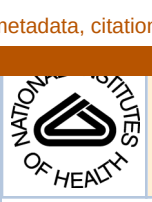

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Process outcomes from a randomized controlled trial comparing tailored mammography interventions delivered via telephone versus DVD

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Abstract

Objective—Tailored, interactive mammography-promotion interventions can increase adherence if women are exposed to and find them usable. We compare exposure to and usability of interventions delivered via telephone v. DVD.

Methods—Process evaluation measures from 926 women randomly assigned to telephone or DVD intervention and completing post-intervention surveys.

Results—~83% of each group reported exposure to all content. Partial exposure was higher for DVD (9% v 0.4%; p<.01); no exposure was higher for phone (15% v 8%; p<.01). There were no differences in exposure by age or race. Full phone exposure was less likely for women who already made mammography appointments. Usability rating was higher for DVD (p<.05), driven by ratings of understandability and length. Usability of both interventions was correlated with lower baseline barriers, and higher fear, benefits, and self efficacy. Higher ratings for phone were

associated with lower knowledge and contemplating mammography. Non-whites rated DVD better than whites.

Conclusion—Both tailored interactive interventions had wide reach and favorable ratings, but DVD recipients had greatest exposure to at least partial content and more favorable ratings, especially among non-white women.

Practice implications—This first evaluation of a tailored, interactive DVD provides promise for its use in mammography promotion.

Keywords

Tailored intervention; Mammography; Breast cancer

1. Introduction

Despite recent controversies, there is no debate that regular mammograms facilitate mortality reduction [1–5]. Among US women 50–64, mammography within the last two years has declined 7% [6–8]. Interventions using translatable technologies are needed [9]. We developed *Mammograms Save Lives: Decide Today* – the first interactive tailored DVD promoting mammography use. Through a randomized controlled trial, we are comparing it with a tailored telephone intervention and with usual care.

DVD and phone interventions cover the same topics, and share tailoring variables and algorithms to select content based on responses to queries. However, they differ in interactivity and method of exposure. Telephone allows for live conversation but cannot use graphics or visuals; the DVD collects real-time information via remote control to deliver tailored narrative stories, graphics, and video.

For exposure, women must either interact with the telephone interventionist or use the mailed DVD.

Intervention studies often report both process and outcome evaluations [10]. Measuring exposure is important for interventions that require voluntary action (i.e., mailed interventions). Research has shown that interventions assessed favorably by users are also more effective for facilitating behavior change [11–16]. Because intervention effects vary by medium, participant demographics, beliefs, attitudes, and intentions, it is possible that these factors result in variations in exposure and reactions. Research questions are:

1. Did intervention exposure differ (a) between DVD and telephone groups and (b) within groups, by participant characteristics?
2. Among those exposed, did usability ratings differ (a) between DVD and telephone groups and (b) within groups, by participant characteristics?

2. Methods

2.1 Sample description

Participants were members of Methodist Medical Group (MMG) in Indiana and Blue Cross/Blue Shield of North Carolina (BCBSNC), ages 41–65, could read English, had no mammogram within 15 months, no previous breast cancer or bilateral mastectomies, and no physician advice to forego mammography. The 15-month adherence cut-off is consistent with US annual screening guidelines at the time of enrollment [17–19], plus a customary "grace period"[20–22]. Of 3,469 women reached who had not had a mammogram within 15 months, 1,705 (49.1%) consented and were randomly assigned (Figure 1). We use data from

926 women (407 DVD and 519 phone) who completed follow-up surveys assessing exposure and usability.

2.2 Procedures

MMG and BCBSNC mailed letters with a brief study description and instructions for opting out of contact. Women not opting out were called to give verbal consent and HIPAA authorization, and complete baseline surveys. Post baseline, we mailed a DVD or attempted delivery of the telephone intervention over a four-week period. Follow-up phone surveys were administered one month post-baseline. Participants received gift cards for completing surveys. Study procedures were approved by Indiana and Duke Universities' IRBs.

