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Who's responsible? Media framing of pediatric environmental health and mothers' perceptions of accountability

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Abstract

How the media frames issues of environmental health may affect mothers' views of who is responsible for addressing environmental risks to pediatric health, and ultimately, their protective behaviors. This article describes how information-oriented media sources attribute responsibility for such risks and examines associations between mothers' routine media exposure, or *scanning*, and perceptions of responsibility. First, a content analysis was conducted with a sample of 474 media stories (i.e., Associated Press (AP), parenting magazines and websites) about childhood exposures to environmental chemicals over a 6-month period (September 2012 – February 2013). We found that media stories attributed responsibility most frequently to parents, though significant differences were observed across media sources such that websites focused more on parents and general news more on government agencies and manufacturers. Next, we conducted an online survey of mothers (n = 819) and revealed website scanning during the prior 6 months was significantly associated with perceived personal responsibility, even after adjusting for potential confounders. Scanning general news was also significantly associated with perceived government and manufacturer responsibility. Understanding media framing of these issues highlights opportunities for health communicators to offset pressure placed on mothers by encouraging greater social and policy support in and exposure to certain media.

Keywords

Responsibility framing; mass media; pediatric environmental health; policy; content analysis

Despite advances in pediatric medicine, upward trends in a variety of adverse health outcomes in children have been observed over the past few decades, including preterm birth, low birth weight, early onset puberty, attention deficit disorder, autism and leukemia (Landrigan et al., 1998; Roosli, 2011; The American College of Obstetricians and Gynecologists, 2013; The National Institute of Child Health and Human Development,

2012; Wigle et al., 2008). In an effort to pinpoint possible causes, attention to prenatal and pediatric environmental health (PPEH) in the U.S. is on the rise.

Roughly 85,000 industrial chemicals are currently in use in the United States (Environmental Protection Agency, 2015), a majority of which remain untested and unregulated (Fischetti, 2010). Responsibility for protecting children from potential toxins has been assumed by a variety of stakeholders, including the medical and scientific communities, government agencies, manufacturers and parents. For instance, the National Institutes of Medicine spends roughly \$1.2 billion a year on research to better understand how childhood health may be influenced by exposures to potentially toxic chemicals in our air, food, water and soil (Kaiser, 2014). Companies are also reformulating products to reduce potentially adverse exposures, for instance, to BPA in food packaging and baby bottles (Weinstein, 2011).

According to a national survey of U.S. adults, a majority believe that environmental factors play a role in serious childhood illnesses, including asthma, birth defects and cancer (Princeton Research Associates for Health-Track, 2000). This may partly explain why new mothers actively take steps to reduce certain chemicals exposures (Mello & Hornik, 2015; Mello & Hovick, 2016) and why households with young children are more likely to purchase organic products (Hughner, McDonagh, Prothero, Shultz, & Stanton, 2007; Loureiro, McCluskey, & Mittelhammer, 2001).

On-going conversations about how to better regulate chemical testing and use, reduce adverse exposures, and ultimately protect pediatric health center on identifying responsible parties. Media play a key role in informing the public about environmental health risks (Adam, Allan, & Carter, 1999) and influencing chemical legislation (Kiss, 2013, 2014). They have the power to tell audiences which issues to think about (*agenda-setting*) and also how to think about them (*framing*). Because toxicology is a highly-contested and politicized science (Shostak, 2013), it is important to determine how the media attributes responsibility for mitigating chemical risks to children and to examine whether mothers' routine media exposure and perceptions of accountability are related as they may ultimately guide protective behaviors, as evidenced in prior framing research (Coleman, Thorson, & Wilkins, 2011).

Although past studies have examined media framing of responsibility for childhood health (e.g., obesity, vaccination), empirical connections have yet to be made between actual media coverage and cognitive outcomes among audience members. Additionally, PPEH-related topics have received very limited attention. To address these gaps, we adopt an approach used in cancer communication studies (i.e., Jensen et al., 2014; Stryker, Moriarty, & Jensen, 2008) combining content analysis data from what are sometimes called 'information-oriented media sources' (e.g., news stories, magazines, the Internet; Dutta-Bergman, 2004) with a survey of the target population: new and expectant mothers.

