Prevention and screening efficacy messages in newspaper accounts of cancer

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Abstract

The news media are a primary source of cancer prevention and detection information for the general public, but little is known about the content of cancer prevention and detection messages in mainstream media. This study examines how cancer prevention and screening efficacy messages are presented in cancer news media coverage. Efficacy messages provide information about skills related to prevention and screening behaviors. Analysis of cancer-related stories in 44 major US daily newspapers during 2003 (n = 2448) reveals that efficacy messages were rarely present in cancer stories. Efficacy messages were less likely to appear in stories that had a local angle, but efficacy messages were more likely to appear in stories that contained mobilizing information (additional resources for readers) or stories that mentioned highly preventable cancers (lung, skin, esophagus and bladder). The discussion includes a theory of norms for effectively influencing cancer-related behaviors through news reports. Implications of this work extend to the lack of efficacy messages when highly detectable cancers are mentioned, thus the lack of actionable information when health risks are presented, and a dearth of efficacy messages when local-ized information is present, each of which represent key areas for encouraging health journalists to include more efficacy statements.

Introduction

Cancer is one of the primary sources of morbidity and mortality for Americans, and for individuals worldwide. An estimated 1.37 million Americans were diagnosed with cancer in 2005, of which an estimated 1 500 died each day [1]. In 2004, over one million Americans were diagnosed and more than 550 000 died from the disease [2]. Globally, 10.9 million new cases of cancer were diagnosed and 6.7 million people died of the disease in 2002 [3].

Two-thirds of US cancer deaths are related to behavioral factors such as tobacco, diet, obesity and lack of physical activity [4]. In 2002, lifestyle changes (e.g. alcohol use, exercise) could have prevented an estimated two-thirds of cancer deaths [5]. Equally important is early detection, or screening behaviors, which significantly prevents cancer deaths [6, 7].

The dissemination of research knowledge about cancer prevention and screening could play a pivotal role in reducing the cancer burden [8]. One venue for such dissemination is the news media. The news media are an important source of cancer prevention and detection information [9, 10] and general cancer information [11, 12]. However, while the reach and frequency of health news is well established, less is known about cancer prevention messages. Given the importance of the news media in influencing health behaviors, examining what

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information appears in cancer news can further our understanding of the decisions health journalists make and provide a basis for formulating strategies for maximizing cancer prevention promotion. To that end, this study examines the frequency and context of self-efficacy messages in cancer news stories.

**Self-efficacy’s role in health behavior change**

Psychosocial theories of behavior change are vital to behavior change efforts, providing key determinants of behavior. For example, behavior change may occur more readily when there are more benefits to performing the behavior than barriers, when there is strong social support for the healthy behavior, and if there are greater intentions to change the unhealthy behavior [13–19]. Across theories of health behavior, self-efficacy is one of the most widely applied constructs.

Self-efficacy pertains to one’s ‘capability to produce valued outcomes and to prevent undesired ones’ [20, p. 1]. In order to take action, individuals must know what to do and believe that they are capable of taking action [15]. The construct of self-efficacy has been used to examine a range of health-related behaviors [21] and is strongly associated with behavior change and maintenance [22–27]. In particular, self-efficacy has been connected to cancer-preventive behaviors such as smoking cessation, exercise, diet and self-examinations [23, 24, 27, 28]. Additionally, self-efficacy is frequently connected with response efficacy, or the extent to which the behavior is perceived to mitigate or avert the health threat [29–32], but the purpose of this analysis is to focus solely on self-efficacy as it is a distinct, separate construct that can function independently of response efficacy.

Teaching specific skills can enhance self-efficacy. One intervention that incorporated the teaching of dietary skills to enhance self-efficacy for cancer prevention found significant changes in the targeted behaviors of fruit/vegetable consumption, multivitamin intake and red meat consumption [5, 33]. Another intervention, the Jump Into Action program [25], focused on educating fifth-grade students about diet, exercise and behaviors related to Type 2 diabetes. Results showed elevated levels of self-efficacy for diet and exercise among participants.

These studies highlight self-efficacy’s relationship with behavior change, and that teaching specific skills or the observation of modeling can enhance self-efficacy. One possible source for self-efficacy information is the news media, one of the most pervasive sources of health information in society.

