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Media portrayal of prenatal and postpartum marijuana use in an era of scientific uncertainty

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Abstract

Background—Objectives were to characterize how scientific information about prenatal and postpartum marijuana use was presented in online media content, and to assess how media portrayed risks and benefits of such marijuana use.

Methods—We analyzed online media items (n=316) from March 2015 to January 2017. A codebook was developed to measure media content in 4 domains: scientific studies, information about health and well-being, mode of ingestion, and portrayal of risks and benefits. Content analysis was performed by two authors, with high inter-rater reliability (mean $\kappa=0.82$).

Descriptive statistics were used to characterize content, and regression analyses were used to test for predictors of media portrayal of the risk-benefit ratio of prenatal and postpartum marijuana use.

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Conflict of Interest
No conflict declared.

Contributors

Dr. Jarlenski had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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Results—51% of the media items mentioned health risks of prenatal and postpartum marijuana use. Nearly one-third (28%) mentioned marijuana use for treatment of nausea and vomiting in pregnancy. Most media items mentioned a specific research study. More than half of media (59%) portrayed prenatal or postpartum marijuana risks>benefits, 10% portrayed benefits> risks, and the remainder were neutral. While mention of a scientific study was not predictive of the portrayal of the risk-benefit ratio of marijuana use in pregnancy or postpartum, discussion of health risks and health benefits predicted portrayals of the risk-benefit ratio.

Conclusions—Online media content about prenatal and postpartum marijuana use presented health risks consistent with evidence, and discussed a health benefit of marijuana use for nausea and vomiting in pregnancy. Portrayal of risks and benefits was somewhat equivocal, consistent with current scientific debate.

Keywords

Marijuana; pregnancy; media; communications

1. Introduction

Marijuana is a commonly used substance during pregnancy (Kuczkowski, 2007; Volkow et al., 2017). Data from the National Survey on Drug Use and Health (NSDUH) indicate that past-month marijuana use as reported by U.S. pregnant women increased from 2.4% in 2002 to 3.9% in 2014; this upward trend closely follows the trend among non-pregnant women of reproductive age (Brown et al., 2016). Currently, 30 states have laws permitting marijuana for medical use; of those states, nine also have laws permitting marijuana for recreational use (including the District of Columbia). State implementation of medical or recreational marijuana laws vary in terms of restrictions on access for medical or recreational use, and in terms of permitting commercial markets for recreational use. It is unclear whether there is a causal relationship between changing state marijuana laws and the increasing trend of marijuana use among women (Pacula et al., 2015). Recent observational research suggests that increasing marijuana use among adults is a population trend that is not attributable to state laws loosening legal restrictions on marijuana (Kerr et al., 2017). Other research has suggested that state medical marijuana laws are associated with increased use among adults (Cerdeira et al., 2012), and that specific provisions of medical marijuana laws, such as protections for medical marijuana dispensaries, are associated with increased use and dependence among youth (Pacula et al., 2015).

Uncertainty remains about the true risks of marijuana use in and around the time of pregnancy (National Academy of Medicine Committee on the Health Effects of Marijuana, 2017). Recent literature reviews have reached conflicting conclusions about whether prenatal or postpartum marijuana use is causally associated with adverse maternal and child outcomes (Conner et al., 2016; Gunn et al., 2016; Jaques et al., 2014; Metz and Stickrath, 2015). Based on research suggesting that marijuana exposure may increase fetal growth risks (El Marroun et al., 2009; Metz and Stickrath, 2015; National Academy of Medicine Committee on the Health Effects of Marijuana, 2017) or neurobehavioral risks (Day et al., 1994; Fried, 1995; Fried and Smith, 2001; Goldschmidt et al., 2004), the American College of Obstetricians and Gynecologists (American College of Obstetricians and Gynecologists

Committee on Obstetric Practice, 2015) and the American Academy of Pediatrics (Behnke et al., 2013) recommend that pregnant women not use marijuana.