Framing & attributions of responsibility

How public health issues are framed has the power to influence public opinion, individual behavior, policymakers, and corporate practices (Dorfman, Wallack, & Woodruff, 2005). In the context of environmental health, it is argued that the “dominant epidemiological paradigm” (DEP), or generally accepted set of beliefs about disease, holds individuals responsible for their own health status (Brown, 2007). Public health advocates are increasingly concerned with counteracting such “victim blaming” (Ryan, 1971) and reframing issues from “an individual to an environmental perspective, showing that where people live, work and play directly affects health” (Dorfman & Krasnow, 2014, p. 296).

Media play a central role in framing social issues and influencing public perceptions of responsibility (Kim, 2015). In their stories, journalists select and make salient certain pieces of reality “in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation for the item described” (Entman, 1993, p. 52). Early research on media frame building found that episodic frames, which present stories as a specific event or personal case, tend to be more prevalent in news coverage than thematic frames, which place an issue within a larger social context (Iyengar, 1991). Experiments have shown that exposure to these frames has the power to influence attributions of responsibility for social issues (i.e., frame setting), such that episodic frames lead audiences to focus more on individual rather than societal accountabilities and vice versa (Iyengar, 1991; Iyengar & Kinder, 1987).

Attempts have been made to replicate these findings more recently in experimental work with news specifically about health, though the evidence is somewhat mixed. Coleman and colleagues (2011) exposed participants to news stories about various health topics (e.g., smoking, diabetes) and found that while thematic frames increased support for public policy changes, they did not entirely shift attributions of responsibility away from individuals. Major (2009) found that thematic frames in news stories about lung cancer and obesity made readers attribute significantly more responsibility to societal factors, particularly when combined with loss frames. These latter studies have raised important questions about whether effects observed in experimental conditions reflect real-world exposures to responsibility frames. Some researchers have started to gauge episodic and thematic framing effects in a more naturalistic setting by examining comments in response to online health articles (Holton, Lee, & Coleman, 2014; Suran, Holton, & Coleman, 2014). In our study, we aim to contribute to the methodological diversification of framing research (Kinder, 2007) and extend this line of observational work by analyzing coverage and self-reported survey data.

Media & responsibility for pediatric health

Research on media coverage of pediatric health issues has documented the nature and frequency of responsibility frames. For example, Kim and Willis (2007) found that between 1995 and 2004, American news media consistently framed childhood obesity as a personal problem, though a balance in individual and societal attributions of responsibility for causing and solving the issue was reached in later years. In a similar analysis of news from

2000 to 2009, Barry and colleagues (2011) found that most stories (75%) mentioned at least one cause of childhood obesity and most often mentioned individual behavioral changes (e.g., diet or exercise) as a solution. They also detected significant differences in frames across media sources, such that newspapers were more likely than magazines to identify system-level solutions (e.g., legislative, regulatory or industry modification) than individual changes. In the context of childhood vaccines, Leask and Chapman (2002) analyzed Australian newspaper coverage of vaccination against preventable diseases and found that most stories blamed parents (versus lack of government coordination) for low immunization rates.

To our knowledge, only one study has examined responsibility framing related to PPEH. Bellows (1998) analyzed stories about childhood lead poisoning from popular American press (e.g., *New York Times*, *Washington Post*) from 1993 to 1994. Frames highlighting intergenerational responsibility for protecting children through lead screening and abatement were most frequent, drawing heavily on “parental guilt” (p. 3). Episodic frames supporting a limited government role were also frequent and recounted parents’ remorse for not having taken preventive measures. By contrast, frames connecting lead poisoning to broader issues of race and poverty, as well as those implicating corporate irresponsibility in the production and marketing of hazardous products, were relatively infrequent.

While informative, the Bellows study had two important limitations. First, it focused on an environmental health risk that parents have limited ability to mitigate compared to other potential toxins, such as bisphenol A (BPA) found in small consumer products. By contrast, our study specifically focuses on chemical risks which parents can take reasonable steps to control and may also be regulated and managed by institutions. Second, like many studies on responsibility framing described above, Bellows did not make a connection between actual media exposure and cognitive outcomes among parents, which our study addresses through the collection of content analytic and survey data examining frames and subsequent perceptions of accountability.