2.3 Interventions

Interventions include messages tailored to variables from the Health Belief and Transtheoretical Models [23,24] previously associated with mammography use. [13,25–39] Sample cells for our intervention development grid appear in Table I, showing theoretical constructs to be addressed, concepts to communicate, and script (telephone) or visual image and voiceover (DVD).

The DVD begins with a narrator introducing four women diverse in age, income, race, education, and reasons for non-adherence1. Questions about risk factors are presented, with tailored video segment responses. An anatomical animation of breast cancer metastasis and the procedure of having a mammogram are demonstrated. A series of video segments on barriers follows. If women respond positively to, e.g., "Is it hard to get regular mammograms because you don't have enough time?" they see a character overcoming the barrier. The DVD ends with the narrator encouraging viewers to overcome barriers and have a mammogram. Average use time was 10 minutes for DVD and 11.3 minutes for telephone, which had the same content adapted to a conversational format.

2.4 Measures

Baseline survey assessed demographics, mammography stage, and beliefs via validated scales [40–43]. Telephone interventionists coded content delivered (all, some, none). We measured DVD exposure via self-report at follow-up. Usability was assessed at follow-up with a scale from our previous work [44].

2.4.4. Analyses—Between-group comparisons used two-sided Fisher's exact test for exposure and Wilcoxon rank sum test for usability score. Individual items were adjusted using the False Discovery Rate (0.05) [45]. Comparisons between participant characteristics and exposure/usability were performed within each group.

3. Results

Intervention groups were similar in baseline characteristics (Table II).

3.2 Research Question 1 – Intervention exposure

a. Some exposure was higher for the DVD; no exposure was greater for phone (Table III).

[1]Actors in the DVD were recruited from the actors' guild in Athens, GA. The narrator was hired through *Voicecasting*, an Atlanta-based talent agency. Graphics, DVD jacket artwork, and DVD formatting, including an instructional demonstration for using the DVD, were developed by *Eo* Studios in Athens, GA.

b. Within-group analyses showed no differences in DVD exposure by participant characteristics. Telephone exposure differed by baseline stage, with full exposure lower for women who already had appointments (preparation) than those without appointments (69% v. 85%, p = .018).

3.3 Research Question 2 –Intervention usability ratings

a. Between-group analyses showed overall usability scores higher for DVD (Table IV). At the item level, after adjusting for multiple comparisons, more phone recipients reported it “took too much time”. More DVD recipients agreed “information was easy to understand,” and “time passed quickly” during the intervention.

b. Within both groups, higher perceived benefits and self efficacy, lower barriers, and higher breast cancer fear were associated with higher usability ratings (Table V).

Within the DVD group, usability scores were higher among non-white women than Caucasians (75.1 v. 71.2; p=.001).

Within the phone group, higher usability scores were associated with contemplating having a mammogram (69.1 v. 71.3; p = .004) and lower breast cancer knowledge (Table V).

4. Discussion and Conclusion

4.1 Discussion

This paper reports process evaluations of two mammography interventions. In both groups, most women (~83%) were fully exposed to the intervention. More women in the DVD group indicated some exposure compared to the telephone group, perhaps indicating more women would receive at least some content if mailed a DVD. Women in the telephone group who had an appointment for a mammogram were less likely to be exposed to the intervention, but no such exposure-by-preparation association existed for the DVD group. Perhaps women who already had an appointment to have a mammogram were less motivated to complete phone counseling than to watch the DVD, which was more novel.

Overall usability ratings were higher for DVD. Specific items for which DVD was rated as better were information being easy to understand and time it took, with phone perceived as taking more time. However, more DVD than telephone recipients reported getting less information than desired. The irony is that phone and DVD content was as similar as possible, given the difference in media, and they took comparable time to complete. Perhaps the DVD felt more fast-paced and engaging – giving the feeling of wanting more when it finished. The higher overall DVD rating suggests wanting more information was not seen as a major negative.

Usability ratings were positively associated with baseline breast cancer knowledge and mammography-related beliefs in both groups. Messages may have resonated more among women whose attitudes and beliefs were already consistent with having mammograms.

