Effects of Competing Narratives on Public Perceptions of Opioid Pain Reliever Addiction during Pregnancy

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Abstract Opioid pain reliever addiction has increased among women of reproductive age over the last fifteen years. News media and public attention have focused on the implications of this trend for infants exposed to opioids prenatally, with state policy responses varying in the extent to which they are punitive or public health–oriented. We fielded a six-group randomized experiment among a nationally representative sample of US adults to test the effects of narratives portraying a woman with opioid pain reliever addiction during pregnancy on beliefs about people addicted to opioid pain relievers, perceptions of treatment effectiveness, policy attitudes, and emotional responses. Portraying a high socioeconomic status (SES) woman in the narrative lowered perceptions of individual blame for addiction and reduced public support for punitive policies. Depicting the barriers to treatment faced by a low SES woman lowered support for punitive policies and increased support for expanded insurance coverage for treatment. The extent to which narratives portraying successfully treated addiction affected public attitudes depended on the SES of the woman portrayed. These findings can inform the development of communication strategies to reduce stigma toward this population, reduce support for punitive policies, and increase support for more public health–oriented approaches to addressing this problem.

Keywords message framing, public opinion, substance use disorders, addiction, vulnerable populations, women's health

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Introduction

Opioid Pain Reliever Use during Pregnancy

Over the last fifteen years, rates of opioid pain reliever addiction and overdose have risen nationwide (Han et al. 2015; Mack, Jones, and Paulozzi 2013), leading the Centers for Disease Control and Prevention (CDC) to label it a national epidemic (CDC 2015). Opioid pain reliever use is not uncommon among women of reproductive age and among women who are pregnant (Ailes et al. 2015; Bateman et al. 2014; Desai et al. 2014; Epstein et al. 2013). More than a third of female Medicaid enrollees of reproductive age and over a quarter of commercially insured women filled at least one prescription for opioid pain relievers within the past year (Ailes et al. 2015). Substantial proportions of women enrolled in Medicaid (21.6 percent during 2000–2007) and in commercial plans (14.4 percent during 2005–2011) filled prescriptions for opioid pain relievers at some point during pregnancy (Bateman et al. 2014; Desai et al. 2014). In addition, hospital data indicate that problematic opioid pain reliever use and addiction during pregnancy increased over the years 1998–2011 by an estimated 127 percent (Maeda et al. 2014).

The consensus among medical experts is that pregnant women with addiction to opioid pain relievers or heroin should receive comprehensive treatment that includes opioid maintenance treatment with methadone or buprenorphine (Center for Substance Abuse Treatment 2004; National Institutes of Health Consensus Development Panel 1998). Opioid maintenance treatment's benefits include reducing fluctuations in opioid levels; protecting the developing fetus from experiencing repeated episodes of withdrawal in utero; lowering the risk of relapse; decreasing harmful exposures related to addiction; and facilitating greater use of prenatal care (Committee on Health Care for Underserved Women and the American Society of Addiction Medicine 2012). Although traditionally most experts have recommended that pregnant women be maintained on methadone, emerging evidence indicates that infants' withdrawal symptoms may be less severe when women receive buprenorphine treatment (Gaalema et al. 2012; Jones, Finnegan, and Kaltenbach 2012a; Jones et al. 2012b; Jones et al. 2010). Despite evidence of the benefits of opioid maintenance for pregnant women with opioid addiction, a minority of these women receive treatment (Terplan, McNamara, and Chisholm 2012; Young et al. 2009). State Medicaid programs vary widely in the extent to which they cover methadone and buprenorphine treatment (Martin and Finlayson 2015; Rinaldo and Rinaldo 2013). In addition, there is resistance to these

treatments in some states and communities with significant opioid addiction and overdose problems (Cherkis 2015; Olsen and Sharfstein 2014).