The role of media in motherhood

Research has shown that during the transition to parenthood, attention increases to information about issues that may affect a child’s well-being, including potential health threats (P. C. Stern, Dietz, & Kalof, 1993). This information is also used to develop self-definitions for women becoming mothers (Deutsch, Ruble, Fleming, Brooks-Gunn, & Stangor, 1988). Often acquired from mass media sources, particularly the Internet (Bernhardt & Felter, 2004; Plantin & Daneback, 2009; M. J. Stern, Cotten, & Drentea, 2012), pediatric health information from the media even ranks higher in importance to new moms than advice from some interpersonal sources (Madge & O’Connor, 2006).

Although media coverage of environmental risk factors for cancer has decreased over the years (Freimuth, Greenberg, DeWitt, & Romano, 1984; Jensen, Moriarty, Hurley, & Stryker, 2010), recent research has shown news about PPEH to be readily available, particularly online and in sources targeting parents (Mello, 2015). In a recent survey of new and expectant mothers, 3 out of 4 participants reported incidentally encountering, or *scanning*,

PPEH-related information during their routine media use at least once in the last six months (Mello & Hornik, 2015). Measures of scanning are said to capture “information acquisition that occurs within routine patterns of exposure to mediated... sources that can be recalled with a minimal prompt,” such that sufficient attention must be paid to the information encountered for it to be encoded into memory and recalled at a later time (Niederdeppe et al., 2007, p. 5). Moreover, these scanned exposures were shown to be positively associated with protective behaviors among mothers. In other words, the more moms scanned, the more attempts they made to reduce adverse exposures through individual behaviors, such as washing produce and purchasing BPA-free products.

While studies have shown media coverage to influence parental response to health issues such as the MMR-autism controversy (Petts & Niemeyer, 2004), H1N1 vaccination (Jung, Lin, & Viswanath, 2013), childhood aspirin administration (Soumerai, Ross-Degnan, & Kahn, 2002), medicalized birth (Young & Miller, 2015), and breastfeeding (Foss & Southwell, 2006), we have yet to understand how exposure to media with certain dominant responsibility frames might influence mothers’ attributions of accountability for PPEH to manufacturers, government regulatory agencies, and/or themselves.

Study research questions & hypotheses

While the content analytic work summarized above reveals important patterns in how media frames responsibility for pediatric health issues (i.e., emphasizing individual accountability), research has yet to examine contemporary issues in pediatric environmental health or to connect media exposure to cognitive or behavioral outcomes in vulnerable populations such as pregnant women and children. By combining data from a content analysis of popular information-oriented media sources and an online survey of mothers in the U.S., this study seeks to close these gaps and address the following the research questions and hypotheses:

Research Question (RQ) 1: How often do media stories attribute responsibility for childhood exposure to chemical threats in the environment to parents, manufacturers, and government agencies?

RQ 2: Are there differences in the locus of attribution across information-oriented media sources?

RQ 3: Do new and expectant mothers perceive that responsibility for reducing their children’s exposure to potentially harmful chemicals lies with themselves personally, with manufacturers and/or government agencies?

Hypothesis (H) 1a: Scanning PPEH information from the source with the most parent attribution frames will be most strongly associated with mothers’ perceptions of personal responsibility for chemical exposures.

H 1b: Scanning PPEH information the source with the most manufacturer attribution frames will be most strongly associated with mothers’ perceptions of manufacturer responsibility.

H 1c: Scanning PPEH information from the source with the most government attribution frames will be most strongly associated with mothers' perceptions of government responsibility.

Method

Two data sources were utilized. To examine how mass media frames responsibility for PPEH, we rely on a content analysis of relevant stories from a range of popular information-oriented media sources. To understand its relationship with individuals' perceptions of responsibility for PPEH, we rely on data from an online survey of new and expectant mothers.

Content Analysis

Similar to prior health communication research (see Dutta-Bergman, 2004; Rains, 2007; Ruppel, 2016), our study focused on “information-oriented media sources” – as opposed to “entertainment-oriented sources” (e.g., television, radio) – whose primary purpose is to convey news and information. Specific sources were purposively sampled on the basis of responses from an online pilot survey of mothers, as well as online traffic and circulation data. The study population included the two most popular parenting websites (Babycenter.com and Parents.com), the two most popular parenting magazines (*Parenting* and *Parents*), and general news stories from the Associated Press (AP) domestic wire services, which prior research has shown to be representative of the national news environment, including newspapers, television and radio (Fan, 1988; Fan & Tims, 1989; Yanovitzky & Stryker, 2001).

