Public Estimates of Cancer Frequency: Cancer Incidence Perceptions Mirror Distorted Media Depictions

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Public Estimates of Cancer Frequency: Cancer Incidence Perceptions Mirror Distorted Media Depictions

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Compared with incidence rates, certain cancers are over- or underrepresented in news coverage. Past content analytic research has consistently documented these news distortions, but no study has examined whether they are related to public perception of cancer incidence. Adults (N = 400) completed a survey with questions about perceived cancer incidence, news consumption, and attention to health news. Cancer incidence perceptions paralleled previously documented news distortions. Overrepresented cancers were overestimated (e.g., blood, head/brain) and underrepresented cancers were underestimated (e.g., male reproductive, lymphatic, thyroid, and bladder). Self-reported news consumption was related to perceptual distortions such that heavier consumers were more likely to demonstrate distorted perceptions

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of four cancers (bladder, blood, breast, and kidney). Distortions in risk perception and news coverage also mirrored discrepancies in federal funding for cancer research. Health care professionals, journalists, and the public should be educated about these distortions to reduce or mitigate potential negative effects on health behavior and decision making.

A recent article in the *Los Angeles Times* reported on the cancer risks associated with smoking cigars (The FDA's Power Over Cigars, 2012). The article noted that smoking cigars increased risk for lung cancer and for cancers of the mouth, lips, throat, and esophagus. However, the article did not mention the relation between inhaling cigar smoke and increased risk of pancreatic and bladder cancer (McCormack et al., 2010; Shapiro, Jacobs, & Thun, 2000). In isolation, this omission is unremarkable; however, what if this situation occurs frequently and predictably? Would it be problematic if certain cancers were less likely to be discussed in news coverage (e.g., bladder cancer) whereas others were frequently the focus (e.g., lung cancer)?

Past content analytic research has found that certain types of cancer are more or less likely to receive news coverage. For example, Jensen, Moriarty, Hurley, and Stryker (2010) found that bladder cancer was less likely to appear in newspapers (11th most mentioned cancer in the news) than in the real world (6th in terms of real world incidence). Similar coverage patterns have emerged in other studies (Cohen et al., 2008; Slater, Long, Bettinghaus, & Reineke, 2008).

Discrepancies between news coverage and actual incidence could be problematic if they lead the public to perceive common cancers as rare, or all cancers as equal. In reality, certain cancers share a disproportionate amount of the cancer burden (Jemal, Siegel, Xu, & Ward, 2010). For example, bladder cancer is far more common (70,530 estimated new cases in 2010) than cancer of the brain (22,020 estimated new cases), yet the latter is more likely to be covered in the news (8th in coverage). As a result, it is possible that the U.S. public may perceive bladder cancer as less frequent than brain cancer; a situation that could lead to less attention to bladder cancer than is warranted. Consistent with this idea, federal funding for bladder cancer is considerably lower (22.6 million/year) than that for brain cancer (62.7 million/year; National Cancer Institute, 2011).

Researchers have long been interested in interreality distortions; perceptual distortions caused by discrepancies between reality and mediated representations of reality. To date, several content analyses have found that certain types of cancer appear more or less frequently in the media than in the real world (e.g., Jensen et al., 2010; Slater et al., 2008). However, no study has examined the relation among cancer incidence perceptions, cancer news distortions, news consumption, and federal funding of cancer research. The present study extends existing research by examining whether the U.S. public has distorted incidence perceptions of cancer, and whether those distortions are related to news consumption and federal funding patterns.

Interreality Distortions in Cancer News Coverage

Most sciences receive sparse news coverage (Weigold, 2001), but health news is flourishing. For example, health news coverage in *The New York Times* increased by 250% between 1968 and 1978, and by 425% between 1979 and 1988 (Wilkes, 1997). More recent analysis suggests this trend continues (Kaiser Family Foundation, 2008; Viswanath, 2005). The objective of health news stories is to provide consumers with content that is informative and compelling. To achieve this objective in the face of tight timelines and limited resources, journalists have come to rely on a set of

routines that cull health content as efficiently and accurately as possible. For the most part, these routines yield quality journalism that serves the public well; however, journalists and researchers have also noted that these practices can produce stories that are distorted or biased (Brechman, Lee, & Cappella, 2009; Brossard, 2009; Cooper & Yukimura, 2002; Jensen et al., 2010; Lai & Lane, 2009; Wallington, Blake, Taylor-Clark, & Viswanath, 2010).

