Adherence to clinical preventive services guidelines: Population-based online randomized trial

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Abstract

The Patient Protection and Affordable Care Act (ACA) addresses use of clinical preventive services relative to evidence-based guidelines by mandating that most health insurance plans provide coverage without cost-sharing for services that receive an A or B rating. However, knowledge about and positive attitudes towards guidelines are extremely low.

This study was a population-based randomized experiment to examine beliefs about and intentions to adhere to screening guidelines for the Prostate Specific Antigen (PSA) and Pap tests. The study had two objectives: (1) test reactions to and understanding of guidelines, and (2) experimentally compare receptivity to messages to promote PSA and Pap test recommendations. We first surveyed a population-based sample of (1) US adults age 18 and over, (2) subsample of women aged 65 or younger, (3) subsample of men aged 40 or older. A sample of 2923 completed an initial questionnaire. Next a subset of participants meeting eligibility criteria were recruited from the population-based sample into a message testing experiment: (1) women aged 65 or younger, (2) and men aged 40 or older. Participants meeting these eligibility requirements were randomized to gain, loss, or balanced PSA (men) or Pap test (women) message stimulus conditions and followed for 8 weeks. Data were collected through the GfK Custom Research panel. A total of 2401 were eligible, 2321 completed the baseline, and 1730 completed follow up.

Mixed effect regression models revealed that higher receptivity to messages was associated with greater intentions to seek cancer information and to speak to a Doctor about PSA and Pap tests. The loss frame was associated with higher intentions to speak to friends and family about PSA and Pap tests. Finally, perceived importance and personal understanding of guidelines predicted intentions to seek more information about them.

This study contributes to evidence on how best to inform and engage consumers regarding preventive services.

Introduction

Both the underuse and overuse of clinical preventive services relative to evidence-based guidelines is of significant public health concern. The Patient Protection and Affordable Care Act (ACA) attempts to address this issue by mandating that most health insurance plans provide coverage of clinical preventive services, without cost-sharing, if they receive an A or B rating and are thus recommended by the United States Preventive Services Task Force (USPSTF). Confusion has arisen around certain screenings that have been downgraded to a C rating or lower; and consumer charges that the government is rationing health care have become more common since passage of the ACA.

Informed consumers are an important foundation of ensuring the ACA provisions result in both effective and efficient use of preventive care. However, knowledge about and positive attitudes toward evidence-based guidelines developed by the USPSTF for preventive care are extremely low across sociodemographic groups (Wennberg, 2002; Koh & Sebelius, 2010). Given demonstrated low levels of consumer knowledge of and trust in guidelines coupled with the importance of consumer involvement in preventive care decisions, improved consumer education and decision-making supports regarding evidence-based clinical
preventive services are greatly needed (Carman, Mauer, & Yegian, 2010).

There are countless health messages delivered through commercial channels, such as pharmaceutical marketing and health plan advertising, and social marketing aimed at prevention and health promotion (e.g., in tobacco, nutrition & physical activity, and HIV/AIDS). Multiple converging messages can lead to information overload and confusion for patients that may be difficult for practitioners to alleviate through brief counseling. At the same time, some evidence-based health recommendations, such as those embodied in the USPSTF clinical preventive services guidelines, can seem counterintuitive and lead to reactance or resistance (Bensing, 2000; Santa, 2013). For example, the guidelines for the Prostate Specific Antigen (PSA) testing and for mammography screening have been controversial and elicited substantial public debate, much of it against the USPSTF guidelines (Squiers et al., 2011). These factors can affect patients' ability to understand their options, behavioral choices, and implications of treatment decisions, and lead to uninformed decision making.

Communicating and promoting health behavior changes are often easiest when there is solid clinical and scientific evidence to support the argument for change. For example, the evidence for health benefits of smoking prevention or increased fruit and vegetable consumption or condom use are clear-cut (Fitzgibbon et al., 2007). In these cases, practitioners can add value to patient decision making by providing a trusted source of additional information that can motivate behavior change (Evans, 2006). However, in cases where scientific information about health behavior is lacking or uncertain, practitioners' advice may seem contrary to consumers' expectations or desires. Many medical decisions are probabilistic (i.e., outcomes are not certain and there are benefits and risks associated with prevention and treatment options) and thus require knowledge acquisition and informed decision-making rather than behavior change in response to persuasive social marketing messages (Jimison & Sher, 2000). Clinical preventive services, where the medically recommended decision in some cases may be counterintuitive (i.e., to not obtain a PSA test), are a prime example of such decisions. Identifying the best information to communicate, and in what manner, becomes essential in order to promote informed and well advised patient decision-making (Evans & McCormack, 2008; Grimshaw, Shirran, & Thomas, 2001).