As part of a larger project, a total of 2,543 stories related to children's health and chemicals in the environment were collected. Details of the content sampling and coding procedures are described in detail elsewhere (Mello, 2015; Mello & Hornik, 2015). To complement data collected from the online survey, we filtered that sample down to focus only on media stories specifically discussing arsenic, bisphenol A (BPA) and pesticides (n=474) in this study. The U.S. Environmental Protection Agency (E.P.A.) considers all three chemical types to be “concerning” to children's health (Environmental Protection Agency, 2011). Arsenic, BPA and pesticides also represent toxins which can reasonably be avoided by engaging in different individual behaviors (e.g., drinking filtered water, storing food in glass, washing produce before eating) and whose environmental presence can also be mitigated by broader institutional changes.

Using the same two coders from the larger project, content across all three source types – the AP, parenting websites, and parenting magazines – was hand coded for the presence of attribution of responsibility framing. First, coders noted the presence of implicit and explicit attributions of responsibility for causing or mitigating prenatal or pediatric exposure to one of the three chemicals mentioned above. Attributions were required to name an entity or locus (i.e., parents, manufacturers, a government agency) in order to be counted. For sources targeting parents (i.e., web-based and magazine content), “You” was interpreted as an attribution to parents. For example, an article in *Parenting* magazine stating “the chemicals you use to get rid of unwanted critters could be harming your family” was coded as an

attribution to parents. Stories mentioning companies that produce children's products (e.g., Johnson & Johnson) or food (e.g., Plum Organics, Monsanto), as well as farms or farmers that grow and process food consumed by pregnant women and children, were coded as attributions to manufacturers. Specific entity names were not required; however, general statements that a chemical can be "found" in certain product categories (e.g., cans, bottles) were excluded. Stories mentioning organizations or governing bodies responsible for assessing and/or regulating environmental health risks (e.g., the Environmental Protection Agency, the Food and Drug Administration, state legislature) were coded as attributions to government agencies. All stories were coded for up to two different attributions (this cutoff was established for analysis after coding revealed all stories had no more than two different attributions). Multiple attributions to the same locus in a single story were counted only once to avoid giving weight to longer stories and to remain consistent with prior work in this area (i.e., Bellows, 1998; Barry et al, 2011).

Two weeks after the completion of the larger study, coders were invited back and trained to code attributions of responsibility. Inter-coder reliability for this study was established on a random sample of 50 relevant texts, which were double-coded and assessed for agreement using Cohen's kappa for nominal variables (Cohen, 1960). Because kappa is arguably a more conservative index for assessing inter-coder reliability, the minimum acceptable level of agreement was set to 0.70 (Lombard, Snyder-Duch, & Bracken, 2002; Neuendorf, 2002). Kappas for coding items were as follows: source type = 1.00, chemical topic = 1.00, attribution of responsibility 1 = 1.00, locus of attribution 1 = 0.95, attribution of responsibility 2 = 0.72, locus of attribution 2 = 0.78. All discrepancies were discussed and consensus was reached before the remaining texts were divided evenly between the two coders. Independent coding was completed within one week, mitigating the risk of coder drift.

Survey

Data analyzed here are from a larger longitudinal survey of risk perceptions and behaviors regarding children's health and chemicals in the environment. Participants completed a baseline and follow-up surveys 6 months apart. Only baseline data is analyzed in this study to match the content analytic work timeframe. Participants were recruited from an opt-in online survey research panel coordinated by Survey Sampling International (SSI). SSI panelists receive multiple emails per week to participate in surveys available through online accounts. In March 2013, a link to this survey was provided to female panelists. A total of 911 SSI panelists began the survey, of which 843 (93%) met the study's eligibility requirements (adult females in the U.S. who were pregnant and/or had children under age 7). Of those eligible respondents, 819 (97%) completed the baseline survey.

Measures

Perceived responsibility—First, a basic definition of each of the three chemicals and their primary exposure pathways was provided. For instance, "Bisphenol A, or BPA, is a chemical used to make certain types of plastics and resins. These plastics may be found in many products such as refillable beverage containers, protective linings in food cans, compact disks and plastic dinnerware." This expository text (40 words or less) was adapted

from publicly available educational resources by the National Science Foundation (NSF) and the American Academy of Pediatrics (AAP).