In the case of cancer news coverage, researchers have consistently documented that news stories about particular cancers, when examined as a collective, do not correspond to actual cancer incidence rates (Cohen et al., 2008; Freimuth, Greenberg, DeWitt, & Romano, 1984; Greenberg, Freimuth, & Bratic, 1979; Slater et al., 2008; Stryker, Emmons, & Viswanath, 2007). In 2003, for example, bladder cancer was less likely to appear in U.S. newspapers (11th most mentioned cancer in the news) than in the real world (6th in terms of actual incidence; Jensen et al., 2010). Similar news coverage patterns have been found in non-U.S. newspapers suggesting that cancer news distortions may be common in non-U.S. contexts as well (Hoffman-Goetz & Freidman, 2005; Peng & Tang, 2010).

In the first comprehensive content analysis of cancer new coverage, Greenberg and colleagues (1979) found in the top 49 highest circulating U.S. newspapers, breast cancer was the most frequently mentioned cancer site (11.0%), followed by lung (7.8%), bladder/kidney (6.8%), bone/muscle (5.5%), and blood/leukemia (5.0%). Seven cancers were underrepresented in the news (colon, female reproductive, male reproductive, head/neck, lymphatic/Hodgkin's, stomach/pancreatic, and thyroid), four cancers were overrepresented in the news (breast, bladder/kidney, blood/leukemia, and bone/muscle), and two cancers were reported proportionate to their incidence rates (lung and skin). A second content analysis by the same research group (Freimuth et al., 1984) found that lung cancer was the most frequently mentioned cancer (10.7%), followed by breast (6.6%), and female reproductive (4.9%) cancer. Compared to incidence data, two cancers were underrepresented in the news (colon and male reproductive), two cancers were overrepresented in the news (breast and female reproductive), and one cancer was reported proportionate to its incidence rate (lung).

Several decades later, three research teams carried out comprehensive content analyses of cancer news coverage. In a sample of Black and general audience newspapers, Cohen et al. (2008) found that breast cancer was the most frequently covered cancer (21.1% of stories), followed by prostate (10.0%), colon and rectum (6.1%), lung and bronchus (4.6%), and melanoma (2.7%).

Slater, Long, Bettinghaus, and Reineke (2008) conducted a comprehensive content analysis across media outlets, including newspapers, news magazines, and television newscasts. Breast cancer was the most frequently mentioned cancer site for all three media outlets. In newspapers, the five cancer cites mentioned the most were breast (29.6%), colon (11.3%), prostate (9.6%), lung (8.7%), and brain (7.0%). They found colon, brain, leukemia, cervical, and liver cancer were all overrepresented in newspaper coverage whereas prostate, lung, and lymphoma were underrepresented in newspapers.

Last, Jensen and colleagues (2010) found that the most mentioned cancers in the top 50 circulating U.S. newspapers were breast (26.0% of stories that mentioned cancer), lung (11.3%), male reproductive (10.4%), colon (8.5%), and blood/Leukemia (8.1%). For ethnic newspapers, the most mentioned cancers were breast (35.4%), prostate (16.1%), colon (14.2%), lung (13.6%), and female reproductive (11.2%; Stryker, Emmons, & Viswanath, 2007). In mainstream newspapers, a comparison of coverage and incidence revealed several interreality cancer distortions. Six cancers were found to be underrepresented in the news (male reproductive, female reproductive, bladder, kidney, lymphatic/Hodgkin's, and thyroid), and seven cancers

were found to be overrepresented in the news (lung, breast, head/neck, blood/ Leukemia, pancreatic, skin, and bone/muscle). Colon and stomach cancer were reported proportionate to their incidence rates. Coverage patterns appeared to be distorted by publicity events (e.g., fundraisers), celebrity cancers, and the efforts of advocacy groups (Jensen et al., 2010).

In summary, multiple content analyses have found that cancer news coverage depicts specific cancers disproportionate to real world incidence rates. To help readers compare the studies, Table 1 depicts the five cancers that received the most news coverage in each study.

Effect of Interreality Distortions

Cancer risk perceptions are related to a variety of health behaviors, including cancer prevention (Codori, Petersen, Miglioretti, & Boyd, 2001), screening (Katapodi, Lee, Facione, & Dodd, 2004), and patient adherence or treatment decisions (Kondryn, Edmondson, Hill, & Eden, 2011). Unfortunately, cancer risk perceptions are often inaccurate (Leventhal, Kelly, & Leventhal, 1999), which could lead to suboptimal decision making across the health care continuum (Peters, McCaul, Stefanek, & Nelson, 2006).

Inaccurate perceptions may be cultivated, in part, by media coverage of cancer. Cultivation researchers were some of the first to examine interreality distortions; for example, early studies compared frequency of crime on television to real world crime statistics and found that the former distorted the perceived likelihood of such events (Gerbner, Gross, Morgan, & Signorielli, 1980). More recently, Dixon and Linz (2000) identified interreality distortions between the racial identity of lawbreakers on local newscasts and the racial distribution of actual arrest rates. On the basis of arrest rates, African Americans and Latinos were found to be disproportionately depicted as law breakers in newscasts. Subsequent research has demonstrated that these distorted racial depictions negatively influence viewer perception of African Americans (Oliver & Founash, 2002).