Lantz, Evans, Mead, Alvarez, and Stewart (2016) conducted a national survey of consumers to understand individual-level factors that may be useful in the design of communication strategies to increase knowledge and positive attitudes about evidence-based guidelines for clinical preventive services (including the USPSTF), and to reduce uncertainty among patients when guidelines change or are controversial (Lantz et al., 2016; Steinman, Bero, & Chren, 2006; Evans, Uhrig, Davis, & McCormack, 2009). This study found that 36.4% of adults knew that the Affordable Care Act requires insurance companies to cover proven preventive services without cost sharing but only 7.7% had heard of the USPSTF. Most respondents agreed that research/scientific evidence and expert medical opinion are important for the creation of guidelines, and that clinicians should follow them. However when presented with patient scenarios in which a physician made a guideline-based recommendation against a cancer screening test, less than 10% believed that this recommendation alone was sufficient for patient decision making. Clearly, different kinds of information, as well as new and more persuasive means of message presentation, are needed to assist patients in making informed decisions and choosing to follow guidelines in their care.

In order to design more effective messages to promote patient adherence to clinical preventive service guidelines, more research is needed on the framing of messages and on how to increase message receptivity (O'Keefe & Jensen, 2007; Evans, Davis, Umanzor, Patel, & Khan, 2011). Framing represents the manner in which messages are presented, the salient information presented, and the depiction of benefits or consequences of acting or not acting on the message (Rothman, Bartels, Wlaschin, & Salovey, 2006; Gallagher & Updegraff, 2012). Framing has been found to be important because messages presenting nearly identical information but in different frames can have variable effects on health behavior (Gallagher & Updegraff, 2012). For example, consider the difference between the benefit, or gain-framed, message that “preventive services can make you healthier” and the consequence, or loss-framed, message that “preventive services can prevent negative health effects.” These messages convey much the same information but have different frames.

Message receptivity (MR) is a construct that represents rational and affective reactions to messages (Dillard, Shen, & Vail, 2007). Health communication studies have established measures of “receptivity” to public service advertising that capture audiences' subjective appraisals of message persuasiveness, believability, and other aspects of cognitive processing (Biener, McCallum-Keeler, & Nyman, 2000; Palmgreen, Lorch, Stephenson, Hoyle, & Donohew, 2007). These measures have been shown to predict changes in attitudes toward the subject matter of advertisements (Evans, Yan, & Datta, 2012; Niederdeppe, Davis, Farrelly, & Yarosevich, 2007). The current study used these same measures, based on a validated scale from the lead author’s previous research (Evans et al., 2011, 2012).

The present population-based study was a randomized experiment conducted online to test reactions to messages intended to promote the importance, understanding, and adherence to preventive services screening guidelines. The specific guidelines tested were for the PSA and Pap test screening. The study had two objectives: (1) General testing of reactions to and understanding of USPSTF guidelines, and (2) a randomized controlled experiment in which a sub-sample of eligible participants were randomized to a specific message condition, completed a baseline questionnaire, and were followed up 8 weeks later to test reactions to messages to promote PSA and Pap test preventive services recommendations. The overall goal was to experimentally test which message frames about specific guidelines generate the most receptivity between a baseline and 8-week follow up and best encourage people to form intentions to follow guidelines in their own health care.

Methods

Overview

The overall target population consisted of the following: (1) non-institutionalized adults age 18 and over residing in the United States, (2) a subsample of women aged 65 or younger, and (3) a subsample of men aged 40 or older. Data were collected by GfK Custom Research, an online research panel. Current members of the panel meeting criteria were randomly selected and recruited to participate in the study, as described in detail below.

In order to qualify for the research, participants were presented with a consent form and asked whether they agreed to participate. If they consented to participate, they were then shown the questionnaire. Those who chose not to participate (selecting “no” to the consent) were excused.

Sample and data collection

We recruited a total of 5032 members of the GfK panel. Of these, 3119 responded (62.0% completion rate) and 2923 were
eligible under the inclusion/exclusion criteria, consented, and completed the initial questionnaire (93.7% eligibility rate). A total of 2401 were eligible for the message testing experiment, 2321 (96.7%) consented, were randomized to a message condition, and completed the baseline message testing questionnaire. A total of 1730 completed the follow up (74.5% follow up rate). GfK used an equal probability selection method (EPSEM) sampling procedure. To ensure that the sample for this study reflected EPSEM results, a standardized sample weighting methodology was employed (Dennis, 2010). GfK used data from the latest March supplement of the Current Population Survey (CPS) along several demographic dimensions, including race/ethnicity, age, gender, and location. This way, the weighted distribution of KP perfectly matches that of the US adult population. The weighting methodology is available online: (http://www.gfk.com/Documents/GfK-KnowledgePanel-Design-Summary.pdf).

To sample the population, GfK targeted households from its KnowledgePanel, a probability-based web panel designed to be representative of the United States. Panel members are randomly recruited through probability-based sampling, and households are provided with access to the Internet and hardware if needed. GfK recruits panel members by using address-based sampling methods. Once household members are recruited for the panel and assigned to a study sample, they are notified by email for survey taking; or panelists can visit their online member page for survey taking (instead of being contacted by telephone or postal mail).