Respondents were then asked to indicate how much they agreed or disagreed with nine statements: (a) I am personally responsible for reducing my child's exposure to [arsenic/BPA/pesticides] in the next 6 months; (b) companies and manufacturers are responsible for reducing my child's exposure to [arsenic/BPA/pesticides] in the next 6 months; and (c) government regulatory agencies, like the Environmental Protection Agency (EPA), are responsible for reducing my child's exposure to [arsenic/BPA/pesticides] in the next 6 months. Response options ranged from 1 (*strongly disagree*) to 5 (*strongly agree*). Items were adapted from previous research on responsibility judgments of food-related risks (Leikas, Lindeman, Roininen, & Lahteenmaki, 2009). Responses to the three chemical-specific items were averaged to create scales of overall perceived responsibility of mothers (Cronbach's $\alpha = .83$), manufacturers (Cronbach's $\alpha = .83$), and government agencies (Cronbach's $\alpha = .85$).

Information-Oriented Media Scanning—Respondents reported from where and how often they routinely scanned information about the relationship between children's health and chemicals in the environment using items adapted from previously validated measures in cancer communication research (Kelly et al., 2010; Kelly, Niederdeppe, & Hornik, 2009). After briefly distinguishing scanning from active seeking, respondents were asked: "How many times did you hear or come across information about the relationship between children's health and chemicals in the environment during the *past six months* from each of the following sources when you were *not actively looking for it*? (1) newspapers (online and print); (2) television and radio; (3) magazines (print only); (4) websites (excluding search engines and newspaper websites)." Response options ranged from 0 (*not at all*) to 2 (*3 times or more*). Items 1 and 2 were averaged to create a general information-oriented media scanning scale (range = 0 – 2; $r = .59^{***}$).

Controls—A series of potential confounding variables was measured and statistically controlled in multivariate models. Certain variables were measured and provided by SSI, including respondents' age, race-ethnicity (Non-Hispanic White, Hispanic, African American, Asian, other), education (1 = *some high school or less* to 4 = *college and above*), and household income (1 = *\$0–\$20,000* to 4 = *\$100,000 or more*).

Additional covariates measured in the survey included pregnancy status (yes/no), number of children under 7, political orientation (liberal, moderate, conservative), and child's health status (1 = *fair* to 4 = *excellent*). To adjust for underlying parenting style, we included three previously validated five-point scales (1 = *never* to 5 = *always*) of authoritarian, authoritative and permissive parenting (Robinson, Mandleco, Olsen, & Hart, 2001). Finally, a five-item scale measuring trust and confidence in media sources (Gaziano & McGrath, 1986; Tsfat & Cappella, 2003) was adapted to specifically ask about channels that provide children's health information.

Analytic Procedure

Descriptive analyses of the media data included basic frequency and χ^2 analyses. For the survey data, we fitted three multiple regression models to assess associations between media scanning and attributions to parents, manufacturers and government agencies, adjusting for covariates. The amount of missing data was minimal (6.1%), thus listwise deletion was used to handle missing values in these analyses. We assessed multicollinearity by examining tolerance and variance inflation factor (VIF) values. All analyses were performed using the statistical software package IBM SPSS Statistics 22 (IBM Corp, 2013).

Results

Content Analysis

Of the 474 media stories analyzed about children's health related to arsenic, BPA, and pesticides, 71 stories (14.9%) did not attribute responsibility to any party for chemical exposure risks. Information with no attributions focused on defining the chemical(s), describing new research findings, and/or explaining the consequences of exposure. Of those containing attributions ($n = 403$), just over half (61.0%; $n = 246$) referred to only one responsible party. The remaining 157 stories included two attributions, resulting in a total of 560 individual attributions. Examples of attributions for each chemical topic are provided in the Appendix.

The first research question asked how often media frames attribute responsibility for childhood exposure to chemical threats to different stakeholders, specifically parents, government agencies and manufacturers. As shown in Table 2, most frames (56.4%) attributed responsibility to parents, followed by manufacturers (23.6%) and government agencies (20.0%).

The second research question asked whether different information-oriented media sources attribute responsibility more frequently to certain stakeholders. Due to the small cell sizes of parenting magazines, we utilized the Fisher's Exact Test for this analysis. We found significant differences in locus of attribution across the three sources (Fisher's Exact Test $p < .0001$). To compare the locus of attributions between pairs of sources, we conducted post-hoc comparisons (general news vs. parenting websites, general news vs. parenting magazines, and parenting magazines vs. parenting websites) using Fisher's Exact Test with Bonferroni corrections for multiple comparisons. The analyses revealed that parenting websites, compared to general news, attributed significantly more responsibility to parents (59.3% vs. 18.9%, respectively) and less responsibility to manufacturers (22.6% vs. 37.8%, respectively) and government agencies (18.1% vs. 43.2%, respectively; Fisher's Exact Test $p < .0001$). The other comparisons (general news vs. magazines and parenting magazines vs. parenting websites) were not significant.