From a theoretical standpoint, the social amplification of risk framework posits that people cannot process all existing risk information and thus reduce overload by relying on heuristics to form risk perceptions (Kasperson, Kasperson, Pidgeon, & Slovic, 2003; Kasperson et al., 1988). As a result, risk perception is amplified or attenuated by social and individual processes. One social process that significantly shapes perceptual amplification/attenuation is media. Media coverage amplifies/ attenuates risk perceptions through variations in coverage. For example, Combs

Table 1. Comparison of comprehensive content analyses

	Most coverage ⟵			⟶ Least coverage	
Greenberg et al. (1979)	Breast	Lung	Bladder/kidney	Bone/ muscle	Blood/ leukemia
Freimuth et al. (1980)	Lung	Breast	Female reproductive	—	—
Cohen et al. (2008)	Breast	Prostate	Colon	Lung	Melanoma
Slater et al. (2008)	Breast	Colon	Prostate	Lung	Brain
Jensen et al. (2010)	Breast	Lung	Male reproductive	Colon	Blood/ leukemia

Note. Top five cancers depicted in mainstream/general audience newspapers by content analysis. Cancers are listed horizontally from most to least coverage. Freimuth et al. (1980) did not provide a fourth or fifth most reported cancer.

and Slovic (1979) examined the relations among news coverage, actual incidence, and public incidence perceptions of 41 causes of death. Similar to research on cancer, they found a small correlation between number of news stories (in two Oregon newspapers) and actual incidence of death ($r = .13$). Across the 41 causes of death, the authors observed that diseases (e.g., cancer) were underreported (compared with frequency) whereas violent or catastrophic events were over reported (e.g., homicide, tornado). In addition, 74 (mostly student) research participants tended to overestimate the frequency of over reported causes of death (media amplification) and underestimate the frequency of underreported causes of death, including stomach, lung, and breast cancer (media attenuation; Combs & Slovic, 1979). This pattern of amplification/attenuation was later replicated in a sample of female adults (Slovic, Fischhoff, & Lichtenstein, 1979).

One heuristic underlying social amplification of risk framework is variations in accessibility, also known as *accessibility bias*, which is "a tendency to estimate the frequency of events by the ease with which they are remembered" (Fischohoff, Bostrom, & Quadrel, 1993, p. 187). Research on social cognition has consistently found quantity of activation is related to cognitive accessibility; where more frequently activated constructs are easier to bring to mind than their less frequently activated counterparts (Shrum, 2009). Constructs that are routinely depicted in the media are activated more in the mind and thus are easier for media consumers to recall. Past research has found that humans often estimate frequencies on the basis of how easy a construct is to bring to mind. The less effort it takes to conjure thoughts about a construct, the more common it is assumed to be (Peters et al., 2006; Tversky & Kahneman, 1973). Thus, media misrepresentations of objects in the real world ultimately create discrepancies in activation that produce accessibility distortions. Accessibility distortions may lead media consumers to perceive objects as more (or less) common than reality and act incorrectly on the basis of this assumption.

Thus, the social amplification of risk framework suggests that incidence distortions in cancer news coverage may have significant health implications. Research on illness representations, for example, has demonstrated that people associate different frequencies, causes, features, and timelines with diseases based on their cultural, social, and personal experiences (Orbell et al., 2008). This may explain why actual cancer risk and perceived cancer risk are often different, such that people frequently miscalculate the likelihood that they will contract a certain type of cancer or cancer in general (Leventhal, Kelly, & Leventhal, 1999). Moreover, inaccurate perceptions about an illness are problematic in that they could lead people to pursue suboptimal health behaviors (e.g., not screening for a frequent type of cancer).

The present study extends existing research by testing whether the amplification/attenuation postulates of social amplification of risk framework can be observed across cancer incidence perceptions, news coverage, and funding. Specifically, it is hypothesized that risk perception for cancers overrepresented in the media should be amplified (Hypothesis 1a), whereas those underrepresented should be attenuated (Hypothesis 1b). Previous studies have examined the relation between risk perception and frequency of media coverage (Combs & Slovic, 1979), but no study to date has tested whether news consumption is correlated with amplified/attenuated perceptions. Consistent with Hypotheses 1a and 1b, it is hypothesized that news consumption should be correlated with risk perceptions such that heavier consumers demonstrate more amplified/attenuated risk perceptions (Hypotheses 2a and 2b). Last, social amplification of risk framework posits that risk perception shapes and is shaped by social processes. One social process with the potential to shape (as well as be shaped by) risk perceptions and news coverage is the allocation of federal funding to specific cancer sites. Thus, we hypothesized that allocation of federal funding to cancer research will mirror distortions in risk perceptions and news coverage, with

amplified cancers receiving more funding than expected by incidence (Hypothesis 3a), and attenuated cancers receiving less funding (Hypothesis 3b).

