

Evaluation of a health communication campaign to increase blood pressure screenings among high risk
community residents

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Master's Thesis

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Submitted: February 2013

Abstract

Almost one-third of U.S. adults ages 20 and over have hypertension, a major risk factor for heart disease and stroke. Regular blood pressure screenings and subsequent treatment can significantly reduce morbidity and mortality. In response to this health concern, researchers have developed interventions to motivate at-risk individuals to pursue a blood pressure check. It is important to assess these interventions for effectiveness. This study's objective was to examine one such intervention: a direct-mailing campaign in King County, Washington. Specifically, this research investigated the relationship between health communication processing variables and a subsequent blood pressure check, and whether individualizing the message was effective in motivating behavior change. This study also assessed whether certain demographic characteristics influenced the likelihood for individuals to report a blood pressure check after receiving the mailing. Data was used from a randomized control intervention that utilized a 2x2 design, manipulating personal risk information and source personalization. Participants of this intervention resided in one of four fire districts in King County, Washington, and were eligible for the study if they had a systolic blood pressure ≥ 160 mmHg and/or a diastolic blood pressure ≥ 100 mmHg, as reported by emergency medical technicians (EMTs) during a 911 visit between July 2007 and September 2009. Statistical analyses, including descriptive, bivariate, and logistic regression, were conducted to measure the participants' likelihood of reporting a blood pressure check subsequent to receiving a brochure. Results from bi-variate analyses indicated that some information processes, including how much the participant liked the mailing and how useful he or she found the mailing, were associated with reporting a repeat blood pressure check. Older age, insurance status, and prior history of hypertension were also positively associated with the outcome variable, providing evidence that direct-mailing interventions can be more effective for certain demographics than others.

Introduction

High blood pressure is a major risk factor for heart disease and stroke, the first and fourth leading causes of death, respectively.¹ According to the American Heart Association, approximately one in three U.S. adults has high blood pressure, also known as hypertension.² The cardiovascular benefits of treating hypertension are well known and result in significant reductions in morbidity and mortality.³ Thus, encouraging individuals with high blood pressure to measure and monitor their condition is extremely important. Current hypertension guidelines recommend target blood pressures below 140/90 mmHg.² One way to motivate consistent routine screening is through direct mail communication campaigns targeted at individuals with high blood pressure.

Meischke et al. conducted a randomized communication campaign intended to encourage individuals with high blood pressure to pursue a free blood pressure check at a local fire department.⁴ The sample population was identified by emergency medical technicians (EMTs) during a 911 call as having a systolic blood pressure ≥ 160 mmHg and/or a diastolic blood pressure ≥ 100 mmHg. The subjects received a direct mailing consisting of a letter and a high blood pressure alert card. Because literature suggests that health information individualized to personal characteristics can be more effective than non-individualized health messages,⁵ half of the subjects were given their actual blood pressure values taken by the EMT on the scene. The other half received the mailing with a message that their blood pressure was “very high” but without specific values. All mailings also included information about the benefits of screening and the ease with which one can obtain a free blood pressure check at a local fire station.⁴ A survey followed four to six weeks after the mailing, assessing the subjects’ responses to the mailing, as well as the subjects’ health history, health beliefs, and demographic information. For a detailed description of the intervention, see Meischke et al.⁴

The objective of the current study was to assess if evaluation of the mailings were related to self-reported blood pressure screening. Guided by the information processing model, this study aimed to assess the information processes that are related to pursuing a blood pressure check after receiving the blood pressure

alert mailing. The information processing paradigm is an input/output model. The input factors include the source, message, channel, receiver, and destination of the communication.⁶ The outputs consist of “information-processes that the communication must evoke in the target person for the persuasive impact to occur.”⁶ These include exposure to the communication, attending to it, liking it, understanding it, learning from it, and yielding to the behavioral recommendation.⁷ The specific information processes that this study investigated include: how surprised the subject was to receive the mailing, how worried he or she was to receive the mailing, how much he or she liked the mailing, and how useful he or she found the mailing. This project also examined whether the individualized brochures were more effective than the generic brochures.