This current scientific uncertainty about health risks of marijuana use in pregnancy has implications for prenatal care. Among women who disclose marijuana use to their prenatal care provider, nearly half receive no counseling pertaining to marijuana use in pregnancy (Holland et al., 2016). As such, women who use marijuana during pregnancy report a lack of useful information about the effects of marijuana on pregnancy and birth outcomes and report searching online for such information (Jarlenski et al., 2016a).

There has been no prior research investigating the content of online media focusing on prenatal and postpartum marijuana use. Media may play an important role in informing women about marijuana use in pregnancy, particularly since women may not self-disclose such use to their healthcare providers. Therefore, we conducted a systematic content analysis of online media items identified using the Google Alerts function between 2015 and 2017. The objectives of our study were to characterize how scientific information was presented in media content, to assess how media portrayed the risks and benefits of prenatal and postpartum marijuana use, and to examine predictors of media portrayals of the risks or benefits of prenatal and postpartum marijuana use. Specifically, we expected that traditional, mainstream news media would be more likely to portray health risks of prenatal and postpartum marijuana use, relative to non-mainstream media. We also expected that media items' characterization of the science around marijuana use would be predictive of their portrayal of the risk-benefit ratio of prenatal and postpartum marijuana use.

2. Material and methods

2.1 Data

Data included online media content collected from March 2015 to January 2017. While the news media play an important role in influencing public knowledge and behaviors around marijuana use (Beaudoin and Hong, 2012; Stryker, 2003), analyses restricted solely to traditional news media content are limited in the interactive media environment that now exists (Freeman and Chapman, 2009; Randolph and Viswanath, 2004). Because we were interested in studying content to which pregnant or postpartum women are exposed via online searching, we used the Google Alerts function to simulate the experience of an individual searching for information online. Google Alerts produces links to online media content including news media, blogs, or informational content; such as websites focused on health information or marijuana legalization, or press releases. We created alerts for English-language content using the keywords: "marijuana" or "cannabis" and "pregnancy" or "prenatal" or "perinatal." The alert messages in Google Alerts are created using keywords and are based on Google's search function. This study time period encompassed two years in which 12 state policy changes related to medical or recreational marijuana use were considered or adopted.

Each Google Alert message, sent daily, contains the titles of online content as well as a link to the content on the relevant website. We created a summary file that included, for each alert, a unique identification number, date, estimated word count, and whether the item was

published in a mainstream news organization or non-mainstream media outlet. To define mainstream news media, we included any news organization that had at least one journalist credentialed by the U.S. Senate Press Gallery (U.S. Government Publishing Office, 2016). Mainstream news media organizations also included “broad interest” websites that focus on generating original news stories for general audiences (Pew Research Center, 2015), as opposed to “niche” publications catering to specific professions or websites that aggregate industry press releases. Non-mainstream media included websites that focused on specific industries or aggregated press releases, those that focused on lifestyle content (e.g., Health.com), websites that focused on marijuana-related information (e.g., *The Cannabist*), and personal or organizational blogs. We classified each media item into 1 of 4 mutually exclusive categories of content: health news, advice/lifestyle content, election or ballot initiative news, or crime news.

There was a total of 388 unique Google Alerts in our study time period. We excluded 72 items that did not focus on prenatal or postpartum marijuana use, defined as those items that did not mention pregnancy or the postpartum period in the headline or first five paragraphs of text. The final analytic sample included 316 items. As shown in the Appendix Table A1¹, there were 233 media outlets represented in our sample; the modal number of media items in each news outlet was 1 (median: 1, range: 1-5). Because this is a study of media content, and not of living individuals, it does not constitute human subjects research, and IRB approval was not needed.