**Media’s influence on health knowledge and behavior**

The public receives a substantial amount of health information from the news media [34, 35], and for many the media may be their only source of health information [36]. As the amount of health news messages has increased over time [37], the availability of these messages has affected health knowledge. For example, one study found that respondents who named print media as the most useful source of their health information were more likely to know about cancer screening than respondents relying on a doctor for similar information [10]. Media messages can also alter behavior [35, 38]. Following news coverage of events such as celebrity diagnoses of cancer or celebrity crusades against cancer, changes in cancer screening practices have been noted [39–42]. Thus, it is evident that the media influence health knowledge and behavior—in effect, educating the public—among differing audiences and for differing health behaviors. To understand what in the media may be driving these effects, we turn to what is known about the content of cancer news coverage.

**Cancer news coverage**

Little is known about current news coverage of cancer prevention and screening. The last comprehensive examinations were conducted by the National Cancer Institute over two decades ago [43], and contemporary analyses discuss prevention and detection only in the context of certain
types of cancer [34, 44] or specific public awareness campaigns [45].

Results of available studies show that prevention and screening receive relatively little attention in cancer news coverage. In 1980, Freimuth et al. [43] discovered that prevention and detection were rarely discussed, and few stories mentioned ways to reduce cancer risks. More recently, an analysis of skin cancer news coverage [44] showed that information about cancer treatment received more attention than prevention or screening. This study also reported that specific skin cancer prevention strategies were rarely mentioned in news accounts.

**Rationale**

Given the limitations of current research on cancer prevention and screening in news media, little is known about whether readers receive self-efficacy messages in news accounts of cancer. Researchers acknowledge that the operationalization of self-efficacy has been inherently problematic (see [46] for a discussion). For example, modeling has alternatively been classified as part of self-efficacy [47], and also as social influence [28]. We operationalize self-efficacy in two ways: modeling of the health behavior (e.g. someone applying sunscreen), or providing specific information about learning a health skill (e.g. a store that sells sun-protective clothing). That is to say, efficacy messages convey specific information about learning a health skill or modeling of the behavior.

This study examines how frequently news accounts of cancer discuss prevention and screening, and the prevalence and context of efficacy messages within these stories. Because efficacy messages could only appear in stories that contained prevention or screening information, a final question is whether particular features or formats are more likely to contain efficacy messages simply because they contain more prevention or screening information, or if there is an independent relationship between efficacy messages and story features.

To test the context of self-efficacy messages in newspaper stories, we constructed the following hypotheses. First, news stories can be classified by the topic of the story, which can range from a report of research, a cancer awareness piece, a profile of someone dealing with cancer or (but not limited to) a cancer-related event. We believe that profiles of people with cancer or stories about cancer awareness/education will be more likely to contain efficacy messages than stories focusing on other topics, but only because they are more likely to contain prevention or detection information.

H1. Profiles and cancer awareness/education stories will contain more prevention and screening information, hence more efficacy messages, than other stories.

Additionally, the presence of additional sources for cancer information such as a web address, phone number, email or mailing address may be related to the presence of efficacy messages. Information that enables the performance of the behavior, or mobilizing information, can cue readers to act [12, 48]. We believe that mobilizing information and efficacy messages are closely related; as such, there may be a relationship between the presentation of resources for readers and the presence of efficacy messages.

H2. Stories containing mobilizing information will be more likely to contain efficacy messages, regardless of attention to prevention and screening, than stories that do not contain mobilizing information.

Next, we wanted to know whether area-specific stories and stories from wire sources are related to the presence of efficacy messages. Stories with a local angle may reference area-specific cancer prevention or screening resources more often. Conversely, stories pulled from wire sources may contain fewer efficacy messages due to the lack of localized information. This should be independent of the amount of attention to prevention and screening.

H3. Stories containing localized information will be more likely to contain efficacy messages than stories without local information, regardless of attention to prevention and screening.
H4. Stories from wire services will be less likely to contain efficacy information than stories that are not from wire services, regardless of attention to prevention and screening.

Finally, efficacy messages could appear more often in the context of certain cancers. Cancers associated with smoking or sun exposure are classified as highly preventable (lung, esophageal, bladder and skin) [6]. Cancers of the breast, cervix, prostate, colon/rectum and skin are considered the most detectable [6, 49]. We would expect to see more attention to prevention or screening in the context of these cancers, and hence a greater presence of efficacy messages. However, we have no reason to expect that efficacy messages would be independently associated with these cancer types.