Survey

Characteristics of the survey sample are summarized in Table 1. Results showed one-quarter of mothers (25.6%, $n=210$) never came across any PPEH information during the prior 6

months, although most scanned at least once from websites (60.1%, $n=499$) and general news (59.0%, $n = 483$). Close to half scanned at least once from magazines (44.9%, $n=368$).

Table 3 summarizes the distribution of mothers' perceived responsibility of different stakeholders. Overall, respondents agreed most strongly with statements that they personally are responsible for controlling prenatal and pediatric chemical exposures ($M = 4.14$, $SD = .71$) and held manufacturers and government agencies equally accountable ($M = 3.79$, $SD = .83$ and $M = 3.79$, $SD = .86$, respectively).

Table 4 presents the three multiple regression analyses of scanning from websites, magazines, and general news and perceived stakeholder responsibility among mothers. We found scanning PPEH information from websites to be significantly and positively associated with perceived personal responsibility. Because websites had the greatest proportion of parent attributions in the content analysis, Hypothesis 1a was supported. Scanning from general news was significantly and positively associated with perceived responsibility of manufacturers and government agencies. Again, because general news had the greatest proportion of attributions to these two stakeholders in the content analysis, Hypotheses 1b and 1c were also supported. There was no evidence of extreme multicollinearity in the models—all VIF values were below 2.2 and tolerance values were above 0.45.

Discussion

We conducted a content analysis to describe how information-oriented media sources attribute responsibility for pediatric environmental health risks and a survey among new and expectant mothers to examine the relationship between mothers' media scanning and their perceptions of accountability. The study answers a call for framing research to extend beyond experiments to more naturalistic settings (Kinder, 2007), and combines evidence across methods, increasing confidence in the measurement and results of media effects research (Fishbein & Hornik, 2008). The majority of media data analyzed included at least one attribution of responsibility and most attributions were directed at parents, consistent with prior research on responsibility framing and pediatric health (i.e., Bellows, 1998; Kim & Willis, 2007; Leask & Chapman, 2002).

Survey respondents considered themselves to be responsible for reducing adverse chemical exposures, over and above government agencies and manufacturers, lending support to concerns expressed over the pressure placed on modern mothers (Richardson et al., 2014; Warner, 2005). Analyses showed a strong association between scanning PPEH information online and perceptions of personal accountability – an important finding given mothers' heavy reliance on the internet for parenting information.

Combined, these findings lend further support to responsibility framing theory (for which research results have been mixed), as well as credence to the belief that social expectations of intensive mothering are conveyed and primed by the media. Exposure to stories about parental responsibility may have positive consequences by encouraging mothers to take greater precautions, but they may also increase maternal stress and have adverse health

consequences for pregnancy and child development (e.g., Mulder et al., 2002). Should stories contain efficacy information for mothers on how to effectively control exposures, however, findings from health communication research suggest such news exposure could actually help mitigate feelings of information overload (Niederdeppe et al., 2014) and increase intentions to change individual health behaviors (Coleman et al., 2011). Unfortunately, research has found that while media frames of social problems tend to identify responsible actors, they typically do not include “mobilizing information,” or specific instructions for alleviating these concerns (e.g., Hoffman, 2006; Holton, Weberling, Clarke, & Smith, 2012). For instance, a content analysis of *Parents* magazine found that breastfeeding articles over the past 80 years rarely included practical advice (Foss, 2010). Future responsibility framing research should consider the presence of efficacy and mobilizing information.

As Barry and colleagues (2011) found in their study on childhood obesity frames, differences in locus of attribution were detected across media sources such that general news was most likely to identify system-level issues related to PPEH (i.e., manufacturing and regulatory problems). The relatively limited amount of responsibility attributed to these stakeholders, particularly online and in parenting magazines, may reinforce a dominant paradigm among mothers focusing on individual lifestyle choices. Not only does this place a significant burden for disease prevention on individuals, but it may also dampen support for and participation in environmental advocacy efforts (Shostak, 2013). However, we did find that the more mothers scanned general news, the more likely they were to attribute responsibility to manufacturers and government agencies, suggesting that a diverse media diet could help alleviate internalized stress and encourage civic participation.