2.2 Coding instrument development

We used summative content analysis methods to develop a coding instrument to analyze the content of the online media items, in which we drafted a codebook based on *a priori* expectations of media content (Hsieh and Shannon, 2005). We developed a 14-item coding instrument that included codes related to 4 domains concerning marijuana use in and around the time of pregnancy: scientific studies about marijuana use, information about health and well-being related to marijuana use, mode of ingestion of marijuana use, and overall portrayal of the risks and benefits of prenatal and postpartum marijuana use. First, because we were interested in measuring portrayal of scientific studies in online media, we measured whether media items mentioned science or research generally or in passing (e.g., “studies show”). Additionally, we measured whether they mentioned a peer-reviewed study and provided enough information to locate that study, or whether they mentioned a report published by a government public health agency and provided enough information to locate the report. Second, we assessed whether media items specifically mentioned two health risks that have fairly consistent evidence of an association with marijuana use in pregnancy in peer-reviewed research: fetal growth risks (El Marroun et al., 2009; Metz and Stickrath, 2015; National Academy of Medicine Committee on the Health Effects of Marijuana, 2017) or neurobehavioral risks (Behnke et al., 2013; Day et al., 1994; Fried, 1995; Fried and Smith, 2001; Goldschmidt et al., 2004). We also measured whether media items mentioned any positive health effect of prenatal or postpartum marijuana use. We measured whether media items mentioned legal implications specific to prenatal or postpartum use (e.g., child

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welfare agency involvement); Jarlenski et al., 2017; Wang et al., 2016). Additionally, we measured whether media items mentioned that women should stop marijuana use in pregnancy; and whether they mentioned child safety related to marijuana use postpartum (e.g., unintentional ingestion among infants or toddlers). Third, we assessed whether media items mentioned any mode of ingestion of marijuana: combustible inhalation (i.e., smoking), non-combustible inhalation (i.e., using a vaporizer), edible consumption, or transdermal products (i.e., creams, oils, or gels). Fourth, we assessed whether each media item portrayed that the risks outweighed the benefits of prenatal and postpartum marijuana use, the benefits outweighed the risks of prenatal or postpartum marijuana use, or whether the risk-benefit portrayal was neutral.

We pilot-tested the coding instrument in a sample of 10 media items about prenatal and postpartum marijuana use that occurred after the final date of our study, so that items included in pilot testing were not in our final analytic sample. During pilot testing, three authors (MJ, JWK, JZ) used a draft codebook to code two media items at a time. The authors met to refine the codebook and clarify wording. This process was then repeated four more times until agreement was reached that the codebook was capturing relevant content. After pilot-testing of the instrument was complete, two authors (JWK, JZ) independently coded a random sample of the same 50 media items so that we could calculate inter-rater reliability. To quantify inter-rater reliability, we employed prevalence- and bias-adjusted Kappa statistics. These statistics provide a measure of inter-coder reliability that is adjusted to assess reliability for binary items where “yes” and “no” values are not evenly distributed (Byrt et al., 1993). Prevalence- and bias-adjusted κ ranged from 0.52 to 1.00, with mean $\kappa=0.83$ (see Appendix Table A2²). The remaining 245 items were then divided between coders who completed the coding.

2.3 Statistical analysis

First, we assessed characteristics of media items included in our study and calculated the monthly volume of media items over our study period. For months with spikes in the number of media items, we identified newsworthy events that were mentioned in the media (e.g., release of scientific studies or ballot initiatives related to marijuana legalization).

Second, we calculated descriptive statistics to determine the prevalence of specific types of content related to health and well-being, mode of ingestion, and portrayal of risks and benefits. We calculated descriptive statistics of the discussion of scientific research overall, and by media type. To test for differences in the discussion of science content by mainstream news media vs. non-mainstream media, we conducted a univariate logistic regression with robust standard error estimation to account for correlation of media items within a given media outlet. We then calculated predicted proportions and 95% confidence intervals from the regression results.

Finally, to examine predictors of the portrayal of risks and benefits, we employed a multinomial regression in which the outcome was a non-ordered categorical variable of whether a media item portrayed that risks>benefits, benefits>risk, or was neutral. We used

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the portrayal of risks>benefits as our base outcome and included media-item level characteristics and specific content items in our model. Robust standard error estimation was used to account for correlation of media items within a given media outlet.