H5. Stories discussing highly preventable cancers will contain more prevention information, hence more prevention efficacy messages, than stories discussing less preventable cancers.

H6. Stories discussing highly detectable cancers will contain more screening information, hence more screening efficacy messages, than stories discussing less detectable cancers.

Variables

Prevention and screening behaviors
Prevention behaviors included alcohol consumption, tobacco use, exercise, diet/nutrition, sexual activity and sun exposure. Screening behaviors included mammography, breast exam, pelvic exam/pap smear, screenings for colorectal cancer (fecal occult blood testing, flexible sigmoidoscopy, colonoscopy), skin exam and prostate specific antigen test (PSA).

Efficacy messages
We coded the presence of skills and modeling separately. The variable skills were operationalized as any mention of a specific information or strategy about how to perform the healthy behavior, or any mention of a specific resource for performing the healthy behavior or avoiding the unhealthy behavior. Modeling was operationalized as a person or persons explicitly performing the prevention behavior.

Story topics
Story topics were coded as report of research; profile of someone dealing with cancer; description of a cancer fundraiser; cancer politics or policies; cancer awareness or education or some other topic. For our analysis, profiles of individuals dealing with cancer and cancer awareness stories were combined and compared with all other story topics.

Mobilizing information
Consistent with previous research [48], a story contained mobilizing information when it provided a web address, a phone number, email or mailing address for obtaining more information about a cancer issue or topic. Mobilizing information differs from efficacy messages in that mobilizing...
information requires readers take multiple steps toward enacting the healthy behavior (for example, being provided the American Cancer Society’s phone number or a Web site where the reader can ‘learn more’ about skin cancer, where the reader would have to first call American Cancer Society (ACS) or go to the Web site before taking additional steps), whereas efficacy messages allow the reader to implement a behavior without additional steps (for example, reading about a store where sun-protective clothing is sold, where the reader could set down the newspaper and drive right to the store).

Localized information

We identified information as localized when the story provided regional information (e.g. San Francisco) or information specific to the readership area (e.g. a story in the Baltimore Sun about a Maryland drug company).

Preventable cancers

We followed the American Cancer Society’s classification of cancers when we separated cancers by highly preventable and highly detectable [6]. Cancers of the lung, esophageal, bladder and skin cancer (those associated with smoking and sun exposure) are considered the most preventable.

Detectable cancers

The ACS classifies five cancers as highly detectable: cancer of the breast, cervix, prostate, colon/rectum and skin.

Inter-coder reliability

Stories were entered into a database for random selection and were reviewed by four coders. The quantity of cancer information in the story determined how many variables were coded. Only a few variables were coded for stories with a small amount of cancer information. Stories that discussed cancer in more than three sentences were coded for information about the cancer continuum, topic, risk and sources for cancer information. Stories that were primarily about cancer were also coded for prevention and detection modeling and skills information.

Coders received ~90 h of training >4 months prior to establishing inter-coder reliability, using stories published in 2002 and 2004. During actual coding, reliability was rechecked every 3 months. After coding with the initial coding instrument was complete, items were added to measure modeling and skills information for prevention and detection behaviors. Coders received training on all new variables, and reliability was again assessed using stories published in 2002 and 2004. Once reliability was established, all stories that were primarily about cancer were coded for these additional variables (n = 2448). Disagreements among coders during the interrater reliability process were resolved by discussing the differences among coders, changing the coding manual when necessary, and re-testing reliability using the updated manual or new consensus on the measurement of the variable. Discussions continued until coders reached an acceptable level of reliability.

Reliability was computed using Krippendorff’s alpha [51]. For the full dataset, Krippendorff’s alpha for each variable was within the range 0.65–1.0, averaged across reliability checks for that specific variable. Reliability for the self-efficacy variables fell between 0.72 and 0.86.