Newborns prenatally exposed to opioids, including methadone or buprenorphine within the context of addiction treatment, may experience neonatal abstinence syndrome (NAS), a condition that describes the collection of symptoms associated with opioid withdrawal in neonates. NAS is characterized by signs of nervous system irritability, gastrointestinal problems, respiratory distress, and other symptoms (U.S. National Library of Medicine 2015). Nationwide, rates of NAS have risen threefold since 2000 (Patrick et al. 2012), but there is significant geographic variability. For instance, Tennessee has experienced nearly a tenfold increase in the incidence of NAS since 1999 (Ramakrishnan 2014). Although NAS is treatable, many affected newborns have longer post-delivery hospital stays and often require temporary pharmacologic treatment (Sutter, Leeman, and Hsi 2014; Tolia et al. 2015). Estimates of the proportion of infants exposed to opioids prenatally who are diagnosed with NAS range widely (Sutter, Leeman, and Hsi 2014). The level of NAS severity depends on factors such as poly-substance exposure, prenatal care, premature delivery, and secondary preventive measures such as swaddling, breastfeeding, and keeping the newborn in close physical contact with the mother (Sutter, Leeman, and Hsi 2014).

Public Health–Oriented and Punitive Approaches to Reducing Substance Use during Pregnancy. Efforts to reduce problematic use of opioid pain relievers and other substances during pregnancy include both public health–oriented and punitive measures (Dailard and Nash 2000; Guttmacher Institute 2015; Young et al. 2009). Public health–oriented strategies have included educational initiatives (e.g., public service announcements), encouraging voluntary prenatal substance use screening and treatment, laws that allow immunity from prosecution for drug-related offenses if engaged in treatment, and prioritizing publicly funded treatment services for pregnant women. According to the Guttmacher Institute, as of 2015, nineteen states had targeted substance use disorder treatment programs for pregnant women, eleven states provided priority access to treatment programs for pregnant women, and four states prohibited publicly funded treatment programs from discriminating against pregnant women, for example by refusing them treatment (Guttmacher Institute 2015).

More punitive actions include requiring health care providers to report infants that appear to have been harmed by prenatal substance exposure (including withdrawal symptoms, e.g., NAS, which can occur in the context

of medically-appropriate opioid maintenance treatment) to child protective services and prosecuting women who use substances during pregnancy on child abuse or assault charges (Dailard and Nash 2000; Guttmacher Institute 2015; Miranda, Dixon, and Reyes 2015). Although the 2003 reauthorization of the Child Abuse Prevention and Treatment Act (CAPTA) mandates that states receiving CAPTA grant funding have reporting procedures in place for infants prenatally exposed to substances (Children's Bureau 2011; Young et al. 2009), states vary in the extent to which they define prenatal substance exposure as abuse or neglect. According to both the Guttmacher Institute and ProPublica research, as of 2015 eighteen states defined substance use during pregnancy as child abuse (primarily civil child abuse) and fifteen states explicitly required health care providers to report pregnant women using substances or women who have delivered an infant displaying signs of prenatal substance exposure to child protective services (Guttmacher Institute 2015; Miranda, Dixon, and Reyes 2015), numbers that have risen since a previous 2000 Guttmacher Institute policy brief on this issue (Dailard and Nash 2000). According to ProPublica research, since 1973, forty-five states have sought to prosecute women for substance use during pregnancy, although most state high courts have rejected these claims (Miranda, Dixon, and Reyes 2015). In South Carolina, however, a 1997 State Supreme Court decision (*Whitner v. South Carolina*) established that the state could prosecute women on criminal charges for prenatal substance exposure (Substance Abuse and Mental Health Services Administration 2000). And in 2014, Tennessee became the first state in the country to pass legislation that enables prosecution of a woman on assault charges if her newborn experiences adverse effects (such as NAS) or if there is evidence of narcotic use during pregnancy (Burks et al. 2014; Miranda, Dixon, and Reyes 2015). Critics of these punitive strategies worry about the potential deterring effects on women's engagement with prenatal care and substance use treatment (Jessup et al. 2003; Poland et al. 1993; Roberts and Pies 2011), which improve birth outcomes (El-Mohandes et al. 2003; Goler et al. 2008). Research also suggests that requiring health care providers to report pregnant women who use substances to child protective services may disproportionately burden already marginalized social groups (Chasnoff, Landress, and Barrett 1990; Dailard and Nash 2000; Flavin and Paltrow 2010; Roberts and Nuru-Jeter 2012).