Previous research has examined how people’s perception of a health communication campaign is associated with behavior change. One study, for example, notes that “[i]f the thoughts generated to the message are primarily positive and congenial to the message, persuasion is likely,” and if thoughts are negative, persuasion is unlikely.⁸ In other words, if the individual likes the campaign, behavior change is probable. Research on an anti-smoking campaign indicated that positive moods towards health messages can increase information processing and persuasion.⁹ Additionally, in a study regarding Public Service Announcements (PSAs), the author posits that one’s liking of a PSA influences his or her attitude toward the advocated action.¹⁰ Indeed, the classic information processing model suggests that one must like the communication to yield to the information.

Relatedly, the perceived usefulness of a communication can also influence the individual’s processing and behavior. That is, for information processing to lead to behavior change the message recipient must understand the message, learn something from the message, or perceive the suggested recommendation as useful. In the aforementioned anti-smoking campaign, the authors measured how “good and useful” the subjects perceived the recommended action. The higher the subject scored on this measure, the more favorably he or she felt about a behavior change.⁹ Bull et al. suggest that the perceived usefulness of printed health education material is an important cognitive step leading to behavior change.¹¹

Another information processing variable that the current study assessed was how worried the participant was to receive the mailing. One study posited that “increased perceptions of risk trigger an emotional response, worry, which in turn triggers an assessment of information needs and subsequent information seeking and processing.”¹² Thus, if a health communication causes one to worry, he or she will more thoroughly process the information. The emotion of worry, however, can also evoke fear and conflicting data exists about whether fear appeals are effective in motivating behavior change.¹³⁻¹⁵ Cho and Salmon (2006), for example, found that “the segment of the population that needs behavior changes most may be least receptive to fear appeals and most susceptible to adverse effects of fear appeals.”¹³

The post-intervention survey also asked participants how surprised they were to receive the blood pressure mailing. Meischke et al. posit that “[i]t is possible that the unexpectedness of receiving a mailing from their local fire department increased motivation to process the message content...”⁴ The unexpectedness or surprise of the brochure may be a result of the novelty in the way the message was presented, which is known to maintain one’s attention and increase arousal. In a study that examined the effects of priming on a public health campaign, the authors suggest that “[f]actors that motivate individuals to engage in active processing include novel presentation, content discrepancies between expectations and reality, and external requests that may prompt increased awareness.”¹⁷ The brochures that the participants received in the mail may be considered both a “novel presentation” and an “external request” (to check blood pressure).

Moreover, the current study investigates whether the individualized mailings were more effective in motivating a blood pressure check than the generic mailings. Individualizing messages involves increasing the relevance of a communication by customizing it to the informational needs, interests, and concerns of the recipient.¹⁸ Ko et al. note that the relevance of a communication is the first important information process. In other words, “people are more likely to process information thoughtfully if they perceive it as personally relevant.”¹⁹ Numerous studies have provided evidence for the effectiveness of individualized messages, including campaigns targeted at decreasing dietary fat intake, increasing fruit and vegetable consumption,

smoking cessation, and screening for various cancers.¹⁹⁻²³ I hypothesize that the participants who received the individualized brochures (including their own blood pressure values) will be more likely to report a blood pressure check than those who received the generic mailings.

In addition to the information processing variables, this study examined the relationship between various demographic characteristics of the intervention population (e.g. age, sex, race, education, prior history of hypertension, self-rated health, and insurance status) and whether those who received the mailing subsequently checked their blood pressure. Numerous studies have indicated that blood pressure screening prevalence is lowest among Hispanics, people with less education, and younger adults.²⁴⁻²⁸ Furthermore, research has noted that lack of insurance is associated with lower rates of blood pressure control and monitoring.²⁹⁻³¹ In a study that assessed the progress in treating and controlling hypertension in the U.S., Egan et al. found that the “percentage of individuals with hypertension who received treatment increased over time...”²⁵ As such, I posit that individuals with a prior history of hypertension, as well as those who reported being in poor health, will be more likely to report a blood pressure check. McGuire (2001) suggests that “[c]ampaigns should be designed with regard for audience characteristics, including capacity variables such as age, education, and intelligence; demographic variables such as gender and ethnicity; and personality, life-style, and psychographics variables.”⁶ This study aims to examine the effectiveness of the communication in regards to the matrix inputs known as “receiver factors”.⁶

Hypotheses:

1. Participants who liked the mailing are more likely to report a blood pressure check than those who did not like the mailing.
2. Participants who found the mailing useful are more likely to report a blood pressure check than those who did not find the mailing useful.
3. Participants who were surprised to receive the mailing are more likely to report a blood pressure check than those who were not surprised.