Analysis

All data were analyzed with SPSS 11.0. Cross-tabulations were used to investigate the prevalence of prevention and screening behaviors. Pearson chi-square analyses were used to determine associations between prevention and screening attention and the variables of interest. Hierarchical logistic regression was used to test our hypotheses. Main effects of self-efficacy were estimated before and after controlling for the presence of prevention or detection information. Because the number of stories containing efficacy messages was small, we combined all mentions of skills and modeling to form a dichotomous efficacy measure, such that efficacy messages were either present or absent.
This measure was used to test hypotheses 1 through 4. To test hypotheses 5 and 6, we separated prevention and detection efficacy into two variables.

### Results

Overall, 19.0% \((n = 466)\) of stories contained prevention information, and 24.0% \((n = 589)\) contained screening information. Efficacy messages received relatively little attention; only 6.5% of stories provided efficacy messages about prevention behaviors \((n = 160)\), and 8% of stories provided efficacy messages about screening behaviors \((n = 197)\). Among stories that contained prevention information \((n = 466)\), diet \((n = 141, 30\%)\) and tobacco \((n = 116, 25\%)\) received the most attention; sun \((n = 69, 14.8\%)\) and exercise \((n = 57, 12.2\%)\) received less attention, and alcohol \((n = 25, 5.3\%)\) and sexual practices \((n = 15, 3.2\%)\) received the least attention. Among stories discussing prevention efficacy, there was more attention paid to diet \([16.31\%, 95\% \text{ confidence interval (CI)} = 13.23, 19.96]\) and sun-related \([10.94\%, 95\% \text{ CI} = 8.41, 14.13]\) efficacy information than tobacco \([3.65\%, 95\% \text{ CI} = 2.26, 5.82]\), exercise \([3.43\%, 95\% \text{ CI} = 2.09, 5.56]\), sexual activity \([0.86\%, 95\% \text{ CI} = 0.26, 2.29]\) or alcohol \([0.43\%, 95\% \text{ CI} = 0.02, 1.68]\).

Among stories that mentioned detection \((n = 473)\), mammography received the most attention \((n = 199, 42.1\% \text{ of stories})\). PSA testing \((n = 80, 16.9\%)\), breast self-exams \((n = 72, 15.2\%)\) and colorectal cancer screening \((n = 55, 11.6\%)\) received some attention. Pap smears \((n = 37, 7.8\%)\) and skin exams \((n = 23, 4.9\%)\) received the least overall attention. The most efficacy information was provided for mammography \([12.73\%, 95\% \text{ CI} = 10.28, 15.69]\), followed by PSA testing \([7.47\%, 95\% \text{ CI} = 5.60, 9.91]\), breast exams \([6.11\%, 95\% \text{ CI} = 4.44, 8.38]\) and all colorectal cancer screening \([5.60\%, 95\% \text{ CI} = 4.00, 7.80]\). Pap smears \([2.55\%, 95\% \text{ CI} = 1.52, 4.21]\) and skin exams \([2.5\%, 95\% \text{ CI} = 1.52, 4.21]\) contained the least efficacy information.

H1. Profiles and cancer awareness/education stories will contain more prevention and screening information, hence more efficacy messages than other stories.

Profiles and awareness pieces were less likely to contain prevention information and more likely to contain screening information than stories concerning other topics \([\chi^2 (1, n = 2448) = 106.25, P < 0.001; \chi^2 (1, n = 2448) = 134.75, P < 0.001]\); 14.3% of profiles of people with cancer and cancer awareness/education stories contained efficacy messages. There was no relationship between efficacy and story topic at the bivariate or multivariate level. Our first hypothesis was not supported.

H2. Stories containing mobilizing information will be more likely to contain efficacy messages, regardless of attention to prevention and screening, than stories that do not contain mobilizing information.

Stories containing mobilizing information were less likely to contain prevention information \((31.0\%)\), and more likely to contain screening information \((54.0\%)\) than stories that did not contain mobilizing information.

Stories with mobilizing information were less likely to contain efficacy messages at the bivariate level \((86.1\% \text{ versus } 13.9\%, \chi^2 (1, n = 2448) = 4.06, P < 0.05)\), but after controlling for attention to prevention and detection, stories with mobilizing information were more likely to contain efficacy messages \([\text{adjusted odds ratio (AOR)} = 1.32, 95\% \text{ CI} = 1.01, 1.73]\). This supports our second hypothesis. See Table I.

H3. Stories containing localized information will be more likely to contain efficacy messages than stories without local information, regardless of attention to prevention and screening.