Framing the Issue of Opioid Pain Reliever Addiction during Pregnancy. The way that the public discourse frames the causes and consequences of

the problem likely informs the types of solutions that the public perceives as appropriate for addressing NAS and opioid pain reliever addiction during pregnancy. In communication research, Entman has defined message framing as "to select some aspects of a perceived reality and make them more salient in a communication text, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation" (Entman 1993). In the context of opioid pain reliever addiction during pregnancy, although risks are associated with pregnant women's health as well (Maeda et al. 2014), much of the news media coverage of the issue has focused on NAS. Sensationalized news stories have described an epidemic of "oxytots" and "drug-addicted babies" (Allen 2011; Davis and Dwyer 2013; FoxNews 2011; Girona 2014; Jan 2014; Wulffson 2011), descriptors that medical experts and health researchers have objected to as both medically inaccurate and stigmatizing (Newman and et al. 2013; Sharfstein 2015)

In addition to the news media framing the issue mainly in terms of its implications for the infant, punitive responses in states such as Tennessee (Guttmacher Institute 2015; McDonough 2014) have led some critics to label this reaction a "moral panic" (Copeland 2014; Thomson-DeVeaux 2014). Moral panics occur when segments of the public exaggerate and become sensitized to a perceived threat, with the news media often escalating fear and outrage. Blame is attributed to specific segments of the population, social deviants who are referred to as "folk devils" by the sociologists who have conducted some of the seminal studies of this phenomenon (Cohen 1972; Goode and Ben-Yehuda 1994). In the case of opioid pain reliever addiction during pregnancy, the panic surrounds newborns experiencing withdrawal and the mothers bear the brunt of public blame and condemnation. Despite a consensus that addiction is a treatable disease with genetic and socio-environmental determinants (National Institute on Drug Abuse 2014), much of the public response to these women has been to label them as social deviants who willfully harm their children (Murphy and Rosenbaum 1999; Thomson-DeVeaux 2014). These attitudes also reflect high levels of stigma toward the broader population of people with substance use disorders (Barry et al. 2014; Pescosolido et al. 2010). Much of the American public associates addiction with moral failure rather than with chronic disease that can be responsive to treatment (Barry et al. 2014; Martin, Pescosolido, and Tuch 2000; McGinty et al. 2015). Women using substances may face particularly high levels of scorn because the behaviors associated with

addiction violate traditional notions of maternal duty (Campbell and Ettorre 2011; Campbell 2000; Murphy and Rosenbaum 1999).

The moral tenor underlying public discourse on substance use and addiction has been related in part to perceptions of the people affected as "others" who pose a threat to the more virtuous (according to mainstream values) members of society (Morone 1997). Assumptions and fears about disenfranchised groups, including racial and ethnic minorities and low-income communities, historically have influenced both attitudes about the characteristics of people using substances and policy responses (Morone 1997; Singer and Page 2014). Examples include early restrictions on opium, which occurred simultaneously with widespread suspicion toward Chinese immigrants, and racially biased mandatory federal sentencing for crack cocaine possession (Morone 1997). During the 1980s and 1990s, public outrage over pejoratively termed "crack babies" was directed toward low-income black women (Cadet 2012; Campbell 2000; Hartman and Golub 1999; Meyers 2004). Negative representations of economically marginalized populations in the media often have included depictions of substance use (Bullock, Wyche, and Williams 2001; Singer and Page 2014).