Instrument and measures

The initial questionnaire completed by all 2923 adults focused on participant knowledge, attitudes, and beliefs about health care, sources of health information, and beliefs about the importance and perceived understanding of the USPSTF guidelines, and health care coverage and practices (e.g., frequency of doctor visits). These items were developed through a prior study published by the research team (Lantz et al., 2016). The initial questionnaire took approximately 10 min to complete and included 30 questions. GfK provided the investigators with detailed sociodemographic information on the sample, which was used in the analysis.

After completing the initial questionnaire, and during the same online GfK survey session, participants were screened for eligibility for the message testing experiment: Qualified women aged 65 or younger (to test Pap test messages), and qualified men aged 40 or older (to test PSA messages). These eligibility criteria were used to include only those women for whom the Pap test USPSTF guidelines would be applicable, and only those men for whom the PSA test guidelines would be applicable.

Eligible participants were randomly assigned to 1 of 6 message testing experimental conditions, as shown in Table 1 (n = 2321). Following recent research on differences in response to gain and loss framed messages, we developed messages that were based on content about the individual benefits/consequences of following/not following the specific guidelines.

The message testing experiment questionnaire was 15 min long and included 45 questions, including specific questions about attitudes and beliefs regarding either the PSA or Pap test guidelines, reactions and receptivity to specific messages concerning each message presented, and resulting self-efficacy, outcome expectations, and other attitudes, beliefs, and intentions to consider and follow the guidelines in personal health care. All questions were derived from validated scales used in the investigators’ previous research (Lantz et al., 2016; Evans et al., 2011). Specifically, these scales have been found to be predictive of outcomes in previous message testing experiments (Evans et al., 2011) and were adapted by the research team to the specific content of preventive services adherence (i.e., the stems of the validated questions were paired with response options concerning preventive services) and tested in a previous study (Lantz et al., 2016). Scales measured level of agreement (e.g., on a scale from strongly agree to strongly disagree, I am confident that I can consistently follow the recommendations in this message) or as a dichotomous yes/no, where appropriate (e.g., Will you follow the recommendations in this message in your future health care decisions?). The questions regarding specific messages were all framed in terms of what the individual participant would do if they were in a situation of deciding whether to follow specific guidelines in their own health care.

Within each message condition, the questionnaire included a specific vignette that described an imaginary life situation and then within that context a series of three potential messages about making a preventive services utilization decision to take or not take the PSA or Pap test framed in terms of either gain, loss, or a balance of gain and loss. The vignettes were randomly assigned to each participant and then messages presented in a randomly assigned sequence. Finally, for each message frame presented, respondents were asked if they would actually follow the guideline in deciding about their own health care given the vignette presented.

Message testing design

The basic design of the message testing experiment was to compare gain-framed, loss-framed, and balanced (benefits and consequences both communicated) clinical preventive service messages for both the Pap test and PSA test. The design summary is shown in Table 1 below.

Eight weeks after the baseline assessment, participants who completed message testing baseline (ie, those eligible and consented to one of the 6 experimental conditions only) were invited to log in to the GfK survey web page again and complete a follow up questionnaire. The follow up contained the same questions, and again randomly presented the same sequence of vignettes/assigned to get these messages frames shown to that participant at the message testing experiment baseline. The vignettes/message frames were presented again to stimulate respondents and remind them of the messages they were asked to consider at baseline, following previous methods employed by the research team. The survey included additional questions asking whether the respondent has searched online, or through other sources, for additional information about the USPSTF, for information about specific guidelines, and whether they had taken other actions such as speaking to their doctor about USPSTF and/or specific guidelines (latter questions conditioned on whether the respondent had the opportunity to do so between pre-test and post-test).

For the PSA conditions, only men were randomly assigned to get these messages. As noted earlier, men from the initial population-based sample who were under age 40 (i.e., for whom no organization recommends PSA screening) were dropped from the message testing experiment. All others were randomized to
gain/loss/balanced conditions. For the Pap conditions, only women were randomly assigned to get these messages. Women from the initial sample who were over age 65 (for whom Pap test guidelines were previously had cancer, know someone who did). For example, this was the description for the Pap test condition:

“You just found out that your best friend was diagnosed with cervical cancer. You remember that you had a Pap test (also called a Pap smear) after your last doctor visit about 1 year ago, but you are worried and immediately call your doctor to make an appointment for another Pap test. Your doctor tells you that based on your personal history you are not at high risk for cervical cancer, and that Pap tests are only recommended for women your age every 3 years. You should wait another 2 years to get your next Pap test. She provides you with written information and points you to resources including Websites that describe the guidelines and suggests that you review them. You decide that you will go search for more information on the Pap test.