Stories with localized information were less likely to contain prevention \((24.5\%)\) and more likely to contain screening \((58.2\%)\) than stories without localized information \([\chi^2 (1, n = 2448) = 68.33, P < 0.001; \chi^2 (1, n = 2448) = 16.30, P < 0.001]\). Stories with localized information were less likely to contain efficacy messages \([11.7\%, \chi^2 (1, n = 2448) = 15.44, P < 0.001]\). After controlling for prevention and detection information, efficacy
messages were still less likely to appear in stories with a local angle (AOR = 0.63, 95% CI = 0.50, 0.80). Our results were opposite of the hypothesized direction.

H4. Stories from wire services will be less likely to contain efficacy information than stories that are not from wire services, regardless of attention to prevention and screening.

If the story originated from a wire source, it was less likely to contain prevention information (39.1%), but it was no more likely to contain screening information (54.3%) than stories not from wire sources, $\chi^2 (1, n = 2448) = 15.61, P < 0.001$; $\chi^2 (1, n = 2448) = 0.09$, not significant. There was no relationship between the presence of efficacy messages and whether the story originated from a wire source at the bivariate or multivariate level. Our fourth hypothesis was not supported.

H5. Stories discussing highly preventable cancers will contain more prevention information, hence more prevention efficacy messages, than stories discussing less preventable cancers.

Stories discussing highly preventable cancers were less likely to contain prevention information than other stories, $\chi^2 (1, n = 2448) = 138.18, P < 0.001$. However, stories discussing highly preventable cancers were more likely to contain prevention efficacy messages (57.8% versus 42.2%), $\chi^2 (1, n = 2448) = 96.39, P < 0.001$. After controlling for overall attention to prevention, there was a significant relationship between stories discussing prevention efficacy messages and preventable cancers. Hypothesis 5 was supported. See Table II.

H6. Stories discussing highly detectable cancers will contain more screening information, hence more screening efficacy messages, than stories discussing less detectable cancers.

If a story discussed highly detectable cancers, it was more likely to contain screening information than other stories, $\chi^2 (1, n = 2448) = 5.69, P < 0.05$. 

<table>
<thead>
<tr>
<th>Table I. Estimates of prevalence of efficacy messages by feature format</th>
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<tr>
<td>$n$ (%)</td>
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<tr>
<td>Profiles and awareness/education</td>
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<td>Stories other than profiles and awareness/education</td>
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<td>Profiles and awareness/education stories</td>
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<tr>
<td>Mobilizing information</td>
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<td>Did not contain mobilizing information</td>
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<td>Localized information</td>
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<tr>
<td>Did not contain localized information</td>
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<td>Did contain localized information</td>
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<tr>
<td>Wire sources</td>
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<tr>
<td>Not from wire sources</td>
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<td>From wire sources</td>
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<tr>
<td>Preventable cancers</td>
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<td>Did not mention preventable cancers</td>
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<td>Did mention preventable cancers</td>
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<tr>
<td>Detectable cancers</td>
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<tr>
<td>Did not mention detectable cancers</td>
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<tr>
<td>Did mention detectable cancers</td>
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</table>

*Adjusted for overall attention to prevention and detection. 
**Adjusted for attention to detection efficacy messages.
‡Adjusted for attention to prevention efficacy messages.
*P < 0.05; **P < 0.001.
Stories discussing highly detectable cancers were the only stories to contain screening efficacy messages. However, after controlling for attention to screening, stories discussing detectable cancers did not contain more screening efficacy messages. Hypothesis 6 was not supported. See Table II.

**Discussion**

US newspaper stories primarily focusing on cancer rarely mention cancer prevention or detection behaviors and contain few efficacy messages overall. When efficacy messages are present, they are found most often in stories with mobilizing information, stories without a local angle and stories discussing highly preventable cancers. Certain behaviors, such as mammography or diet, are accompanied by efficacy messages more often than other behaviors. Our results support previous research in that behaviors related to cancer prevention and screening are rarely discussed [44, 52], strategies or skills for performing behaviors are nearly absent [44] and mobilizing information in cancer news coverage is infrequent [48, 53].