It is not clear that perceptions about race or social class play the same role in shaping how the public understands problematic opioid pain reliever use and the related recent upsurge in heroin use. Opioid pain reliever overdose rates have been higher among whites than most other racial and ethnic groups in the US (Back et al. 2010; Cicero et al. 2014; King et al. 2014). However, public opinion data suggest that the majority of Americans do not perceive the problem of opioid pain reliever addiction as affecting particular racial or ethnic groups or income classes disproportionately (Barry et al. 2016). Yet when OxyContin initially became popular in Appalachian states, it was known as "hillbilly heroin" (Inciardi and Cicero 2009), with clear social class connotations. In addition, Medicaid, the public health insurance program for people with low incomes, is the primary payer of NAS-related treatment (Patrick et al. 2012) and opioid pain reliever use is higher among Medicaid-enrolled women than among privately insured women (Ailes et al. 2015; Desai et al. 2014), patterns that theoretically could influence public perceptions. It is unknown how possible preconceptions among the public about the sociodemographic characteristics of people with opioid pain reliever addiction might change in response to exposure to messages frames. One of the few message framing experiments exploring the effects of social class cues on public attitudes found, somewhat counterintuitively, that depicting an individual as part of the working versus the middle class was associated with reduced perceptions of individual blame

for the health condition (in this study, diabetes) and increased support for governmental assistance (Gollust and Lynch 2011).

In addition to public perceptions of the social composition of affected groups, we can also examine addiction through the lens of attribution theory. Attributional theories of motivation posit that the way people respond to various conditions or situations depends on the extent to which they perceive the causal loci as internal or external to the individual and the degree of control they perceive an individual has over the contributing factors (Gilbert and Malone 1995; Kelly and Westerhoff 2010; Weiner 2006). Internal, controllable causes often relate to the perceived dispositional characteristics of an individual, whereas external causes comprise social and structural forces (Weiner 2006). In the context of addiction, internal attributions might include risk-seeking behavior, irresponsibility, and immorality or bad character. In contrast, external (or situational) attributions might include exposure to trauma, iatrogenic factors, and insufficient or inaccessible substance use treatment. Internal and external attributions influence public responses, including the types of policies the public supports (Barry et al. 2009; Niederdeppe et al. 2011; Weiner 2006). In the context of substance use, even minor differences in labeling a person a substance abuser versus someone with a substance use disorder affect perceptions of personal culpability and support for punitive responses (Kelly and Westerhoff 2010).

The discourse in Tennessee during the debates surrounding passage of a law enabling prosecution of a woman for assault if she uses narcotics during pregnancy (a response to increasing rates of NAS) provides one example of how causal attributions in message frames can point to particular policy responses. One of the bill's sponsors, Representative Terri Lynn Weaver, stated that "these ladies are not those who would consider going to prenatal care. These are ladies who are strung out on heroin and cocaine and their only next decision is how to get their next fix. These ladies are the worst of the worst. Again, I want to emphasize what they are thinking about, and that is just money for the next high." Weaver also observed, "I don't know what to say about [how] some [women] have insurance and some do not. It's a terrible thing but I don't want to get into that because that's another subject" (McDonough 2014). In promoting legislation offering a punitive solution to substance use among pregnant women, Weaver framed addiction during pregnancy as attributable to internal causes, primarily selfish and irresponsible dispositions, and dismissed an external factor, lack of health insurance (and by extension, addiction treatment), as a

contributor to the problem. She also framed the issue within the context of illegal drug use even though research has linked NAS to rising rates of opioid pain reliever use and addiction (Patrick et al. 2012).

Public health faces a dearth of communication research on how messages framing important health issues affect attitudes toward the target population and influence public support for potential policy responses. Public opinion is critically important because it affects the likelihood of policy adoption (Burstein 2003). Messaging campaigns that aim to advance public health goals should be grounded in empirical research. Without this foundational research, communication campaigns may fail to achieve their objectives and resources may be wasted. For instance, despite major investments over the last two decades in public education and media campaigns to highlight the neurobiological contributors to mental illness and to reframe these illnesses as "disease like any other," subsequent research on public attitudes found that levels of social stigma toward people with mental illness was largely unchanged (Pescosolido et al. 2010). This example provides a cautionary tale of the risks of launching communication campaigns without foundational empirical research.