Method

Participants

From April 2011 to June 2011, adults were recruited from one of seven shopping malls in Indiana. At each location managers allowed the research team to set-up a table and twelve chairs in one of the main intersections of the mall. A team of three to five researchers recruited mall shoppers from 9 am to 9 pm. Participants were recruited verbally and through the use of six large canvas signs (with the name of the university supporting the research). We recruited 1,600 adults, and 400 were randomly assigned to the present study. When participants approached the research team, they were randomly assigned to one of four different studies (one of which was the present protocol). Participants were given a $10 gift card for completing the survey.

More women (56.9%) participated than men (43.1%). Participants ranged from 18 to 89 years of age, with a mean age of 33.88 years ($SD = 16.10$ years). In terms of race, 80.7% were Caucasian; 5.3% African American; 4.8% Hispanic, Latino, or of Spanish origin; 7.9% Asian or Pacific Islander; 0.8% American Indian or Native American; and 2.8% described themselves as ''other'' (participants could check more than one category). Education was distributed as follows: less than a high school degree (4.4%), high school degree (22%), one year of college/vocational training (21.3%), 2–3 years of college/vocational training (34.9%), and 4-year college graduate (16.9%).

Measures

Perceived Cancer Incidence

Past research has used rank as a numeric indicator of interreality distortions (Jensen et al., 2010). In line with this research, participants were asked to rank 15 cancers in terms of incidence. Cancer is typically categorized by site (e.g., breast, bladder, lung), and the 15 cancers selected for this study parallel the most common sites as identified by past research (Jemal et al., 2010). In line with past work, nonmelanoma skin cancers (i.e., basal and squamous cell skin cancers) were excluded from the ranking. Nonmelanoma skin cancers are routinely excluded from cancer incidence statistics as they are not tracked by most cancer registries (Rubin, Chen, & Ratner, 2005). A rank of one conveyed the cancer perceived to be most frequent and a rank of 15 the cancer to be least frequent. Perceived cancer incidence rank was transformed into two variables: average perceived cancer incidence and absolute perceived cancer incidence. The former is the mean rank for a cancer type, whereas the latter is the corresponding absolute rank.

News Consumption Index

Five news consumption measures were used in the present study. For local TV consumption, participants used an 8-point scale (0–7) to respond to two questions ''How many days of the week do you watch local morning news/local evening news?'' (Cronbach's $\alpha = .76$; $M = 2.40$, $SD = 2.25$). National TV consumption (ABC, CBS, NBC) was measured in a similar fashion (Cronbach's $\alpha = .73$; $M = 2.70$, $SD = 2.20$). Newspaper consumption was measured using a 4-point scale (0–4+) and a single item: ''How many newspapers do you subscribe to?'' ($M = 0.88$, $SD = 0.67$). Online news subscription was measured in a similar fashion ($M = 1.55$, $SD = 1.21$). Last, online news is accessible to those without a subscription; thus, participants were asked about their exposure (*none, a little, some, a lot*) to online content,

"Do you stop and read news articles at web portals (e.g., Yahoo!, MSNBC)?" ($M = 2.65$, $SD = 1.09$).

A news index was created by combining scores on all five measures of news consumption: local TV news consumption, national TV news consumption, newspaper consumption, online newspaper consumption, and news consumption at web portals ($M = 10.26$, $SD = 4.71$). Internal reliability is not relevant at the level of index as it is valid (and logical) for participants to have high scores for one form of consumption (e.g., local TV news consumption) and low scores for another (e.g., online newspaper consumption).

Results

Perceptual Distortions

In the United States, the six cancers with the highest incidence rates are (in descending order) male reproductive, breast, lung, colon, female reproductive, and bladder (Jemal et al., 2010). Participants perceived incidence differently, with breast cancer rated as most frequent followed by lung, colon, blood, female reproductive, and melanoma. Blood cancer was ranked considerably higher than reality (10th in actual incidence, 4th in perceived incidence), whereas male reproductive cancer (1st in actual incidence, 7th in perceived incidence) and bladder cancer (6th in actual incidence, 15th in perceived incidence) were ranked lower.