3. Results

The descriptive characteristics of the 316 online media items about prenatal and postpartum marijuana use are shown in Table 1. The majority of items (n=190; 60%) were classified as health news items, with 84 (27%) advice/lifestyle items, 24 (8%) election news, and 18 (6%) crime news. Fifty-four percent (n=172) of media items were published in mainstream news media organizations, with 46% (n=144) appearing in non-mainstream media.

Figure 1 shows the monthly volume of media items over the study time period. Spikes in the volume of media coverage are annotated with relevant current events that were included in the media content. In November 2015, marijuana ballot initiatives occurred in 3 states and the American Medical Association called for pregnancy-related warnings on marijuana products. In November 2016, marijuana ballot initiatives occurred in 9 states. We observed spikes in media coverage related to three research studies: a study suggesting an association between marijuana exposure and abnormal fetal brain development (El Marroun et al., 2016), a meta-analysis suggesting marijuana was not an independent predictor of adverse maternal-fetal outcomes (Conner et al., 2016), and a study showing increasing marijuana use in pregnancy among U.S. women (Brown et al., 2016).

Overall, 161 (51%) media items mentioned that prenatal marijuana use is associated with increased risk of fetal growth restriction and 145 (46%) mentioned that prenatal marijuana use is associated with neurobehavioral risks for children (Table 2). Slightly more than a third (n=120; 38%) described any health benefit of prenatal and postpartum marijuana use. The primary health benefit mentioned was marijuana use to treat nausea and vomiting in pregnancy (n=88; 28%). Other health benefits that were mentioned include pain relief (n=32; 10%), and maternal mental health benefits, such as treating depression, anxiety, or stress in pregnancy or the postpartum period (n=15; 5%). Forty (13%) of media items mentioned legal implications of use, 25 (8%) suggested quitting marijuana use in pregnancy, and 14 (4%) mentioned child safety. The most commonly mentioned form of marijuana ingestion was combustible inhalation (n=144; 46%), followed by edible consumption (n=48; 16%), non-combustible inhalation (n=17; 5%), and transdermal products (n=15; 5%). While most media items (n=187; 59%) portrayed risks of prenatal or postpartum marijuana as outweighing the benefits, 33 items (10%) portrayed benefits outweighing the risks, and the remainder (n=96; 30%) were neutral in portrayal of the risk-benefit ratio.

Overall, the majority of media items (n=255; 81%) mentioned science or research generally, while far fewer referenced specific peer-reviewed studies (n=186; 59%) of public health agency reports (n=14; 4%) (Figure 1). After adjusting for correlation within media outlets, we found that a greater proportion of non-mainstream media items mentioned science generally, relative to mainstream news media (88% and 74%, respectively). Likewise, a greater proportion of non-mainstream media items referenced specific peer-reviewed studies (74%) relative to mainstream news media (47%). Mainstream news media items were more

likely to mention public health reports than were non-mainstream media, however (6% and 3%, respectively).

Table 3 shows predictors of news media item portrayal of benefits of marijuana use outweighing the risks, or neutral risk-benefit portrayal, relative to portrayal of the risks outweighing the benefits. Compared to portraying that risks>benefits of marijuana use in pregnancy and the postpartum period, media items in mainstream news media, relative to non-mainstream media, were less likely to portray that benefits>risks (RRR: 0.33, $p=0.01$) or a neutral risk-benefit ratio (RRR: 0.50, $p=0.01$). Media items that mentioned a risk of fetal growth restriction or neurobehavioral effects, relative to items that did not mention these health factors, were less likely to portray that benefits>risks of prenatal or postpartum marijuana use (RRR: 0.31, $p=0.01$). In contrast, media items that mentioned any health benefit of marijuana use, relative to items that did not mention a health benefit, were more likely to portray that benefits>risks of prenatal or postpartum marijuana use (RRR: 3.89, $p<0.01$).