4. Participants who received the individualized mailings are more likely to report a blood pressure check than those who received the generic mailings.
5. Demographic variables will be associated with the likelihood of reporting a blood pressure check.
 - a. Non-Hispanics are more likely than Hispanics to report a blood pressure check.
 - b. People with more education are more likely to report a blood pressure check than those with less education.
 - c. Older adults are more likely to report a blood pressure check than younger adults.
 - d. People with insurance are more likely than those without insurance to report a blood pressure check.
 - e. People with a prior history of hypertension will be more likely to report a blood pressure check than those without a history of hypertension.
 - f. People who have poor self-rated health will be more likely to report a blood pressure check than those who reported they were in good health.

Conceptual Model

Guided by the information processing paradigm and previous research, I developed a conceptual model to understand the variables that may be associated with seeking a blood pressure check subsequent to receiving a brochure that alerts the individual of his or her high blood pressure. In this model (Figure 1), I posit that particular demographics and health statuses may be linked with a blood pressure check. Additionally, I suggest that individualized brochures and information processing may also be associated with pursuing a blood pressure check.

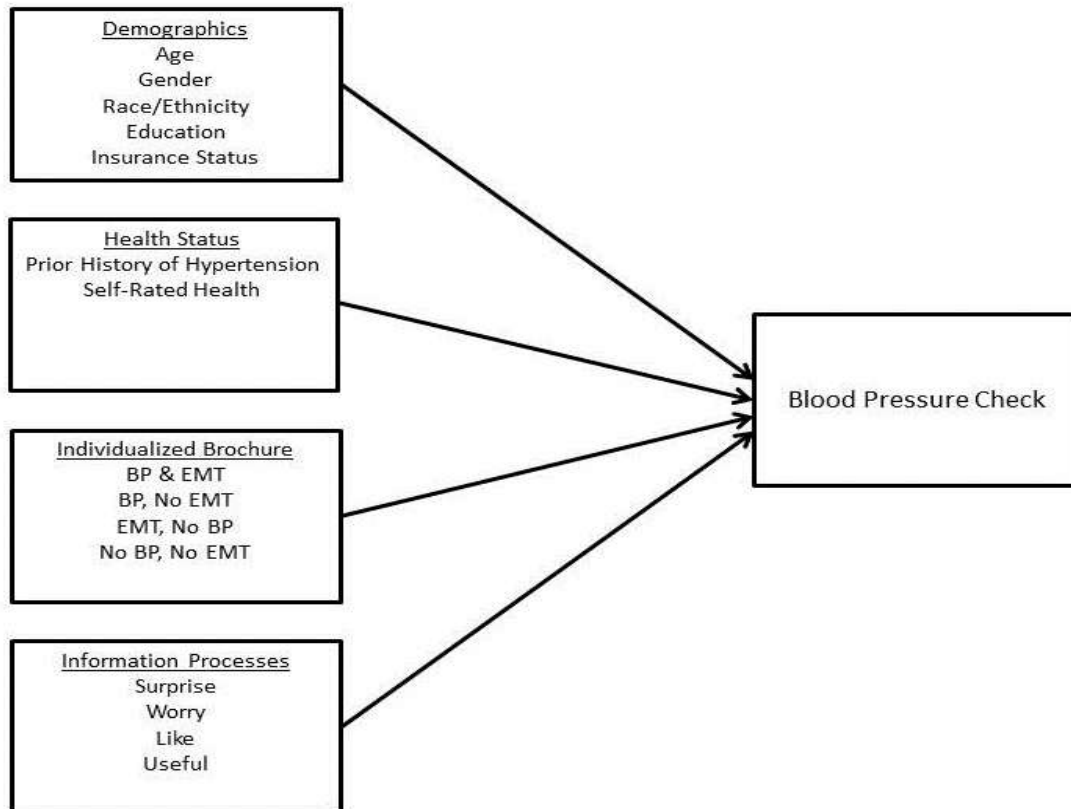


Figure 1. Conceptual model depicting the relationships between demographics, health status, individualization, and information processes on pursuing a blood pressure check subsequent to receiving a high blood pressure alert brochure.¹