Table 2 depicts participants' average ranking for each cancer (a low score conveys higher perceived frequency), the corresponding absolute perceived incidence rank (1st to 15th), the actual incidence ranking, and a perceptual difference score

Table 2. Public perception of cancer incidence

	Average perceived incidence rank	Absolute perceived incidence rank	Actual incidence rank	Perceptual difference score	News difference score
Breast	2.93 (3.04)	1	2	+1	+1
Lung	4.64 (3.73)	2	3	+1	+1
Colon	5.98 (3.86)	3	4	+1	0
Blood/leukemia	6.54 (3.80)	4	10	+6	+5
Female reproductive	6.62 (3.55)	5	5	0	−1
Melanoma	6.68 (4.50)	6	8	+2	+1
Male reproductive	7.25 (3.72)	7	1	−6	−2
Pancreatic	9.35 (3.53)	8	11	+3	+1
Kidney	9.44 (3.47)	9	9	0	−3
Lymphatic	9.49 (3.90)	10	7	−3	−2
Stomach	9.67 (3.73)	11	13	+2	0
Head/brain	9.71 (3.88)	12	14	+2	+6
Bone/muscle	9.73 (3.63)	13	15	+2	+1
Thyroid	9.98 (3.69)	14	12	−2	−3
Bladder	10.62 (3.95)	15	6	−9	−5

Note. Perceived incidence rank is represented in two columns. Average perceived incidence rank is the mean rank (and standard deviation) for each cancer type. Absolute perceived incidence rank translates the mean rank into an absolute ranking. For example, breast cancer had a mean ranking of 2.93, which translates to 1st in perceived incidence rank whereas bladder cancer had a mean ranking of 10.62, which translates to 15th in perceived incidence rank. Actual incidence rank was calculated using 2007 incidence rate data from the National Program of Cancer Registries. Perceptual distortion was calculated by subtracting absolute perceived incidence rank from actual incidence rank. A positive score means the incidence of the cancer was overestimated and a negative score means it was underestimated. News difference scores were culled from Jensen et al. (2010).

(actual incidence rank minus absolute perceived incidence rank). The latter reflects the degree of distortion between perceived and actual incidence. For example, blood cancer has a perceptual difference score of +6 which reflects participants perceived blood cancer as occurring much more frequent than reality. A negative perceptual difference score reflects that participants underestimated that type of cancer (e.g., male reproductive has a score of −6). Two cancers were significantly overestimated (blood and pancreatic) and three were significantly underestimated (male reproductive, lymphatic, and bladder).

The final column of Table 2 contains news differences scores from Jensen and colleagues (2010). These scores were calculated similar to the perceptual scores, except that news coverage rank (i.e., how frequently a type of cancer appeared in the news) was subtracted from actual incidence. For example, blood cancer was more likely to be depicted in the news than in reality (news difference score of +5). A comparison of news and perceptual difference scores reveals support for Hypotheses 1a and 1b as there are high perceptual difference scores for cancers overrepresented in the news (e.g., blood, head/brain) and low perceptual differences scores for cancer underrepresented in the news (e.g., male reproductive, lymphatic, thyroid, and bladder).

News Consumption and Perceptual Distortions

The similarity between perceptual and news difference scores suggests the two could be related. In line with this idea, Hypotheses 2a and 2b posited that heavier news consumers would be more likely to demonstrate amplification and attenuation effects. To test these hypotheses, a series of ordered logistic regressions were carried out as the outcome, average perceived cancer incidence, is a rank-ordered variable and should be treated as ordinal. Average perceived cancer incidence was also reverse-coded to facilitate interpretation (i.e., high rank equates to greater perceived incidence for this analysis only). Age, race, gender, and education were included in the analyses as all are related to actual cancer incidence (Siegel, Ward, Brawley, & Jemal, 2011), and thus could be related to perceived incidence.

We conducted 15 ordered logistic regression analyses (one for each cancer type) to examine the relation between news consumption, demographics, and average perceived cancer incidence rank (see Table 3). News consumption was significantly related to perceived incidence of bladder, breast, and kidney cancer. Increased news consumption was related to increased perceived incidence for breast cancer (support for Hypothesis 2a) and decreased perceived incidence for bladder and kidney cancer (support for Hypothesis 2b).

Some readers may be interested in the relation between various measures of news consumption (e.g., consumption of local TV news) and perceived cancer incidence. Breaking the news consumption index into five measures (local TV news consumption, national TV news consumption, newspaper consumption, online newspaper consumption, and news consumption at web portals) yields one additional finding. News consumption at web portals is positively related to perceived incidence of blood cancer ($r = .20$, $SE = .09$, $p = .03$). In other words, individuals that consumed more news at web portals perceived blood cancer to be more common.