Our results demonstrate that certain self-efficacy information is likely to appear in some cases but is absent in others; in effect, news coverage provides information about cancer causes or risks without providing skills to help avoid or ameliorate subpar health practices. Research has shown that the strongest changes in behavior occur when audiences believe that they are susceptible to a problem (high fear) but also able to do something about it (high self-efficacy) [54–56]. If an individual perceives a threat but does not receive information about how to cope with that threat, he or she often reacts with indifference, defensiveness or even denial [56]. If newsreaders are learning about cancer risk factors without receiving actionable information, then the media may not be providing the information needed to foster behavior change.

These data suggest that journalists operate, intentionally or unintentionally, with certain norms and practices when discussing cancer prevention and detection. Recognizing these patterns allows us to illustrate ways in which health professionals and health researchers might target efforts for change.

The negative relationship between localized stories and efficacy messages may mean that localized news stories instead focus on either very general information or particular people or events. In this respect, the target area for change is clearly at the level of stories written for a local audience. Providing information about resources or personages familiar

<table>
<thead>
<tr>
<th>Variable</th>
<th>Highly preventable cancers</th>
<th>Highly detectable cancers</th>
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</thead>
<tbody>
<tr>
<td>Prevention efficacy messages</td>
<td>1.57 (1.01, 2.46)*</td>
<td>54.66 (0.26, 126.65)</td>
</tr>
<tr>
<td>Detection efficacy messages</td>
<td>1.54 (1.39, 1.69)**</td>
<td>1.37 (1.25, 1.52)**</td>
</tr>
<tr>
<td>Prevention</td>
<td>Cox and Snell $R^2$</td>
<td>0.070</td>
</tr>
<tr>
<td>Detection</td>
<td>Cox and Snell $R^2$ due to efficacy messages (entered before other characteristics)</td>
<td>0.068</td>
</tr>
<tr>
<td></td>
<td>Cox and Snell $R^2$ due to efficacy messages (entered after other characteristics)</td>
<td>0.038</td>
</tr>
</tbody>
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*$P < 0.05$; **$P < 0.001$.  

Table II. Logistic regression equation for highly preventable cancers and highly detectable cancers.
to the news audience may boost chances for behavior change.

With regard to types of cancer, our results suggest that it is more typical for journalists to associate information about skills and modeling with smoking- and sun-related cancers, but even that practice is not widespread. What motivates journalists to detail prevention efforts for lung, bladder, esophageal and skin cancer more than all other cancers is a perplexing question. One explanation may lie at the disease-specific level. In a study of cancer screening messages in popular magazines, there was evidence of dissimilar, although not significantly different, coverage of prostate and colon cancers [57]. It is possible that with a group of five cancers, variations in coverage within the ‘highly detectable’ group prevented us from distinguishing relationships with efficacy messages.

Our data showed that the presence of efficacy messages was related to the presence of mobilizing information, but the low frequency of the information indicates that room for change exists. If journalists already link the two types of information together, what remains is encouraging more overall inclusion in news stories. Hoffman-Goetz et al. [48, 53] argue that mobilizing information can be a valuable resource for readers; while it is impossible to determine audience-level effects from these data, it is likely that the more information an individual receives, the more likely that individual may experience enhanced self-efficacy and thus enact the healthy behavior [13].

Several strategies exist for encouraging health journalists to include more efficacy statements. Initially, the link between information about highly preventable or detectable cancers and efficacy messages must be enhanced. Our results indicate that the relationship exists to some extent with preventable cancers and efficacy messages, but the overall low frequency of the relationship is cause for concern. Moving beyond mentions of certain cancers or including more references about local resources for cancer prevention and detection could enhance the ability of newspaper articles to impact the health audience. Moreover, encouraging journalists to make these changes at the point where they collect their research, before even writing the story, could assist in strengthening the link between efficacy messages and prevention and screening information. From the standpoint of a health educator, linking efficacy messages with prevention or detection information, and including local information or resources where local information could be found, when providing information to health journalists, might enhance positive outcomes of exposure to health news. Supplying the most detailed information as possible, including efficacy messages as well as statements about prevalence or risk, is a key strategy that health educators can use. At a broader level, prevention and screening still receive less overall attention when compared with cancer treatment [43, 44]; as such, advocating more comprehensive coverage of cancer prevention and screening is a necessary first step toward seeing more efficacy messages in the news. In making these changes to the news and how cancer news is presented to the public, a civic journalism approach could be a successful means to the ends advocated here. Getting the public more involved with the press, and opening a dialogue between newsrooms and the public, quite possibly could help motivate both parties to change the way health news is presented and consumed, in much the same way as civic journalism approaches have worked in the past [58, 59].