Methods

Sample

Data used in this study come from the Hypertension Identification via Emergency Responders (HIER) Study (PI: Hendrika Meischke, PhD), a health communication campaign intended to motivate individuals with hypertension to pursue a free blood pressure check. The intervention used a 2x2 design, manipulating personal risk information (individualized blood pressure values or generic blood pressure information) and EMT personalization (image of local crew or generic insignia), that tested the efficacy of the direct mailings.

¹ In the category “Individualized Brochure” in the conceptual model, BP refers to whether or not the brochure contained the individuals’ actual blood pressure values or a generic message that the participant had high blood pressure. EMT refers to whether or not the brochure contained an image of the participants’ local EMT crew or a generic EMT insignia.

Participants were randomized into one of five intervention groups: individualized risk information and image of local EMT crew, individualized risk information and generic insignia, generic risk information and image of local EMT crew, generic risk information and generic insignia, or a control group. The intervention has been described in detail elsewhere.⁴

Study participants were identified from the medical incident report form (MIRF) database maintained by Public Health Seattle-King County for the medical emergency responders in King County, Washington. Four large fire departments served as partners for this project, and together these four departments serve approximately one-quarter of the total population of King County, Washington. EMS responders fill out a MIRF for every patient, which includes information on demographics, the reasons for the 911 call, procedures and diagnosis by EMTs, vital signs, patient contact information, and outcome of the EMS encounter. Eligible cases were individuals who had a recorded systolic blood pressure ≥ 160 mmHg and/or a diastolic blood pressure ≥ 100 mmHg when attended by EMTs between July 2007 and September 2009. Participants had to be at least 18 years old, have an address in or near one of the areas served by the participating fire departments, and have a phone number recorded on the MIRF or publicly available on the internet. Patients transported by paramedics (rather than EMTs) to the hospital were excluded from the study, as paramedic transport indicates a more serious medical problem. Patients transported by police or sheriff were also excluded, as they were attended by EMS at a jail, police station, or other custodial setting. Residents of nursing homes were excluded due to their regular access to nursing care.

Data Collection

Intervention participants were called approximately one month after the mailing to assess whether they obtained a blood pressure check. The subjects in the control group who did not receive a mailing were also called 6-8 weeks after their 911 visit in order to interview them in the same time frame as the intervention group. Half of the subjects received a short survey and the other half received a longer version of the survey. The longer survey included the information processing questions, such as whether the subject liked the mailing,

found the mailing useful, was surprised by the mailing, and was worried when they received the mailing. This study utilizes only the subjects who received the long version of the survey and reported that they remembered the mailing. The subjects who received the short version of the survey were excluded because the shorter survey did not include the variables examined in this project. Additionally, controls were omitted because the goal of this project was to examine whether the mailing prompted a blood pressure check, and the controls did not receive a mailing. Lastly, because the mailing was a one-time print brochure that could have been easily missed, this study only includes those who remembered receiving it and, thus, had at least some awareness of the message. The reason for this was to maximize the potential for an effect.

Measures

Dependent Variable

Blood pressure check was collected with one question: “Did you check your blood pressure AFTER you got the mailing?” Response categories included (1) yes, (2) no, (3) no, but tried to check BP at a fire station (was unable – fire fighters not available), (4) no, but made an appointment to check BP or have other intention to check BP in the near future, (5) don’t know/don’t remember/no response, (6) N/A. These categories were collapsed for analytic purposes and dichotomized as yes or no.