Perceptual Distortions and Funding of Cancer Research

Both public perception and news coverage are distorted, but are these distortions related to other outcomes? To bridge this issue, absolute perceived cancer incidence, news coverage rank, and actual cancer incidence were compared to federal funding of cancer research by site (see Figure 1). Breast cancer is second in actual incidence, but it receives (at least) double the funding of any other cancer site. The abundance of

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Table 3. Public perception of cancer incidence, by demographics and news consumption

	Age	Race	Gender	Education	News consumption	$\chi^2(df)$	Cox and Snell R^2
Bladder	.01 (.01)	-.51 (.24)*	-.38 (.19)*	-.16 (.06)**	-.20 (.09)*	19.26*	.05
Blood	-.01 (.01)	-.53 (.24)*	.03 (.18)	.03 (.06)	.09 (.09)	6.63	.02
Bone/muscle	-.02 (.01)**	-.12 (.24)	.06 (.18)	-.13 (.06)*	-.08 (.09)	19.76**	.05
Breast	-.01 (.01)	-.35 (.26)	.20 (.19)	.05 (.06)	.24 (.10)*	9.32†	.03
Colon	.02 (.01)*	.48 (.25)†	-.24 (.18)	-.03 (.06)	.09 (.09)	17.33**	.05
Female reproductive	.01 (.01)†	-.11 (.24)	.50 (.19)**	-.04 (.06)	-.11 (.09)	11.07†	.03
Head/brain	.00 (.01)	-.61 (.24)*	-.18 (.18)	-.15 (.06)*	-.08 (.09)	15.13*	.04
Kidney	-.01 (.01)	-.60 (.25)*	.19 (.18)	-.19 (.06)**	-.16 (.09)†	24.46**	.06
Lung	-.01 (.01)*	.18 (.24)	.22 (.19)	-.02 (.06)	-.07 (.09)	8.21	.02
Lymphatic	.01 (.01)	.18 (.24)	.02 (.18)	.01 (.06)	-.01 (.09)	4.48	.01
Male reproductive	-.01 (.01)	.32 (.24)	-.35 (.19)†	.12 (.06)*	.05 (.09)	8.51	.02
Melanoma	.01 (.01)	1.27 (.25)**	-.02 (.18)	.24 (.06)**	.02 (.09)	47.99**	.12
Pancreatic	.01 (.01)†	-.26 (.24)	-.49 (.19)**	-.02 (.06)	.07 (.09)	12.61*	.03
Stomach	-.01 (.01)	-.24 (.24)	-.25 (.18)	-.02 (.06)	.03 (.09)	4.74	.01
Thyroid	-.02 (.01)*	.21 (.25)	.10 (.18)	-.01 (.06)	.06 (.09)	5.86	.02

Note. Ordinal regression analysis predicting average perceived incidence rank with demographics and news consumption. Coefficients with standard errors presented in columns. Perceived incidence rankings were reverse coded to ease interpretation for this analysis. For news consumption, a positive coefficient means with increased consumption a cancer was perceived to be more frequent. A negative coefficient means with increased consumption a cancer was perceived to be less frequent. Race was coded 0 = not Caucasian, 1 = Caucasian. Gender was coded 0 = male, 1 = female. Age, education, and news consumption are all continuous variables were higher scores equate to older, more educated, and heavier consumption. All significance tests were two-tailed. For each χ^2, $df = 5$.
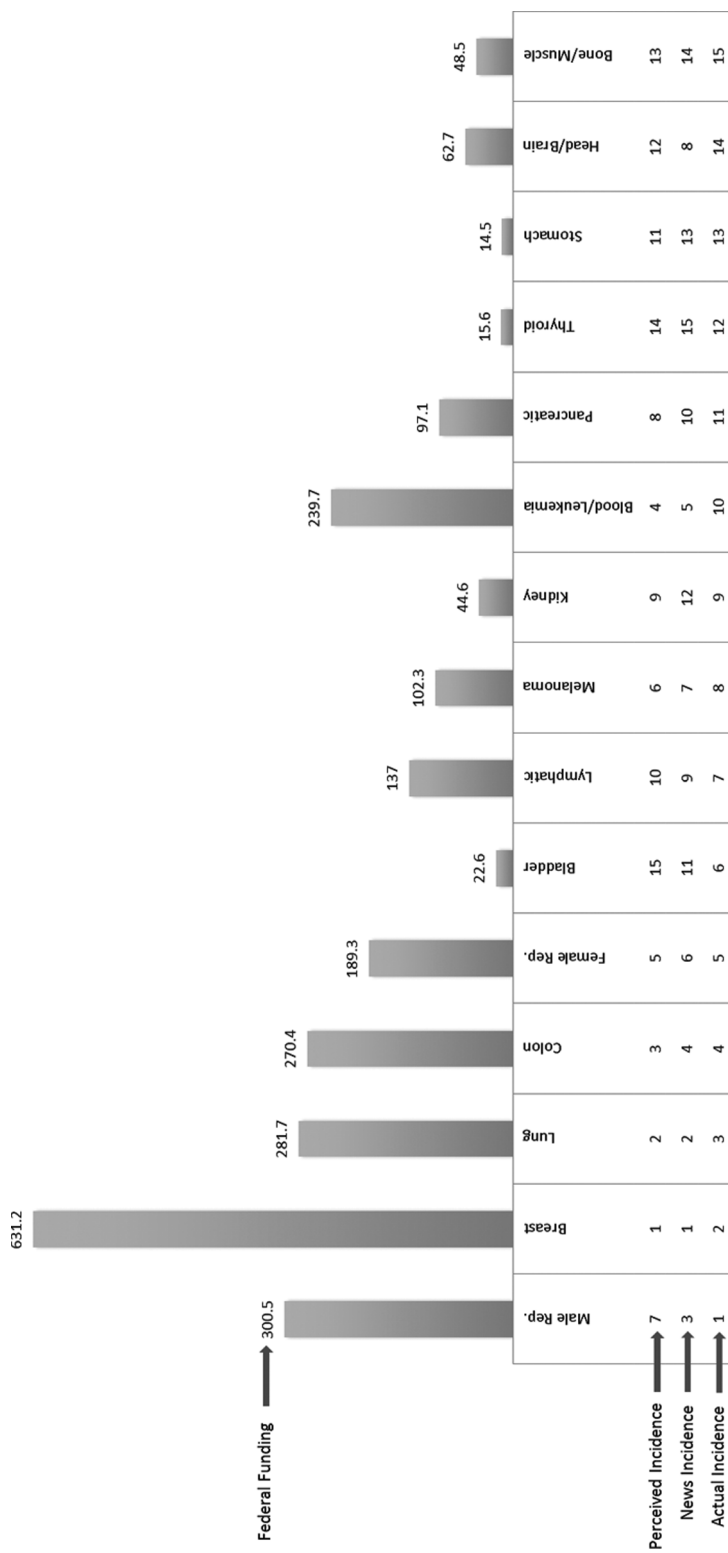†$p < .10$. *$p < .05$. **$p < .01$.