An opportunity exists to challenge the dominant paradigm here through media advocacy, or attempting to reframe the issue in terms of shared responsibility, especially in parent-targeted channels (Dorfman & Krasnow, 2014). While increasing the frequency of thematic frames in news coverage “does not appear to be moving the responsibility needle sufficiently,” combining this approach with others – such as loss-framing, citizen science and narrative messaging – seem promising (Suran et al., 2014, p. 734). When health news stories include both thematic frames and emphasize risks/losses (versus benefits/gains) associated with a particular policy choice, the likelihood of societal level attributions among readers can increase (Major, 2009). Also, there is some evidence from the BPA movement that collaboration between scientists and activists can result in scientifically robust and persuasive message frames, helping mobilize social movements to improve chemical regulation (Lubitow, 2013). Finally, health communicators might consider developing inoculation or narrative messages as counter frames, shown to increase policy support in the face of persuasive anti-policy messaging from industries (e.g., tobacco and chemical companies), which tend to stress personal accountability for health (Niederdeppe, Heley, & Barry, 2015). Ideally, methodological diversification will continue and future studies examining these framing effects will exploit natural experiments when changes in content are anticipated (Kinder, 2007).

Limitations

While the content analysis and survey examined multiple PPEH issues, the generalizability of the results was limited by the samples themselves, which were not representative. The sampling strategy for the content analysis was purposive, focusing on information-oriented media sources most widely available to and used by new mothers. Data collection also took place over a short period of time to incorporate the vast amount of ever-changing information online. It is also important to recognize that how we conceptualized and measured responsibility frames (explicit attributions vs. as episodic or thematic) may limit comparisons to traditional framing studies (Scheufele & Tewksbury, 2007). The survey was limited by the cross-sectional nature of the data, prone to validity threats including unmeasured confounders and reverse causation (e.g., it is possible that mothers who feel more personally responsible are also more likely to recall and report encounters with PPEH information in certain media). Nevertheless, this study provides enough evidence to justify future research using longitudinal or experimental methods to explore these issues.

In sum, this study showed the frequency of and differences in attribution frames related to PPEH across information-oriented media sources, as well as mothers' perceptions of accountability across stakeholders. Positive associations observed between exposure to such frames and perceptions of responsibility for specific stakeholders help to advance prior research on responsibility framing, which tended to focus predominantly on describing the media environment rather than connecting content to exposure and cognitive outcomes. In practice, health communicators promoting certain PPEH-related behaviors may capitalize on mothers' already high perceptions of personal responsibility, but in ways that carefully mitigate stress and information overload. Our results also highlight a need to bolster support for changes to both corporate practice and environmental policy, which could be achieved by steering mothers more toward general news and encouraging parent-targeted media to adopt strategies that counterbalance parent attribution frames.

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Appendix A Examples of attributions of responsibility in PPEH information in the media

“A recent study found that 38% of conventional produce has traces of pesticides, while just 7% of organic produce does. This is a big deal, as a 2010 study found a close correlation between the amount of a certain pesticides present in children's urine and the severity of their ADHD. And prenatal exposure to pesticides has been shown to harm children's brain formation and lead to lower IQs. If buying all organic foods seems like a tall order for your grocery budget, you can pick and choose produce—some types are more likely than others to have pesticide residue.” - Parents.com, October 12, 2012

“The Food and Drug Administration may consider new standards for the levels of arsenic in rice as consumer groups are calling for federal guidance on how much of the carcinogen can be present in food.” - *The Associated Press*, September 19, 2012

“While the government and the chemical industry assert that the levels of BPA found in humans are very low and that the product is safe, many medical experts, scientists, and environmental experts disagree and believe that the evidence is now strong enough that parents should consider steps to reduce infants’ exposure to BPA when possible. In fact, dozens of state and national environmental health organizations... have called for a moratorium on the use of bisphenol A (BPA) in baby bottles and other food and beverage containers.” - Babycenter.com, December 14, 2012

Table 1

Analyzed survey sample characteristics (N = 819)