Independent Variables

Intervention. Participants were randomized to four intervention groups: individualized risk information and image of local EMT crew, individualized risk information and generic insignia, generic risk information and image of local EMT crew, or generic risk information and generic insignia.

Information Processes. These were collected with four questions: “How surprised were you to get the letter and brochure?”; “How worried were you get the letter and brochure?”; “How much did you like getting the letter and brochure?”; and “How useful did you find the information in the letter and brochure?” Response categories ranged from 1 (very) to 4 (not at all).

Demographics. Age was collected as a continuous variable and calculated using the date of birth on the MIRF. Race/ethnicity was collected as Hispanic, white, black, Asian, and other. Gender was collected as male or female. Education was assessed as the highest level of schooling received and used as a categorical variable with the options of “less than a high school degree,” “high school degree,” “some college,” “college degree,” and “post college.” Prior history of hypertension was collected with one question: “Do you have, or have you ever had, high blood pressure?” Response choices were (1) yes or (2) no. Insurance status was collected as one question: “Are you covered by any kind of health insurance or some other kind of health care plan?” Response choices were (1) yes or (2) no. Self-rated health was collected with one question: “Would you say your health in general is (1) excellent, (2) very good, (3) fair, or (4) poor?” This was used as a categorical variable.

Analysis

Descriptive analyses were used to generate frequencies for categorical variables and means for continuous variables. Bivariate analyses were conducted for categorical variables, and *t*-tests were used for continuous variables. An alpha level of 0.05 was used for all analyses to test for statistical significance. Bivariate analysis was conducted to assess significant relationships between the independent variables and the outcome variable. Variables that were at alpha 0.061 or less were selected as a candidate for the logistic regression. These included age, prior history of hypertension, insurance status, liking the brochure, and finding the brochure useful. The logistic regression was built as one model with the aforementioned selected variables, as well as the geographic location (i.e. fire district) from which the participants came. This accounted for demographic and fire department differences in the sample. All analyses were conducted using PSAW Statistics 18.0 (copyright 2009 SPSS Inc.).

Results

Of the 2,889 individuals who completed a survey, 1,077 received the long version which included the information processing questions. Only 537 of these individuals reported that they remembered receiving the mailing. The final data set was based on this sample of 537 subjects. Demographic variables included age, sex,

race/ethnicity, education level, insurance status, prior history of hypertension, and self-rated health. The denominator for the individual questions is based on the number who answered the question, and thus denominators vary slightly because of drop-outs, those who declined to answer a particular question, and those who answered a question as “unknown” or “do not remember”.

Table 1 reflects the demographic characteristics of the sample. Participants tended to be older (mean age = 64 years), female (67.6%, $n = 363$), and mostly non-Hispanic whites (81.6%). Approximately one-third (32.5%, $n = 166$) of the subjects had some college education and most of the individuals (93.4%, $n = 483$) had health insurance. Prior history of hypertension was fairly high among the sample, with 72% ($n = 368$) reporting that they currently have, or have ever had, high blood pressure. Even so, almost a third (31.8%, $n = 119$) of the individuals reported that they were in “good” health.

Table 1 also includes the frequencies of the subjects’ responses to the information processing questions. Approximately half (49.1%, $n = 248$) of the individuals reported being “very” surprised by the mailing and 70.2% ($n = 355$) said they were “not at all” worried. Of the subjects who responded, 60.1% ($n = 286$) reported that they liked the mailing “very much” and 42.3% ($n = 207$) said it was “very” useful.

Bivariate analyses and t -tests were conducted to examine whether the aforementioned demographic and information processing variables were associated with the outcome variable: “Did you check your blood pressure AFTER you got the mailing?” Table 2 indicates that older adults were significantly more likely to report a blood pressure check ($p = 0.002$). Level of education, however, was not significantly associated with reporting a blood pressure check ($p = 0.207$). The table also shows that those who reported having a history of hypertension were slightly more likely to report a blood pressure check ($p = 0.061$). Insurance coverage was also significantly associated with reporting a blood pressure check ($p = 0.061$), but self-reported health was not ($p = 0.102$). Moreover, Table 2 reveals that the more the subject liked the mailing ($p = 0.013$) or found the mailing useful ($p = 0.007$), the more likely he or she was to report a blood pressure check. There was no statistically

significant association between the various arms of the intervention and a blood pressure check ($p = 0.571$), indicating that the individualized brochures were not any more effective than the generic brochures.