After meeting with the doctor, you go to a health care website that you trust and look up information on the Pap test. On the Website home that describes the guidelines, you read the following message:...

Following this overall description was a series of three, one-paragraph descriptions of the benefits and consequences or a combination of benefits and consequences (depending on whether the participant was in the gain, loss, or balanced condition) of following or not following the health care recommendations contained in the guidelines, presented in narrative text with no other enhancements. There was a distinct series of three descriptions for each study message condition. Each series of descriptions was worded in a nearly identical manner, with the exception of presentation of benefits, consequences, or a combination of these factors that only the frame varied between messages. To avoid potential effects of message sequencing on outcomes (Niederdeppe et al., 2007), the order of presentation of the three paragraph descriptions was randomized for participants within each condition.

Data analysis

Descriptive statistics (means, percentages, standard errors) were calculated for all measured variables collected on the full sample of initial population-based questionnaire participants. All subsequent data analysis was conducted on the message testing experimental sample of 2321 eligible participants. As noted, exploratory factor analysis was conducted on the variables for participant beliefs about the “importance” and their “understanding” of preventive services guidelines and for the message receptivity scale. Tables 2 and 3 summarize the results. Overall, we identified separate factors for understanding and importance, and a message receptivity factor, and used these in subsequent analyzes.

Next, we estimated mixed effect regression models to examine the effects of change in message receptivity from message testing experimental sample of 2321 eligible participants. As noted, exploratory factor analysis was conducted on the variables for participant beliefs about the “importance” and their “understanding” of preventive services guidelines and for the message receptivity scale. Tables 2 and 3 summarize the results. Overall, we identified separate factors for understanding and importance, and a message receptivity factor, and used these in subsequent analyzes.

We estimated mixed effect logistic regression models for the entire sample (both PSA and Pap test messaging conditions) to examine the effect of participant reaction to messages and understanding of content on whether they intend to consider and follow guidelines in their preventive care decision-making process. Change in receptivity from baseline to follow up was modeled as an interaction term in a fixed effect model, with the factors described above, as well as the participant’s subjective belief of their own cancer risk, included as additional fixed effect covariates. A random intercept term, and a random slope term for the participant’s gender, was also included in each model.

Mixed effect logistic regression models were constructed in a similar manner to examine the effect of treatment condition (receiving a gain, loss, or balanced message) and other beliefs on positive change in outcomes from baseline to follow up around behaviors such as seeking new information and in considering and following USPSTF guidelines. Stata version 12 (College Station, TX) was used in all analyses.

We used complete case analysis methods to handle missing data. Only those respondents with both baseline and follow up message testing experiment data were used in the mixed effect model. We separately conducted paired t-tests to examine any significant differences between the baseline and follow up message testing experiment samples and found none.

Results

The initial population-based sample of 2923 was 77.0% White, 12.2% Hispanic, 8.3% African American, and 2.5% other. A total of 54.4% of participants were male, 34% had a Bachelor’s degree or higher, 71.4% were age 45 or older, 61.6% were currently married, and 85.8% lived in a designated metropolitan area (DMA). A total of 59.1% reported working full time and 79.5% reported having home Internet access (without receiving it from GIK, which provided Internet if necessary to participate in the panel).

All subsequent results reported below are for the message testing experimental sample of 2321 eligible participants. As noted, exploratory factor analysis was conducted on the variables for participant beliefs about the “importance” and their “understanding” of preventive services guidelines and for the message receptivity scale. Tables 2 and 3 summarize the results. Overall, we identified separate factors for understanding and importance, and a message receptivity factor, and used these in subsequent analyzes.

Next, we estimated mixed effect regression models to examine the changes in message receptivity from message testing

| Importance and understanding of guidelines | Factor loadings |
|------------------------------------------|----------------|
| Factor 1 | Factor 2 |
| How would you rate your understanding of preventive care? | 0.1829 | 0.7422 |
| How important is preventive care for your own personal health? | 0.7077 | 0.3732 |
| How important is preventive care for your family’s health? | 0.7333 | 0.3466 |
| How would you rate your understanding of “guidelines” for preventive care? | 0.2695 | 0.6974 |
| How important are guidelines to you for your own personal preventive care decisions? | 0.8477 | 0.1588 |
| How important are guidelines for preventive care decisions for your family? | 0.8568 | 0.1331 |

Scale Reliability Coefficient (Cronbach’s Alpha/Pearson Correlation) $\alpha=0.8861$, $\rho=0.7981$
higher odds of seeking more information on the internet, (OR = 1.39, CI = 1.13, 1.70, p < 0.001) intention to speak to a health professional (OR = 2.06, CI = 1.56, 2.72, p < 0.001), as well as indication that messages in their condition grabbed their attention (OR = 3.68, CI = 2.89, 4.70, p < 0.001). Finally, the factor of belief in the importance of preventive care was associated with higher odds of seeking more information on the internet (OR = 1.24, CI = 1.05, 1.45, p < 0.009) and lower odds of speaking to family and friends (OR = 0.78, CI = 0.66, 0.92, p = 0.003) and of indicating messages in their condition grabbed their attention (OR = 0.75, CI = 0.63, 0.90, p < 0.001). Note that for these logistic regression analyses, the reference group is the gain frame message condition.