Figure 1. Federal funding, in millions of dollars, by cancer type.

funding for breast cancer research is consistent with both public perception and news coverage patterns. A similar pattern emerges for blood cancer which is the 5th most funded cancer—and 4th in perceived incidence and 5th in news coverage—despite being 10th in actual incidence. In contrast, bladder and kidney cancer receive comparatively less funding. Bladder cancer is among the least funded cancers (13th)—and lowest in perceived incidence (15th) and news coverage (11th)—despite the fact that it is one of the most common (6th in actual incidence). Kidney coverage is underrepresented in the news (12th in news incidence, 9th in actual incidence) and, as revealed by ordinal regression analysis, is one of two cancers (the other being bladder) for which news consumption is negatively related to public perception. Thus, there is evidence that perceptual and news coverage distortions mirror amplification and attenuation distortions in other key outcomes (support for Hypotheses 3a and 3b).

Discussion

Public perception of cancer incidence seems to mirror news distortions more than reality. At times the effect is relatively small; for example, perceptual and news coverage difference scores for breast cancer are both +1, which equates to the public perceiving that type of cancer as slightly more frequent (first in perceived incidence) than reality (second in actual incidence). However, the effect can also be robust; for example, bladder cancer incidence is highly distorted in the news as well as in the mind of the public. Consistent with the difference scores, ordered logistic regression analyses revealed that news consumption was related to distorted perceptions of four cancers (bladder, blood, breast, and kidney). Of these, kidney cancer is atypical in that the perceptual difference score is zero even though news coverage is distorted (−3). Despite this discrepancy, regression analysis still revealed a relation between news consumption and distorted incidence perceptions of kidney cancer; a logical finding as more frequent consumers can still exhibit distorted perceptions when the content is skewed.

In addition to demonstrating a link between perceptual and news distortions, the present study revealed that such distortions parallel discrepancies in federal funding for cancer research. It is tempting to think that news coverage patterns distort public perception which, in turn, influences support/allocation of federal funding (henceforth, referred to as the news distortion hypothesis). The news distortion hypothesis is plausible, but the present dataset is cross-sectional and thus not suitable for making/supporting causal claims. Moreover, a perfectly linear causal chain may be less plausible than a model of mutual influence or reinforcement (Slater, 2007; Slater, Goodall, & Hayes, 2009). Social amplification of risk framework posits that mutual influence is a more likely model of amplification and attenuation effects (Kasperson et al., 1988). For example, effective organizing, branding, and event management by breast cancer advocacy groups could influence all of these distortions as well as initiate a cycle of mutual influence; where news distortions, perceptual distortions, and funding distortions influence and reinforce each other (henceforth referred to as the *mutual influence hypothesis*). Future research could use longitudinal designs to test the news distortion and mutual influence hypotheses. Key outcomes could be support/allocation of federal funding, knowledge of cancer, stage of cancer at diagnosis, and screening attitudes/behaviors. Past research has demonstrated that cancer risk perceptions are related to a variety of health behaviors (Codori et al., 2001; Katapodi et al., 2004; Kondryn et al., 2011). Thus, the primary contribution of future longitudinal research is not the demonstration of a link between perceived cancer incidence and behaviors, but rather testing models that include all of the variables (i.e., news distortion, perceptual distortions, and behaviors).