In this study, we tested how various narrative depictions of a pregnant woman with opioid pain reliever addiction affected public attitudes. The media, policymakers, and educational campaigns often make use of narratives, or stories about individuals, when communicating particular messages framing social and public health issues. Narratives can engage audiences by transporting them into another person's story and can elicit emotional reactions, both features that may enhance receptivity to the narrative's persuasive message (Busselle and Bilandzic 2009; Niederdeppe et al. 2014, 2011). Although one study showed that the social class of the person depicted in a narrative may affect perceptions of blame for a health condition (Gollust and Lynch 2011), there has been minimal research examining the effects of portraying individuals of differing social classes. Research has shown that narratives have the potential to increase perceptions that structural determinants contribute to the development of stigmatized health conditions, such as obesity, when the narrative illustrates external forces influencing an individual (Niederdeppe et al. 2014, 2008). However, the effects of narratives portraying barriers to treatment access, which frames untreated addiction as partly attributable to external causes, has not been tested. Prior research involving depictions of opioid addiction in vignettes (i.e., short narratives) found that portraying addiction as a treatable condition significantly decreased stigma and negative attitudes

toward persons with addiction, but did not increase support for policies benefitting this population (McGinty et al. 2015).

To build on prior research, we conducted a randomized experiment to study the effects of exposure to three different narrative features: (1) portrayal of the pregnant woman as high or low socioeconomic status (SES), (2) portrayal of the barriers to addiction treatment access during pregnancy; and (3) portrayal of a successfully treated pregnant woman. We examined how these narratives affected study participants' beliefs about persons with opioid pain reliever addiction, perceptions of addiction treatment effectiveness, support for public policies to address opioid pain reliever addiction during pregnancy, and emotional reactions. Emotions may be important mechanisms linking message frames more broadly with changes in attitudes because these message frames operate through both cognitive and affective channels (Dillard and Nabi 2006; Gross and Ambrosio 2004; Gross 2008; Miller 2007; Weiner 2006). Therefore, we also tested whether emotional responses mediated the relationship between exposure to the narratives and public attitudes.

Methods

Data

We fielded a six-group, randomized web-based experiment to assess the effects of exposure to narratives describing a pregnant woman with addiction to opioid pain relievers on beliefs about people with this disorder, perceptions of treatment effectiveness, policy attitudes, and emotional responses. The experiment took place during the period of September 18 through October 6, 2014. We sampled participants from GfK's KnowledgePanel, a probability-based web panel designed to be representative of the US adult population. GfK forms its panel using address-based sampling from a frame that includes 97 percent of all US households (GfK 2013). When selected households lack Internet access or a computer, GfK provides these resources so that these groups are not underrepresented. KnowledgePanel panelists typically take around two surveys each month and GfK encourages participation by offering cash awards and other incentives (GfK 2013). Academic researchers in a number of disciplines, including sociology, political science, public health, and medicine, have used GfK to field surveys or experimental studies (Emery et al. 2014; Gollust et al. 2013; Henderson and Hillygus 2011; Lin et al. 2014).

Of the KnowledgePanel panelists we sampled to participate in the study, 72.8 percent completed the experiment. The overall recruitment rate in KnowledgePanel was 16.6 percent at the time of the study. We dropped seven participants because their survey completion times were potentially too short to ensure adequate time to read the narrative and answer the outcome questions. These were participants randomized to read the shorter narratives who took less than two minutes and participants randomized to read the longer narratives (portraying barriers to treatment or treated addiction) who took less than 2.5 minutes to respond. In addition, we dropped thirty-six participants who took more than four hours to complete the experiment due to concern that these participants did not have sufficiently recent exposure to the narrative prior to answering the outcome questions. The final analytic sample included 1,620 participants. On average, participants took about thirteen minutes to complete the experiment. The Johns Hopkins Bloomberg School of Public Health Institutional Review Board determined this study to be exempt.