**Discussion**

The research findings presented here build upon the very limited evidence base on messages to promote consumer understanding and adherence to clinical preventive services guidelines. As noted earlier, consumers are generally not well informed about the importance of evidence-based medical decision making in general, and clinical preventive services in particular (Lantz et al., 2016; Steinman et al., 2006). However, there is little prior research regarding how expert guidelines or recommendations are framed in health communications (Evans et al., 2009). The current research helps to shed light on two important areas of research interest: (1) developing, refining, testing, and evaluating patient-centered approaches for translating evidence-based care into health care practice in ways that account for individual patient preferences for various outcomes; and (2) identifying, testing, and/or evaluating methods that can be used to assess the patient perspective when researching behaviors, lifestyles, and choices within the patient’s control that may influence their outcomes (Lantz et al., 2016).

This research also provides preliminary information to help craft effective communications regarding confusing and/or controversial guidelines for preventive behaviors that assist patients in considering “what are my options and what are the benefits and harms of those options?” While the controversial guidelines being considered in this particular research are about cancer screening, our findings are significant as they may apply to other types of USPSTF recommendations and patient decisions (Evans & McCormack, 2008).

As noted earlier, while not an explicit message frame (Gallagher & Updegrove, 2012), message receptivity has been shown to be an important immediate effect of exposure to health messages that predicts future behavioral and related outcomes (Biener et al.,
Table 5
Message frames and outcomes. (OR and 95% confidence interval and \( P \) values shown)

|                                | Seek more information on internet (\( n = 2321 \)) | \( P \) value | Talk to a health professional (\( n = 2321 \)) | \( P \) value | Talk to friends or family (\( n = 2321 \)) | \( P \) value |
|--------------------------------|-----------------------------------------------|----------------|-----------------------------------------------|----------------|---------------------------------------------|----------------|
| Received loss pap or PSA message (gain=ref) | 1.095 (0.762, 1.574) | 0.623 | 0.612* (0.394, 0.953) | 0.030 | 1.486* (1.002, 2.202) | 0.049 |
| Received balanced pap or PSA message (gain=ref) | 0.982 (0.687, 1.403) | 0.919 | 0.801 (0.518, 1.241) | 0.321 | 1.256 (0.854, 1.849) | 0.247 |
| Change from baseline to follow up in loss group | 0.864 (0.624, 1.196) | 0.379 | 0.899 (0.594, 1.361) | 0.615 | 1.574* (1.094, 2.204) | 0.014 |
| Change from baseline to follow up in gain group (gain=ref) | 1.127 (0.708, 1.792) | 0.614 | 1.428 (0.817, 2.497) | 0.211 | 0.697 (0.416, 1.166) | 0.169 |
| Change from baseline to follow up in balanced group (gain=ref) | 1.113 (0.707, 1.751) | 0.644 | 1.239 (0.689, 2.227) | 0.474 | 0.647 (0.394, 1.062) | 0.085 |
| Lower than average risk of cancer | 1.470 (0.970, 2.226) | 0.069 | 1.132 (0.651, 1.967) | 0.660 | 1.133 (0.729, 1.760) | 0.578 |
| Higher than average risk of cancer | 1.122 (0.857, 1.471) | 0.402 | 1.233 (0.876, 1.735) | 0.230 | 0.997 (0.745, 1.334) | 0.984 |
| Factor of understanding content (gain=ref) | 1.387*** (1.134, 1.698) | 0.001 | 2.061*** (1.563, 2.719) | 0.000 | 0.972 (0.787, 1.200) | 0.789 |
| Factor of importance of preventive care (gain=ref) | 1.236*** (1.053, 1.450) | 0.009 | 1.215 (1.000, 1.476) | 0.050 | 0.781*** (0.663, 0.919) | 0.003 |
| Would you say the message grabbed your attention? | 0.708 (0.476, 1.054) | 0.089 | 0.993 (0.581, 1.699) | 0.980 | 1.238 (0.858, 1.785) | 0.255 |
| If I consistently follow the recommendations in this message, I will have better health | 0.855 (0.580, 1.260) | 0.429 | 1.027 (0.616, 1.712) | 0.919 | 1.686*** (1.178, 2.413) | 0.004 |
| How likely are you to follow the U.S. Preventive Services Task Force guidelines in regard to your own use of preventive care | 0.847 (0.590, 1.216) | 0.369 | 0.993 (0.623, 1.583) | 0.978 | 1.287 (0.934, 1.772) | 0.123 |
| Change from baseline to follow up in loss group | 1.457 (0.878, 2.421) | 0.146 | 0.971 (0.504, 1.871) | 0.930 | 0.863 (0.542, 1.374) | 0.534 |
| Change from baseline to follow up in balanced group (gain=ref) | 1.505 (0.924, 2.449) | 0.100 | 1.132 (0.585, 2.190) | 0.713 | 0.757 (0.480, 1.193) | 0.230 |
| Lower than average risk of cancer | 2.055*** (1.325, 3.186) | 0.001 | 0.615 (0.338, 1.120) | 0.112 | 1.213 (0.788, 1.869) | 0.381 |
| Higher than average risk of cancer | 0.897 (0.676, 1.190) | 0.450 | 1.324 (0.903, 1.944) | 0.153 | 0.885 (0.678, 1.154) | 0.365 |
| Understanding content factor | 3.679*** (2.885, 4.691) | 0.000 | 4.496*** (3.194, 6.329) | 0.000 | 3.334*** (2.679, 4.148) | 0.000 |
| Importance of preventive care factor | 0.753*** (0.633, 0.895) | 0.001 | 0.828 (0.657, 1.044) | 0.110 | 1.238*** (1.059, 1.448) | 0.007 |

