	0(0%)
Missing Data	3(6%)	2(4%)	2(4%)	5(9%)

Table 4.

Stages of Change; movement from T1 to T3

				Chi-square	Mixed Models		
	Total Sample	**Control**	**Intervention**	**p-value**	**p-value *differences by group***	**p-value *differences by time***	**p-value *group-by-time interaction***
Stage of Change (movement from T1 to T3; n[%])				**0.027**	0.85	0.078	**0.010**
Moved away from action	14(13.7)	8(15.4)	6(12.0)				
No change	70(68.6)	40(76.9)	30(60.0)				
Moved toward action	18(17.6)	4(7.7)	14(28.0)				