4. Discussion

Marijuana legalization in more than half of U.S. states, and a recent trend of increasing marijuana use in pregnant women, has renewed scientific debate about the causal effects of marijuana exposure in pregnancy and the postpartum period. In our analysis of online media content over a 2-year period, we found that, consistent with obstetric and pediatric medical society opinions, media items frequently mentioned fetal growth risks and neurobehavioral risks (51% and 46%, respectively; American College of Obstetricians and Gynecologists, 2017; Behnke et al., 2013).

Nearly a third of media items (28%) mentioned treatment of nausea and vomiting in pregnancy as a health benefit of marijuana use, 10% mentioned marijuana use for pain relief in pregnancy or postpartum, and 5% mentioned marijuana use to improve maternal mental health. Scientific evidence is scant on the question of whether marijuana use might be beneficial for treatment of nausea and vomiting in pregnancy. A survey study of >4,000 women in Hawaii found that severe nausea in pregnancy was correlated with self-report of marijuana use in pregnancy (Roberson et al., 2014). Another survey study of 84 women in British Columbia found that most women who used marijuana for nausea and vomiting in pregnancy perceived marijuana to be an effective treatment (Westfall et al., 2006). It remains unclear whether marijuana use alleviates nausea and vomiting, or whether marijuana use is a cause of nausea and vomiting. Some regular marijuana users develop cannabinoid hyperemesis syndrome, which is characterized by severe nausea and vomiting and compulsive hot water bathing (Allen et al., 2004; Manning Meurer et al., 2017). Cases of cannabinoid hyperemesis syndrome have recently been documented in pregnant women (Alaniz et al., 2015; Andrews and Bracero, 2015). Our study is consistent with evidence that pregnant women are using marijuana to treat nausea and vomiting. Interestingly, media items in our study focused on *fetal* risks and *maternal* benefits of marijuana use in pregnancy. For example, we did not find that media items commonly mentioned long-term benefits to children among women who used marijuana to treat nausea and vomiting.

The portrayal of the risk-benefit ratio of prenatal and postpartum marijuana use was somewhat equivocal, with 59% of media items portraying that risks outweighed benefits, 10% portraying that benefits outweighed risks, and 30% neutral. Information about the legal implications of prenatal and postpartum marijuana use was presented less often, however. The absence of such information is striking because these are salient issues to women who use marijuana. Pregnant women who use marijuana have identified legal consequences, such as involvement of child welfare agencies, as an important concern (Jarlenski et al., 2016a; Roberts and Pies, 2011).

We expected that portrayal of scientific information in media items would differ between mainstream news media and non-mainstream media. In contrast to our expectation, we found that non-mainstream media items were more likely to mention science generally and to reference specific scientific studies, relative to mainstream news media. This finding is likely explained by two factors. First, non-mainstream media contain a wide variety of information sources, ranging from marijuana-focused blogs to medical sites that aggregate information from press releases. Second, we found that pro-marijuana blogs and informational sites devoted more content to scientific studies than was anticipated. Indeed, despite mentioning scientific research more frequently, non-mainstream news media were significantly more likely to portray that the benefits of prenatal and postpartum marijuana use outweigh the risks or a neutral risk-benefit portrayal, relative to mainstream news media. Taken together, these findings suggest that, although women may be exposed to the scientific research across both mainstream and non-mainstream media, the framing and contextualization of research findings varies by media type.

The present study fits into an emerging body of knowledge about how the public is engaging with health information during a time of rapid state-level policy change. Our finding that media content tended to focus on health effects, rather than provide advice about quitting marijuana use, is consistent with a previous analysis of content published by state public health agencies (Jarlenski et al., 2016b). However, our results diverge from recent work suggesting that the news media do not frequently cover public health research about marijuana legalization (McGinty et al., 2017; McGinty et al., 2016). This difference in results might be explained by our focus on online media focused on marijuana use in pregnancy and the postpartum period.