\* \( p < .05 \).
\** \( p < .01 \).
First, this study is consistent with previous message receptivity research, and finds that it is associated with a range of effects on preventive services outcomes (Niederdeppe et al., 2007). Generally, higher receptivity and an increase in receptivity between baseline and follow up in our experiment were associated with greater intentions to seek more information about preventive services. Receptivity to message stimulates interest in knowing more about preventive services, which presumably would lead to more informed decision-making. This was true both with regard to specific PSA and Pap test messages. A natural conclusion is that messages need to be designed to maximize receptivity. The question is how best to accomplish this.

Second, we found that understanding and belief in the importance of preventive services as measured in this research (1) represent scale variables that can be used in future research, and (2) are highly predictive of preventive services outcomes. Generally, having greater understanding of guidelines predicts more interest in gaining information about preventive services. This in turn would naturally lead to more informed decision making. Again, this was true both with regard to specific PSA and Pap test messages. The question of course is how best to increase understanding.

However, we found mixed results for the belief in importance factor. In some cases, such as speaking to a health care professional, it predicted greater likelihood of future action. However, in other cases such as speaking to family and friends and a message grabbing the individual’s attention, it predicted lesser likelihood of the action. One interpretation is that this indicates belief in importance calls for stronger and more definitive action on the part of the individual. In any case, increasing belief in the importance of clinical preventive services appears to be an importance objective, but how best to accomplish it?

Our experiment was designed to investigate the influence of different frames on message receptivity, understanding, and belief in importance of guidelines. As such, it was a study of the comparative effectiveness of messages. We found that the loss frame was associated with increased intentions to speak to family and friends about preventive services. Given that family and friends would presumably be among the “first stops” as an individual becomes more informed about guidelines and preventive services, this may indicate the loss-framing increases contemplation (rather than action) to make informed decision and follow guidelines in personal care. Following the Transtheoretical model, promoting contemplation is an important step, but an early one that would not alone be sufficient to change behavior (Prochaska, DiClemente, & Norcross, 1992). Also, a balanced message frame was associated with likelihood to follow U.S. Preventive Services Guidelines. However, no other framing effects were observed in the experimental study, and no effects were observed over time in change of beliefs relative to treatment groups.

The lack of other significant framing effects suggests two competing hypotheses that deserve further investigation. First, the relatively information-poor, briefly presented, text-only messages used in this experiment are insufficiently persuasive and informative to lead to behavioral effects. Previous research suggests that graphic, interactive, and repeat presentation (ie, higher dosage) of messages is required to produce meaningful effects (Evans et al., 2009; Hornik, Jacobsohn, Orwin, Piesse, & Kalton, 2008). Because there is scant evidence in the preventive services and informed decision making literature on these points (Evans et al., 2009), more research is needed to test whether enhanced, information rich messages would have greater effects on preventive services outcomes.

Second, it is possible that messaging in simple text mode, without elaboration or other sources of stimuli, is simply insufficient to have behavioral effects. Based on work in public health promotion, such as tobacco control (Centers for Disease Control and Prevention, 2015; Evans, Davis, & Farrelly, 2008), it may be that multiple types of interventions involving the various levels of social ecology (eg, interpersonal, community, media, policy) are required to produce meaningful effects on preventive services outcomes. Field based studies to examine larger campaigns to change health care consumer behavior would be needed to examine this important hypothesis.

There are some important limitations to this research. First, while we gathered a nationally representative sample using the GfK panel, and employed a randomized experimental design, testing reactions to preventive services messages outside of a health care environment, and outside contexts on which consumers focus on health care issues is somewhat artificial. The study has high internal validity but relatively low external validity. Field-based studies in health care, or health decision-making, settings would be needed to achieve higher external validity.