Limitations
This study uses data from newspaper coverage only; we cannot generalize our findings to other media sources such as magazines, television coverage or non-mainstream media sources. The data was also drawn from only 1 year of newspaper coverage. However, as the sample was randomly drawn, and contains stories from the top US newspapers, we are confident that our newspaper data is not an atypical representation of cancer news coverage.

Recommendations for further research
Investigating what the public learns and how the public learns from efficacy messages can be a
valuable tool in determining how to contextualize self-efficacy in a way that maximizes positive public health outcomes [60]. Future research should investigate how the public translates efficacy messages into behavior. By examining message type (if not all efficacy messages are created equal), message frequency (if one message is not enough), and related variables (if it takes more than information about skills or modeling to influence behavior), research can illuminate ways in which professionals might hope to encourage behavior change.

Moreover, response efficacy often serves a second dimension of efficacy in health behavior theory [29–32]. The extent to which the health behavior described in the news article is depicted as helping mitigate or forestall the threat of cancer should also be investigated in future studies of efficacy messages. As self-efficacy and response efficacy often are paired to describe an overall appraisal of how the individual can cope with the health threat [30, 32], a logical second step in examining efficacy messages in the news is to understand the characteristics of response efficacy messages and how those messages function with self-efficacy messages to present a more comprehensive view of efficacy to the newsreader.

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Conflict of interest statement

None declared.

References

Cancer prevention and screening efficacy messages


Appendix A

Search terms used for obtaining the sample
The open search included any mention of the following words, appearing anywhere in the article (an exclamation point is used for truncated searches in LexisNexis):

Body (cancer! or leukemia! or lymphoma! or melanoma! or hodgkin! or tumor! or sarcoma! or carcino! or retinoblastoma! or adenoma! or astrocytoma! or blastoma! or glioma! or macroglobulinemia! or meningioma! or mesothelioma! or mycosis! or myelo! or neoplas! or neuroblastoma! or osteosarcoma! or pheochromocytoma! or rhabdomyosarcoma! or anticancer! or oncol!)

Our closed search term was the following:

“OPEN TERM” and BODY (atleast 2 (cancer! or leukemia! or lymphoma! or melanoma! or hodgkin! or tumor! or sarcoma! or carcino! or retinoblastoma! or adenoma! or astrocytoma! or blastoma! or glioma! or macroglobulinemia! or meningioma! or mesothelioma! or mycosis! or myelo! or neoplas! or neuroblastoma! or osteosarcoma! or pheochromocytoma! or rhabdomyosarcoma! or anticancer! Or oncol!)) and not body((feline pre/l leukemia) or (capricorn))

Appendix B

List of newspapers in content analysis
1. Atlanta Journal and Constitution
2. Baltimore Sun
3. Boston Globe
4. Boston Herald
5. Buffalo News
6. Charlotte Observer
7. Chicago Sun-Times
8. Chicago Tribune
9. Columbus Dispatch
10. Daily News (New York)
11. Dallas Morning News
12. Denver Post
13. Detroit Free Press
14. Fort Worth Star-Telegram
15. Houston Chronicle
16. Indianapolis Star
17. Investor’s Business Daily
18. Kansas City Star
19. Los Angeles Times
20. Miami Herald
21. Milwaukee Journal Sentinel
22. New York Post
23. New York Times
24. Newsday
25. Orange County Register
26. Oregonian
27. Orlando Sentinel
28. Philadelphia Inquirer
29. Pittsburgh Post-Gazette
30. Plain Dealer
31. Rocky Mountain News
32. San Antonio Express-News
33. San Diego Union-Tribune
34. San Francisco Chronicle
35. San Jose Mercury News
36. Seattle Times
37. St. Louis Post-Dispatch
38. St. Petersburg Times
39. Star Tribune (Minneapolis, MN)
40. Sun-Sentinel (Fort Lauderdale)
41. Tampa Tribune
42. Times-Picayune
43. USA Today
44. Washington Post