Several participant characteristics were correlated with usability for only one group. Favorable ratings of phone – but not DVD – were associated with lower breast cancer knowledge and lower stage of considering mammograms. Presumably, these women had more to learn and, therefore, found the two-way phone intervention more relevant and useful. But, why were there not similar associations in the DVD group? Perhaps DVD recipients, regardless of knowledge or stage, were interested in the novel medium and graphics that could not be included by telephone.

Non-white participants rated the DVD more favorably, perhaps due to diversity of featured characters and race-tailored photographs - features that could not be reproduced by phone. Finally, we were surprised that women with lower cancer fatalism scores rated the DVD more favorably because messages combating fatalism in each intervention had the same elements (e.g., good treatment outcomes if found early, better to find out and do something about it). The conversational phone intervention may have been more acceptable for women with fatalistic beliefs than narrative from a DVD character who found her own cancer early and “beat it”.

Several study limitations must be considered. Because we could not directly measure DVD exposure, we followed the practice of other mailed intervention studies and relied on self reports [11–13]. However, a more direct measure of DVD exposure would have provided stronger conclusions. We had no exposure or usability data from intervention recipients who did not complete the follow-up survey; this limitation is exacerbated by differential completion rates in the two groups. Those not exposed to the interventions or who liked them least may have been less likely to complete the survey. Mammography outcome data that will eventually be available from our randomized trial may shed light on whether this is the case.

4.3 Conclusions & practice implications

DVD and telephone tailored interventions each had wide reach and favorable ratings, but the DVD had greatest exposure to at least partial content and more favorable overall ratings. This first evaluation of a tailored DVD provides support for this medium to deliver health behavior change interventions.

I confirm all patient/personal identifiers have been removed or disguised so the patient/person(s) described are not identifiable and cannot be identified through the details of the story.

Acknowledgments

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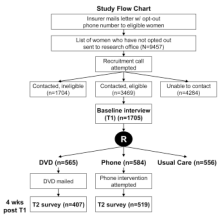

Fig. 1.
Study Flow Chart

Table I

Sample cells from DVD intervention development grid

Theoretical constructs	**Concepts**	**Visual image**	**Voiceover/ Character Script**
Perceived risk and benefits from early detection	You may still be at risk even with clinical or self exam and mammograms have benefit of finding smaller lumps	Sharon Jacobs character with jewelry box on dresser	Why do you need to add mammograms to breast exams?
		Picks up smaller pearl earring	With mammograms, lumps this size can be detected and removed before they begin to spread in the breast and the rest of the body.
		Picks up larger pearl earring	But, without mammograms, breast lumps usually keep growing – up to about this size, when they're large enough to be felt by a breast exam.
		Puts on larger pearl earring	Large pearls are nice. But, when you're talking about breast cancer, smaller is definitely better.
Perceived barrier (embarrassment)	Mammogram technologists are empathetic and trained to minimize exposure	Mammography technologist talking with mammogram machine in background	I do mammograms every day. And, once a year, I have one myself. So, I know what it's like on both sides of the machine. I tell women who might be embarrassed to wear a two-piece outfit so they don't have to get completely undressed, and I show them how to use the gown to keep themselves covered up as much as possible. I always tell women to let me know if they have any concerns before or during the mammogram. And finally, if you go somewhere and don't get the respect and privacy you deserve, don't put up with it. Shop around until you find a place that treats you right.

Table II

Participant characteristics and baseline beliefs by group

Characteristics/Beliefs	DVD Group (n = 407)	Phone Group (n = 519)	P value
Age, mean (SD)	52.3 (8.1)	51.9 (8.2)	0.372
Years of education, mean (SD)	14.5 (2.4)	14.3 (2.3)	0.287
	n (%)	n (%)	
Race			0.773
Black or African American	61 (15.0)	78 (15.1)	
White	337 (82.8)	431 (83.4)	
Other	9 (02.2)	8 (01.5)	
Married or living with a partner, n (%) yes	301 (74.0)	403 (77.6)	0.215
Currently working for pay, n (%) yes	321 (78.9)	405 (78.0)	0.809
Household income			0.131
<$30,000	70 (17.6)	81 (16.1)	
$30,001 – $50,000	101 (25.4)	112 (22.2)	
$50,001 – $75,000	84 (21.2)	113 (22.4)	
$75,001 – $100,000	70 (17.6)	86 (17.1)	
>$100,000	72 (18.1)	112 (22.2)	
Mammography stage (baseline)			0.773
Pre-contemplation	124 (30.5)	153 (29.5)	
Contemplation	283 (69.5)	366 (70.5)	
Preparation, # (%) yes	41 (10.1)	36 (6.9)	0.094

Note. For continuous variables and ordinal income, the two-sided normal-approximated Wilcoxon rank sum test was used. For categorical variables, the two-sided Fisher's exact test was used.