Second, since little is known about how to construct preventive services messages, we had little to go on in constructing effective message frames and creating persuasive content. Our findings reflect some progress in understanding these factors, but also significant gaps. It is not clear whether framing alone can produce meaningful preventive services decision-making effects. More research is needed on the framing and message content factors noted above to isolate these effects. Additionally because our study only targeted consumers, we cannot comment on the potential contributions of providers in framing clinical preventive services messages. Future research that includes provider input on framing is needed.

Conclusion

Prior research demonstrates that health care consumers generally are not well informed about evidence-based care and that they hold beliefs and values that interfere with optimal decisions, including the belief that more care is almost always better (Kivinieme & Hay, 2012; Allen, Solberg Nes, Marnach, Polga, & Jenkins, 2012). Additionally, attempts to inform consumers about treatments and tests that are overused and often unnecessary (such as the Choosing Wisely campaign) face the difficult challenge of telling people “what not to do.” (Briss, Rimer, & Reilley, 2004)

In other areas of health behavior and health care promotion, use of elaborated messaging using graphic, video, and narrative story (eg, a doctor and patient communicating successfully about guidelines) and case study methods have been shown to be highly effective (Harmon, 2011). Yet no such approach has been applied in promotion of preventive services guidelines in health care (Lantz et al., 2016). Further, no comparative effectiveness research has been conducted on the relative benefits of specific enhancements and elaborations, such as video versus narrative text-based messages to promote patient-provider communication about preventive services (Andrade, Evans, Edberg, Cubana, & Cleary, 2015). This study starts the process of filling those gaps and demonstrate comparative effectiveness of messages for PSA screening and Pap test decision making (Hoffman, Elmore, Fairfield, & Gerstein, 2014).

Future research should examine how practitioners can best communicate with patients about following preventive services guidelines, both individually and in combination with other strategies for provider education (eg, Continuing Medical Education, publications) and consumer education (eg, direct-to-consumer communication and marketing) (Steinman et al., 2006).
To develop these strategies for practitioners, more experiments in which messages are delivered and reactions measured under controlled conditions are needed to demonstrate how messages can best be changed. This study suggests that message receptivity could be a mediating variable between message framing and attitudes or adherence to guidelines. Future research should examine multiple pathways through which preventive services messages may influence adherence outcomes.

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References

Allen, S. V., Volberg Nes, L., Marnach, M. L., Polga, K., Jenkins, S. M., et al. (2012). Patient understanding of the revised USPSTF screening mammogram guidelines: need for development and patient decision aids. BMC Women’s Health, 12, 36.

Andrade, E., Evans, W. D., Edberg, M., Cubana, I., & Cleary, S. (2015). Victor and Erika webisodes for the adelante brand: An innovative audience engagement strategy for prevention. Journal of Health Communication., http://dx.doi.org/10.1080/10810731.2015.1018648.

Bensing, J. (2000). Bridging the gap: The separate worlds of evidence-based medicine and patient-centered medicine. Patient Education and Counseling, 39(1), 17–25.

Biener, L., McCallum-Keefer, G., & Nyman, A. L. (2000). Adults’ response to Massachusetts anti-tobacco television advertisements: Impact of viewer and advertisement characteristics. Tobacco Control, 9, 401–407.

Bris, P., Rimmer, B., Reilley, B., et al. (2004). Promoting informed decisions about cancer screening in communities and healthcare systems. American Journal of Preventive Medicine, 26(1), 67–80.

Carman, K. L., Mauer, M., Yegian, J. M., et al. (2010). Evidence that consumers are skeptical about evidence-based health care. Health Affairs, 29(7), 1400–1406.

Centers for Disease Control and Prevention (2014). Best practices for comprehensive tobacco control programs. http://www.cdc.gov/tobacco/stateandcommunity/best_practices/ Retrieved on 15.11.15.

Dillard, J. P., Shen, L., & Vail, R. G. (2007). Does perceived message effectiveness cause persuasion or vice versa? 17 Consistent Answers. Human Communication Research, 33(4), 467–488.

Dennis, J. M. (2010). KnowledgePanel: Processes and procedures contributing to sample representativeness and tests for self-selection bias. (http://www.knowledgenet.com/ganp/docs/knowledgenpanel-statistical-methods-note.pdf) Retrieved on 15.11.15.

Evans, W. D. (2006). How social marketing works in health care. British Medical Journal, 322, 1207–1210.

Evans, W. D., & McCormack, L. (2008). Applying social marketing in health care: Communicating evidence to change consumer behavior. Medical Decision Making, 28(5), 781–792.

Evans, W. D., Uhling, J., Davis, K., & McCormack, L. (2009). Efficacy methods to evaluate health communication and marketing campaigns. Journal of Health Communication, 14(3), 244–254.

Evans, W. D., Davis, K. C., Umanzor, C., Patel, K., & Khan, M. (2011). Evaluation of sexual communication messages. BMC Reproductive Health, 8[15d]). http://dx.doi.org/10.1186/1742-4755-8-15.