Study Design

We randomized participants to one of six groups: a no-exposure control group or one of five versions of a narrative about a woman who becomes addicted to opioid pain relievers after suffering injuries from a car accident and becomes pregnant. Two variations of the narratives, which we refer to as the base narratives, portrayed the woman as low SES and as high SES. The low SES base narrative read as follows:

> Michelle is a woman in her early twenties who began working at a fast food restaurant after she dropped out of high school. She lives in a government-subsidized apartment. Two months ago, Michelle learned that she was pregnant.
>
> Last year, Michelle was hit by a car. The accident left her with back, hip, and knee injuries and she had to have surgery. After the surgery, she still had severe pain in her back and hips so her doctor prescribed OxyContin, a narcotic pain medication. Three months after her back surgery, she was still feeling a lot of pain so her doctor prescribed her a higher dose of OxyContin. Michelle began taking more pills to try to control the pain and sometimes ran out before her next refill. When she ran out, she felt anxious, became sweaty and nauseous, and had trouble sleeping. These symptoms lasted until she was able to get more pills. Her doctor refused to give her more pills before her next scheduled refill, so

> Michelle sometimes took the bus to other parts of town to get more pills from other doctors. Her family and friends noticed that Michelle's behavior had changed, and that she was borrowing money that she didn't repay. When Michelle's family found out that she was pregnant, they told her that they were worried about the pills she was taking and urged her to get help.

In the narrative, we portrayed a woman who develops an addiction to opioid pain relievers. Although many people who use opioid pain relievers over the long term develop physical dependence on the medications (and will suffer withdrawal symptoms if they abruptly discontinue use), the aberrant behaviors featured in the narrative, including visiting multiple doctors to obtain additional prescriptions (colloquially referred to as "doctor shopping") and other social and financial difficulties, are hallmarks of a more serious problem than physical dependence. Physical dependence differs from the clinical diagnosis of opioid dependence, although some experts have suggested that, in certain cases, these conditions should be treated similarly (Ballantyne, Sullivan, and Kolodny 2012). The fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-V) replaced the DSM-IV diagnoses of opioid abuse and opioid dependence with "opioid use disorder." However, in the narrative and survey questions that followed narrative exposure, we used the word *addiction* rather than "opioid dependence" or "opioid use disorder" because it is more likely to be familiar to and easily comprehensible among the general public.

The high SES base narrative was identical to the low SES base narrative with the exception of the following characteristics. The woman depicted in the high SES base narrative (1) was in her early thirties (and therefore, older at the age of her first pregnancy); (2) worked as the regional manager of a restaurant chain (higher paying job with greater prestige); (3) had a master's degree in business administration (higher educational attainment); (3) lived in a new house (an indicator of wealth); (4) was married when she became pregnant; and (5) drove a car as her means of transportation (rather than using public transportation).

The narrative with barriers to treatment added the following text to the low SES base narrative described above:

> Michelle took the concerns of her family to heart. She was worried that her inability to stop taking OxyContin might cause problems during her pregnancy. Michelle's doctor recommended that she begin taking methadone, a medical treatment for addiction, on a daily basis. He explained to

> Michelle that abruptly stopping the OxyContin would cause withdrawal symptoms that might put her health and the baby's wellbeing at risk.
>
> However, when Michelle called a nearby methadone treatment center, they told her that there was a long waiting list. Michelle desperately wanted to begin treatment as soon as possible. She found another treatment center two hours away that had a spot for her. However, Michelle had trouble getting to the treatment center because she didn't have a car. She felt embarrassed asking friends for help because she didn't want them to know about the problems she was dealing with while pregnant. She was grateful to family members who helped out occasionally, but no one could take her every day. Taking a taxi was too much money and there was no bus line between the two towns. The nurse at the methadone center told her that she needed to be there every day for the treatment to be effective. Traveling four hours round-trip on the days she was able to find a ride became exhausting and began to create problems for Michelle at work. Her manager became angry when she was repeatedly late for shifts and threatened to let her go. Michelle missed days of treatments and began using OxyContin again. She felt guilty and ashamed.