	N	%	Mean (SD)
Mother's age, years	819		30.34 (7.52)
Race/ethnicity	750		
White (non-Hispanic)		64.4	
Hispanic		14.9	
African American		9.5	
Asian		8.1	
Other		3.1	
Education	806		
Some high school or less		3.5	
High school		19.5	
Some college		26.6	
College and above		50.5	
Income	780		
< \$20,000		17.3	
\$20,000 – \$49,999		30.1	
\$50,000 – \$99,999		33.3	
\$100,000		11.3	
Pregnant (yes)	819	30.6	
No. children under 7	819		
0		9.9	
1		60.7	
2		23.7	
3 or more		5.7	
Political orientation	720		
Liberal		26.1	
Moderate		40.3	
Conservative		33.6	
Child's health status	818		
Fair		0.9	
Good		12.2	
Very good		43.4	
Excellent		43.5	
Parenting style (scales of 1 to 5)	819		
Authoritarian		4.11 (0.69)	
Authoritative		2.25 (1.02)	
Permissive		2.58 (0.96)	
Media trust (scale of 1 to 5)	817		2.08 (0.83)

Note. Cases (N) and percentages represent non-missing data and are unweighted.

Table 2

Frequency of attribution of responsibility frames by media source (n = 560)

	<i>Locus of attribution</i>					
	Parents		Manufacturers		Govt. Agencies	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
<i>Media source</i>						
General news (<i>N</i> = 37) ^a	7	18.9	14	37.8	16	43.2
Parenting websites (<i>N</i> = 513) ^a	304	59.3	116	22.6	93	18.1
Parenting magazines (<i>N</i> = 10)	5	50.0	2	20.0	3	30.0
Total	316	56.4	132	23.6	112	20.0

Note. Tests for locus of attribution by media source (news vs. websites vs. magazines): Fisher's Exact Test $p < .0001$ (two-sided).

^a Post-hoc comparisons indicate significant differences in the locus of attribution between general news and parenting websites: Fisher's Exact Test $p < .0001$ (two-sided).

Table 3

Mothers' perceptions of responsibility for protecting children from chemicals in the environment (n = 819)

<i>Chemical topic</i>	<i>Locus of attribution</i>					
	Personal		Manufacturers		Govt. Agencies	
	M	SD	M	SD	M	SD
Arsenic	4.11	.82	3.86	.93	3.85	.97
BPA	4.15	.85	3.73	.97	3.69	1.02
Pesticides	4.17	.81	3.79	.96	3.82	.96
Overall Responsibility Scale	4.14	.71	3.79	.83	3.79	.86

Note. Perceived responsibility for each stakeholder/chemical combination was measured on scale from 1 (*strongly disagree*) to 5 (*strongly agree*).

Table 4

Multiple regression predicting mothers' perceived responsibility of stakeholders by scanning from different media sources (n = 674)

<i>Independent Variable</i>	<i>Perceived Stakeholder Responsibility</i>		
	Personal	Manufacturers	Govt. Agencies
Website scanning	.157 (.001)***	.090 (.077)	.012 (.816)
Magazine scanning	-.018 (.709)	.013 (.832)	-.066 (.289)
General news scanning	.027 (.639)	.180 (.010)*	.296 (.001)***
Age	.005 (.124)	.005 (.268)	.004 (.322)
Race/ethnicity (white)	-.084 (.104)	-.049 (.439)	-.035 (.590)
Education (college & above)	-.040 (.549)	-.111 (.170)	-.111 (.185)
Income (\$50,000)	.061 (.247)	.081 (.209)	.066 (.321)
Pregnant (yes)	.020 (.726)	.012 (.861)	.042 (.557)
No. children under 7 (1)	-.050 (.360)	-.046 (.490)	-.156 (.024)*
Political orientation	-.014 (.552)	.029 (.299)	.046 (.111)
Health status (excellent)	.172 (.002)**	.045 (.477)	.078 (.233)
Authoritarian parenting	-.037 (.234)	.020 (.595)	.035 (.368)
Authoritative parenting	.300 (.001)***	.191 (.001)***	.234 (.001)***
Permissive parenting	-.020 (.533)	.079 (.043)*	.036 (.378)
Media trust	.094 (.002)**	.106 (.004)**	.124 (.001)***
Model <i>R</i> -squared	.197	.156	.165

Note. Cells present unstandardized *B* coefficients and *p*-values for each indicator variable. Asterik denotes regression coefficients that were significantly different from zero at **p* < .05; ***p* < .01; *** *p* < .001.