Evans, W. D., Yan, T., & Datta, R. (2012). Receptivity to 2010 US census media messages.Journal of Mass Communication and Journalism, 2(9). http://dx.doi.org/10.4172/2165-7912.1000126.

Evans, W. D., Davis, K. C., & Farrelly, M. C. (2008). Planning for a media evaluation In: D. Holden, & M. Zimmerman (Eds.), A practical guide to program evaluation planning. Thousand Oaks, CA: Sage Publications, Inc.

Fitzgibbon, M., Gans, K., Evans, W. D., Vyaswanath, V., Johnson-Taylor, W., Krebs-Smith, S., et al. (2007). Communicating healthy eating: Lessons learned and future directions. Journal of Nutrition Education and Behavior, 39(2), S63–S71 (51).

Grimshaw, J. M., Shirran, L., Thomas, R., et al. (2001). Changing provider behavior: An overview of systematic reviews of interventions. Medical Care, 39(8), 112–145.

Gallagher, K. M., & Updiggere, J. A. (2012). Health message framing effects on attitudes, intentions, and behavior: A meta-analytic review. Annals of Behavioral Medicine, 43, 101–116.

Hornik, R., Jacobsohn, L., Orwin, R., Piesse, A., & Kalton, G. (2008). Effects of the National Youth Anti-Drug Media Campaign on youths. American Journal of Public Health, 98(12), 2229–2236.

Harmon, K. (2011). Does science need more compelling stories to foster public trust? Scientific American Blog. Retrieved on November 15, 2015 from (http://blogs.scientificamerican.com/observations/2011/11/08/does-science-need-more-compelling-stories-to-foster-public-trust/).

Hoffman, R. M., Elmore, J. G., Fairfield, K. M., Gerstein, B. S., et al. (2014). Lack of shared decision making in cancer screening discussion: Results from a national survey. American Journal of Preventive Medicine, 47(3), 251059.

Jemison, H. B., & Sher, P. (2000). Advances in presenting health information to patients in decision making in health care: Theory, psychology, and applications In: G. B. Chapman, & F. A. Sonnenberg (Eds.), Cambridge series on decision making (p. 334) Cambridge (UK): Cambridge University Press.

Koh, H. K., & Sebelius, K. G. (2010). Promising prevention through the Affordable Care Act. Newly England Journal of Medicine, 363, 1296–1299.

Kiviniemi, M. T., & Hay, J. L. (2012). Awareness of the 2009 US Preventive Services Task Force recommends in mammography screening guidelines in women ages 40–49 and 50+. BMC Public Health, 12, 899.

Lantz, P., Evans, W. D., Mead, K. H., Alvarez, C. P., & Stewart, L. (2016). Knowledge and attitudes regarding guidelines for clinical preventive services: results from a national survey. Milbank Quarterly.

Niederdeppe, J., Davis, K. C., Farrelly, M. C., & Yarsevich, J. (2007). Stylistic features, need for sensation, and confirmed recall of national smoking prevention advertisements. Journal of Communication, 57, 2729e2729.

O’Keeffe, D. J., & Jensen, J. D. (2007). The relative persuasiveness of gain-framed loss-framed messages for encouraging disease prevention behaviors: a meta-analytic review. Journal of Health Communication: International Perspectives, 12 (7), 623–644.

Palmgreen, P., Lorch, E. P., Stephenson, M. T., Hoyle, R. H., & Donohew, L. (2007). Effects of the Office of National Drug Control Policy’s Marijuana Initiative Campaign on high-sensation-seeking adolescents. American Journal of Public Health, 97(9), 1644–1649.

Prochaska, J. O., DiClemente, C. C., & Norcross, J. C. (1992). In search of how people change: Applications to addictive behaviors. American Psychologist, 47(9), 1102–1114.

Rothman, A. J., Bartels, R. D., Wlaschin, J., & Salovey, P. (2006). The strategic use of gain- and loss-framed messages to promote healthy behavior: How theory can inform practice. Journal of Communication, 56, S202–S220.

Santa, J. S. (2013). Communicating information about “what not to do” to consumers. BMC Medical Informatics Decision Making, 13(Suppl 3), S2.

Squiers, L. B., Holden, D. J., Dolina, S. E., Kim, A. E., Bann, C. M., & Renauld, J. M. (2011). The public’s response to the U.S. Preventive Services Task Force’s 2009 recommendations on mammography screening. American Journal of Preventive Medicine, 40(5), 497–504.

Steinman, M., Bero, L., Chren, M., et al. (2006). The promotion of Gabapentin: An analysis of internal industry documents. Annals of Internal Medicine, 145, 284–293.

Wennberg, J. E. (2002). Unwarranted variations in healthcare delivery: Implications for academic medical centers. British Medical Journal, 325, 961–964.