Online searching has become an important portal to health information for U.S. women, and media content may influence women's health behaviors (Patton et al., 2017; Witteman et al., 2016). We note, however, that the news media, blogs, or advice columnists can only disseminate what is currently known about the effects of prenatal and postpartum marijuana use. In fact, there is debate in the research and clinical communities about the magnitude of the biological risks of prenatal marijuana use and how to weigh them against the social risks. Recent letters to the editor in both leading U.S. obstetrics journals have questioned the assertion that biological risks of marijuana use merit universal screening among women and highlight that stigma and legal consequences should be central concerns for clinicians (Stadterman and Hart, 2015; Torres and Hart, 2017). There are currently conflicting guidelines from the American Academy of Pediatrics and the Academy of Breastfeeding Medicine about whether marijuana use is a contraindication to breastfeeding (American

Academy of Pediatrics Section on Breastfeeding, 2012; Reece-Stremtan and Marinelli, 2015). Such discord in expert opinion presents challenges to local public health officials, who must act quickly as policy is changed and are tasked with disseminating credible information to the public and the media. The present study suggests that, taken as a whole, the online media environment in the past two years was reflective of the ambiguities in the current discourse on the true risks of marijuana use in pregnancy and the postpartum period.

4.1 Limitations

This study has limitations. First, our study included media items identified via Google Alerts to simulate online search results, so results likely do not represent information included in the traditional news media outlets. Results also will not generalize to the use of other search engines. However, the focus of our study was to examine information that women may encounter during online searching, which included both mainstream news media and non-mainstream media. Second, many states had not fully implemented marijuana legalization policies during our study period from 2015-2017, so we are unable to compare longer-term time trends in media content that may correspond to such policies. Third, our study design does not permit us to measure whether pregnant women were exposed to different media content about prenatal and postpartum marijuana use, or how exposure to media content may have influenced their marijuana consumption. These are important questions for further research, however. Fourth, there was variation in the inter-rater reliability scores, including two items with Kappa statistics <0.70 , which is a traditional cut-off rate for excellent inter-rater reliability scores.

5. Conclusions

Online media content focusing on prenatal and postpartum marijuana use commonly mentioned potential health risks that are consistent with scientific evidence, and frequently mentioned a health benefit – namely, treatment of nausea and vomiting in pregnancy – that is not supported by current evidence. The vast majority of media items mentioned scientific research. Portrayal of the risks and benefits of prenatal and postpartum marijuana use was somewhat equivocal, perhaps reflecting the current scientific debate about the true health effects of such marijuana use.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Highlights

- We analyzed online media content about prenatal and postpartum marijuana use
- Many media items presented health risks consistent with scientific knowledge
- Nearly one-third of media mentioned use of marijuana for nausea in pregnancy
- Portrayal of the risk-benefit ratio of prenatal marijuana use was equivocal

Figure 1.
Frequency of online media items about prenatal and postpartum marijuana use, 2015-2017.
N=316 unique online media items.

Figure 2.

Proportion of media items mentioning science, specific peer-reviewed studies, or public health reports among online media items about prenatal and postpartum marijuana use. N=316 unique online media items from 2015-2017. Mainstream news media includes accredited news; non-mainstream media included websites focused on advice or lifestyle content and websites focused on marijuana-related information. Estimated by media type are predicted margins from a logistic regression model; standard errors are clustered to account for correlation within media outlets.

Table 1

Descriptive characteristics of media items about prenatal and postpartum marijuana use

	N (%)
Category of content ^a	
Health news	190 (60)
Advice/Lifestyle	84 (27)
Election or ballot initiative news	24 (8)
Crime news	18 (6)
Media type ^b	
Mainstream news media organization	172 (54)
Non-mainstream	144 (46)
Estimated length	
Median word count (IQR)	1,000 (250,5000)
All Items	316 (100)

N=316 unique online media items from 2015-2017.