Future research should examine whether cancer information seeking and scanning are related to perceptual distortions. Seeking occurs when an individual actively

pursues specific content, whereas scanning occurs when an individual encounters information more passively. Past research has shown that scanning is far more common than seeking (Kelly et al., 2010), and it is plausible that news consumers may be more vulnerable to macrolevel news distortions, like the kind examined here, when passively consuming large amounts of information. For example, in the present study, participants who consumed more news at web portals—which is often a passive form of consumption—exhibited more distorted perceptions of blood cancer incidence. In future research, one way to explore this possibility is through longitudinal studies comparing news content, cancer incidence perception, and scanning/seeking behavior within larger theoretical frameworks such as the risk information seeking and processing model (Griffin, Dunwoody, & Neuwirth, 1999). In addition, researchers should be sensitive to the possibility that passive consumption often occurs through channels (e.g., web portals) that may have significantly different news patterns. For example, Hurley and Tewksbury (2012) found that online news aggregators (e.g., Google News) had different coverage patterns than nonaggregator sites (e.g., CNN.com).

One larger issue that still needs to be addressed is why certain cancers are distorted in the news. Jensen and colleagues (2010) demonstrated that some of the distortion was consistent with personalization bias (Bennett, 2007). Others have noted that health news distortions could be a byproduct of basic news routines (Wallington et al., 2010) and/or the influence of heavily cited sources (Moriarty, Jensen, & Stryker, 2010). Additional possibilities that should be explored are the influence of funding mechanisms, issue controversies, differential risk/opportunity, and news streamlining. Funding has the potential to influence the amount of research for a given cancer site which could facilitate the cycle of mutual influence, and hence distortion. Issue controversies, such as the debate about mammography screening recommendations, could also skew coverage toward a particular cancer.

Differential risk/opportunity is one of the more complex factors to engage, as researchers will need to contemplate how to decipher myriad competing influences. For instance, bladder cancer is more common in men and Caucasians and is a disease that disproportionately manifests in older groups (mean age at diagnosis is 69–71 years; Madeb & Messing, 2004). Blood cancer, in contrast, is more common in younger populations and has a lower 5-year survival rate (Jemal et al., 2010). Such differences may influence individual and public perception of various cancers as well as news story selection and federal funding. Indeed, it is completely logical for the public, journalists, and funding organizations to prioritize a less frequent, but more deadly cancer that often impacts the young (i.e., blood cancer). However, notice that this explanation does not account for the distortion in incidence perceptions. Data in hand reveal that U.S. adults perceive bladder cancer as less frequent than blood cancer. So, although a logical argument could be made in favor of increased attention for blood cancer, the current situation is inconsistent with this explanation.

Concerning news streamlining, and consistent with the example described in the introduction, it is possible that certain cancers come to be underreported because a list of cancers (e.g., lung, pancreatic, bladder) are cut and replaced by a single representative cancer (e.g., lung). Such streamlining practices are common, and past research has demonstrated that they have a host of negative effects on news consumers, including increasing fatalistic beliefs, nutritional backlash, and distrust in scientists (Jensen, 2008; Jensen et al., 2011). Exploring whether news streamlining contributes to incidence distortions is a valuable goal for the future.

Study Limitations

The present study had several limitations. Correlational data does not demonstrate causality; thus, the present data do not confirm a causal link between incidence

perceptions and news consumption. Moreover, news distortions documented in the past (news years 1979, 1980, 2002–2005) may not be representative of the year or region in which the survey was conducted. On a similar note, the perspectives of those in the sample—a convenience sample collected at several malls—may not be representative of adults in other regions of the United States, or even Indiana specifically. Last, several key constructs were assessed using single-item measures (e.g., perceived cancer incidence ranking). The development and validation of more sophisticated measurement tools would strengthen the research.

Conclusion

Certain cancers are more or less likely to be covered by the news. The present study found preliminary evidence that these news distortions are related to both perceptual distortions about cancer incidence and discrepancies in federal funding for cancer research. Educating healthcare practitioners, journalists, and the public about these distortions could help to balance news coverage or mitigate the effects of particular distortions.

Funding

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