To account for demographic and fire department differences in the sample, a binary logistic regression was conducted on the variables that had an alpha of at least 0.061 in the bivariate analyses: age, history of hypertension, insurance status, liking the mailing, and finding the mailing useful. Table 3 indicates that, taking all other variables into account, subjects who reported having health insurance were only slightly more likely to report a blood pressure check than those without insurance ($p = 0.091$, 95% C.I. = 0.178-1.136). Participant age, history of hypertension, liking the mailing, or finding the mailing useful were not significant in the multi-variate analysis.

Discussion

The primary purpose of this study was to examine a health communication campaign intended to motivate at-risk individuals to pursue a blood pressure check. Specifically, I was interested in whether information processing variables were significantly related to a blood pressure check. I also wanted to investigate whether individualizing the brochure or certain demographic characteristics influenced the likelihood for individuals to check their blood pressure after receiving the mailing.

Bivariate analyses indicated that older participants, those with a prior history of hypertension, or those with insurance coverage were significantly more likely to check his or her blood pressure after receiving a brochure. Additionally, the more the subject liked the mailing and the more the subject found the mailing useful, the more likely he or she was to report a blood pressure check. This indicates that some information processing may be important in people's decisions to get a blood pressure check. Logistic regression revealed a similar, although not as strong, association with regards to insurance status. Contrary to the bivariate analysis, however, the logistic regression revealed no significant associations between the information processing variables "like" and "useful" and pursuing a blood pressure check. There were also no significant associations between a blood pressure check and age or history of hypertension. However, the sample size for the multiple

regression was much reduced due to missing data. This may have affected the power to detect significant findings.

My hypotheses regarding the information processing variables were formulated based on the information processing model. I posited that individuals who were more surprised by the mailing would be more likely to report a blood pressure check because the unexpectedness and novelty of receiving the mailing would increase information processing of the message content and motivate action. Similarly, I hypothesized that those who liked the brochure and found it useful would be more likely to get a blood pressure check because those information processes also tend to elicit behavior change.⁶ The results of this study indicated that there was no significant association between being surprised by the mailing and a self-reported blood pressure check. While almost half of the participants reported being “very” surprised to receive the mailing, they may not have been surprised by the actual content of the brochure. A majority of the sample had a prior history of hypertension, so even though receiving something in the mail may have been unexpected, the “surprise” of the message itself was not sufficient enough to provoke a blood pressure check. There was, however, a significant association between liking the mailing and a self-reported blood pressure check, and for perceived utility and a self-reported blood pressure check. Although these results did not remain significant in the logistic regression, this finding has implications for future health communication campaigns, in that an informative, clear communication may be more likely to motivate change in one’s behavior than a communication that utilizes surprise or novelty as an impetus to behavior change. One reason for the lack of a significant association between the information processing variables and a blood pressure check could be because the individuals in the sample responded very similarly to the information processing survey questions. Thus, there is too little variation in the responses to show any significance.

I did not have an *a priori* hypothesis regarding the “worry” variable. Worry can evoke fear and conflicting data exists about whether fear appeals are effective in motivating behavior change.¹³⁻¹⁵ Results of this

study revealed no significant association between reported blood pressure checks among those who were worried by the brochure and those who were not worried.