Two-sided Fisher's exact test p-value for Caucasian vs others was 0.79.

Two-sided Fisher's exact test p-value for dichotomized income (≤$50,000 vs. >$50,000) was 0.15

Table III

DVD versus phone exposure

	DVD (n = 407)		Phone (n = 519)		p-value
Exposure to content in DVD or phone call	n	%	n	%	<.001
Full exposure to all content	337	83.2	437	84.2	
Some exposure	36	8.9	2	0.4	
No exposure	32	7.9	80	15.4	
Unknown					

Note. The p-value is from the two-sided Fisher's Exact test.

[#]Because the 2 × 3 table was significant (p <.001), post-hoc 2 × 2 comparisons are:

Full exposure vs Some or None, p = 0.719.

Some exposure vs Full or None, p < 0.001.

No exposure vs Some or Full, p = 0.001.

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Table IV

DVD versus phone usability scores

	Usability Scores	DVD (n =337) Mean	SD	Phone (n = 432) Mean	SD	Unadjusted p-value
	Usability Total Score §	71.86	7.76	70.62	7.25	0.009
Item	Item-level comparisons					
1	You could understand messages you heard	4.79	0.41	4.67	0.51	0.002*
2	It took too much time	1.77	0.70	2.34	0.98	<.001*
3	It made you nervous	1.68	0.76	1.74	0.77	0.195
4	You enjoyed it	3.95	0.79	4.06	0.68	0.094
5	Information you received was important to you	4.27	0.73	4.27	0.69	0.674
6	You were very interested in the information	4.17	0.75	4.16	0.71	0.604
7	It made you think about breast cancer	4.38	0.73	4.39	0.65	0.674
8	Messages made sense to you	4.50	0.54	4.48	0.54	0.691
9	The information doesn't relate to you	1.84	0.86	1.92	0.84	0.070
10	The information was interesting	4.20	0.64	4.17	0.62	0.358
11	Now have enough information to make decision	4.32	0.70	4.37	0.61	0.574
12	Time passed quickly when using it	4.04	0.76	3.91	0.80	0.010*
13	You listened carefully to messages	4.37	0.50	4.34	0.52	0.543
14	The information was easy to understand	4.50	0.51	4.37	0.53	0.001*
15	You can use the information in your daily life	4.20	0.66	4.09	0.70	0.025
16	It seemed like it was meant just for you	3.43	1.02	3.39	0.96	0.393
17	You don't really need this information	1.95	0.88	1.98	0.86	0.548
18	You had trouble paying attention to it	1.70	0.58	1.80	0.64	0.032

§ Usability Total Score is the sum of 17 items, reverse scoring items 2, 3,9,17,18 and excluding item 3.

The unadjusted p-value is from the two-sided normal-approximated Wilcoxon rank sum test.

* Four items remained significant after adjusting for 18 item-level comparisons with the FDR method.

Item response options: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree.

Table V

Correlations between baseline scales and usability by group

	DVD (n =337)		Phone (n = 432)	
	r	**p**	**r**	**p**
Baseline scales				
Mammography screening scales				
Knowledge	−0.01	0.830	−0.15	0.002
Benefits	0.31	<.001	0.29	<.001
Self efficacy	0.25	<.001	0.17	0.001
Barriers	−0.24	<.001	−0.29	<.001
Fear	0.13	0.021	0.12	0.010
Fatalism	−0.10	0.061	−0.08	0.082
Susceptibility	0.10	0.064	0.03	0.513
Optimism	0.08	0.150	−0.07	0.167

r = Spearman rank correlation.