^a Mutually exclusive categories^b Mainstream news media includes accredited news organizations; non-mainstream media included websites focused on advice or lifestyle content and websites focused on marijuana-related information

Table 2

Content of media items about prenatal and postpartum marijuana use

	N (%)
Health and well-being	
Fetal growth risks ^a	161 (51)
Neurobehavioral risks ^b	145 (46)
Health benefits ^c	120 (38)
Nausea and vomiting	88 (28)
Pain relief	32 (10)
Maternal mental health	15 (5)
Other health benefit	19 (6)
Legal implications	40 (13)
Suggest quitting in pregnancy	25 (8)
Child safety	14 (4)
Mode of ingestion	
Combustible inhalation (smoking)	144 (46)
Edible consumption	48 (16)
Non-combustible inhalation ^d	17 (5)
Transdermal product ^e	15 (5)
Portrayal of prenatal or postpartum marijuana use	
Risks outweigh benefits	187 (59)
Benefits outweigh risks	33 (10)
Neutral	96 (30)
All Items	316 (100)

N=316 unique online media items from 2015-2017.

^a Mentioned that marijuana use may increase the risk of low birthweight/restricted fetal growth/small for gestational age^b Mentioned that marijuana use may increase the risk of negative effects on cognition/neurobehavioral processes/executive functioning in childhood^c Mentioned any health benefit of marijuana use in pregnancy^d Ingestion using a vaporizing device^e Ingestion using creams, oils, or gels applied to the skin

Table 3

Predictors portrayal of benefit>risk or neutral (compared to risk>benefit) among media items about prenatal and postpartum marijuana use

	Benefit>Risk vs. Risk>Benefit RRR (95% CI)	P-value	Neutral vs. Risk>Benefit RRR (95% CI)	P-value
Media item characteristics				
Non-mainstream media ^a	Ref		Ref	
Mainstream news media ^a	0.33 (0.14,0.80)	0.01	0.50 (0.30,0.84)	0.01
Date published ^b	1.07 (1.01,1.13)	0.04	1.06 (1.01,1.11)	0.02
Word count	1.08 (0.90,1.28)	0.42	1.14 (0.99,1.30)	0.06
Specific content mentioned				
No scientific study	Ref		Ref	
Scientific study	0.72 (0.25,2.09)	0.55	0.81 (0.39,1.69)	0.58
No health risk	Ref		Ref	
Any health risk ^c	0.31 (0.11,0.84)	0.02	0.74 (0.40,1.37)	0.34
No health benefit	Ref		Ref	
Any health benefit ^d	3.89 (1.70,8.94)	<0.01	1.34 (0.78,2.30)	0.29
Combustible inhalation	Ref		Ref	
Edible consumption	0.76 (0.18,3.23)	0.71	0.94 (0.41,2.19)	0.89
Non-combustible inhalation ^e	4.39 (0.71,7.33)	0.11	0.74 (.22,2.49)	0.63
Transdermal product ^f	0.72 (0.07,7.64)	0.78	3.71 (0.93,4.86)	0.93

N=316 unique online media items from 2015-2017. From a multinomial logistic regression model;. Standard errors are clustered to account for correlation within media outlets. RRR=Relative Risk Ratio

^aMainstream news media includes accredited news organizations; non-mainstream media included websites focused on advice or lifestyle content and websites focused on marijuana-related information

^bDate published is month-year, relative to the first month of the study (March 2015)

^cMentioned that marijuana use may increase the risk of low birthweight/restricted fetal growth/small for gestational age or may increase risk of negative effects on cognition/neurobehavioral processes/executive functioning in childhood

^dMentioned any health benefit of marijuana use in pregnancy; including relief of nausea vomiting, mental health conditions, and others

^eIngestion using a vaporizing device

^fIngestion using creams, oils, or gels applied to the skin