In addition to the aforementioned hypotheses, I posited that the participants who received the individualized brochures would be more likely to report a blood pressure check than those who received the generic brochures. This conjecture was based on the notion that individualized health communications enhance information processing because they are personally relevant to the individual. Bivariate analyses indicated that there was no association between the different intervention groups and a blood pressure check. Meischke et al. reported similar results and noted that “[i]t is possible that the unexpectedness of receiving a mailing from [the] local fire department increased motivation to process the message content, thereby diluting the effect of tailoring and source personalization manipulation.”⁴

In analyzing the data for this study, I was also interested in examining whether demographic characteristics would be associated with pursuing a blood pressure check after receiving the brochure. I speculated that non-Hispanics would be more likely to report a blood pressure check than Hispanics, but there was no significant difference between the ethnicities. This may be due to the large number of Caucasians in the sample ($n = 407$) and the very small number of Hispanics ($n = 10$). I was not certain about differences between men and women, and the results indicated no significant difference between the genders. This is in line with recent data that suggests a decline in blood pressure screening in both men and women.^{24,26} Moreover, I hypothesized that those who were more educated would be more likely to report a blood pressure check than those who were less educated, yet an independent samples *t*-test revealed the opposite. This could be due, in part, to the population sample, as most of the participants were older Caucasians with health insurance. Thus, even if a subject had less education, it is likely that he or she was insured, with ample access to health care.

Participants who had insurance were more likely to get their blood pressure checked than those who did not have insurance. This supports my hypothesis, as well as previous research, which posits that lack of insurance is associated with lower rates of blood pressure control and forgone health care in general.²⁹ Older

individuals were also more likely than younger participants to report a blood pressure check. This seems logical because “the elderly have the most frequent contact with the health system and are the most likely to have medical insurance.”³¹ Additionally, I believed that individuals with a prior history of hypertension and those who described their health as “poor” would be more likely to report a blood pressure check. Those with a history of hypertension were slightly more likely to report a blood pressure check but self-rated health was not associated with the outcome variable. These results conflict with previous data, which found that treatment of hypertension has increased in individuals who were aware of their high blood pressure.²⁵ Although a blood pressure check is not the same as “treatment”, I suspected that I would see a similar result.

Limitations

Although the results of this study indicated that certain information processing variables and certain demographic characteristics are, indeed, associated with getting a blood pressure check following a direct mailing, there are some limitations to the study that need to be addressed.

First of all, of the 1,077 individuals who completed the long version of the survey, only 537 subjects remembered receiving the mailing. It is possible that the four to six week time frame between the mailing and the survey was too long. Perhaps more subjects would have remembered and, thus, yielded a larger sample size had the survey been administered closer to the mailing of the brochure (but still with ample time to pursue a blood pressure check). Secondly, this data was based only on the subjects who received the long version of the survey. Thus, half of the participants who received a brochure were not included in the analyses, also reducing potential sample size and power. Lastly, the majority of the sample was elderly Caucasians who are more likely to pursue regular blood checks regardless of receiving a brochure.

It is evident that the approach used to reach these under-controlled hypertensives was successful and can be generalizable to other communities outside of King County, Washington. Every community has an EMS division that can be involved in the identification of high risk residents. Future research, however, should find additional approaches to reach individuals who are newly diagnosed or have not called 911. Because the

intervention was randomized this research is informative for future health communication campaigns. Several of the results corresponded with prior research on campaigns targeted at other diseases and populations. As such, this data contributes to the growing literature on effective health communications.

Conclusion

This study provides some evidence that the certain information processes, such as liking a communication and the perceived usefulness of a communication, may be more likely to motivate change in one's behavior than a communication that utilizes surprise or novelty as an impetus to behavior change. Although individualized health communications have been shown to be more effective than generic communications, the present study did not replicate those results. Further research should be conducted to investigate this inconsistency. The communication campaign was, however, more effective for certain demographic characteristics than others. Older individuals and those with insurance coverage were more likely to pursue a blood pressure check after receiving a brochure alerting them of their risk. Participants with a prior history of hypertension were also slightly more likely to check their blood pressure. It is important for communication campaigns to be designed with regard for audience characteristics.

According to the Centers for Disease Control, 31.9% of adults ages 20 and over have hypertension.³² As the obesity epidemic continues to grow in the United States, so will the prevalence of hypertension. This is a serious public health concern, as high blood pressure increases the risk for heart disease and stroke, which are leading causes of death. Health communication campaigns can be incredibly beneficial in ensuring that people regularly test and control their blood pressure. This study is a good foundation for evaluating what types of interventions are effective and whom the interventions should target.

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