We tested only a low SES version of the barriers to treatment narrative (and not a high SES version) because many of the barriers included in the text are more relevant to a person with limited financial resources, social support, and job flexibility. In order to test the effects of portraying successfully treated addiction, we added the following paragraphs to the original low and high SES base narratives:

> Michelle took the concerns of her family to heart. She was worried that her inability to stop taking OxyContin might cause problems during her pregnancy. Michelle's doctor recommended that she begin taking methadone, a medical treatment for addiction, on a daily basis. He explained to Michelle that abruptly stopping OxyContin would cause withdrawal symptoms that might put her health and the baby's wellbeing at risk. Michelle was able to enroll in a methadone program near her home. With the help of this program and working with a counselor, Michelle had a healthy pregnancy. Her treatment has continued successfully and she hasn't used OxyContin or other narcotic prescription pain medications in over two years.

To assess the face validity of the narrative text and survey instrument, we examined how recent news media coverage has described pregnant women

with opioid pain reliever addiction and solicited feedback from experts in treatment of opioid addiction.

Measures

The independent variable was exposure to one of the five narrative messages or no exposure (control group). We examined how exposure to narratives affected four categories of outcome measures: (1) beliefs about people with addiction to opioid pain relievers; (2) perceptions of the effectiveness of treatment for addiction to opioid pain relievers; (3) attitudes about policies to address problematic opioid pain reliever use and addiction; and (4) emotional responses. Participants randomized to the control group proceeded directly from the introductory screen to questions about the extent to which they currently felt four types of emotions. Participants randomized to one of the other five groups proceeded from the introductory screen to their randomly assigned narrative text before answering questions about their emotions. To assess emotional responses to the narratives, we used questions adapted from the validated Positive and Negative Affect Scale (PANAS) (Watson, Clark, and Tellegan 1988). Participants indicated, on a five-point Likert scale, to what extent they felt the emotion at that moment. We measured anger, disgust, sympathy, and pity.

Following the questions about emotional responses, all participants read a definition of opioid pain relievers, which we referred to using the less technical and more easily comprehensible term *prescription pain medication* throughout the survey; participants were also able to view a list of examples of these medications. Then, all participants answered questions about their beliefs about people with addiction to opioid pain relievers, perceptions of treatment effectiveness, and support for or opposition to potential policy solutions to address problematic opioid pain reliever use and addiction. We randomized the order of all question modules as well as the order of questions within each module to minimize the potential for bias related to priming, in which exposure to earlier questions influences responses to later questions in the survey.

To measure beliefs about people with opioid pain reliever addiction, participants indicated, on seven-point Likert scales, the extent to which they saw people as completely to blame (or not at all to blame) for their addiction, as irresponsible (or responsible), and whether or not they would be willing to work closely with a person addicted to opioid pain relievers, a measure of social distance preferences (Barry et al. 2014; McGinty et al. 2015; Pescosolido et al. 2010). To assess beliefs about the acceptability

of discrimination, we asked participants whether employers should be allowed to deny employment, and whether landlords should be allowed to deny housing, to persons addicted to opioid pain relievers (Barry et al. 2014; McGinty et al. 2015; Pescosolido et al. 2010). To examine perceptions of treatment effectiveness, participants indicated the extent to which they agreed that most people addicted to opioid pain relievers can, with treatment, get well and return to productive lives, and whether they agreed that effective treatment options are available to help people who are addicted to opioid pain relievers (Barry et al. 2014; McGinty et al. 2015; Pescosolido et al. 2010).

To test how the narratives affected policy attitudes, we asked participants to indicate, on seven-point Likert scales, whether they opposed or favored six proposed solutions to problematic opioid pain reliever use and addiction broadly as well as actions targeting pregnant women specifically. We identified policy proposals related to the more general problem of prescription drug misuse from the 2013 Trust for America's Health report on this issue (Trust for America's Health 2013). In addition, we identified proposed and existing state policies specific to substance use during pregnancy from reports produced by the Guttmacher Institute (Dailard and Nash 2000; Guttmacher Institute 2015) and Florida's Task Force on Prescription Drug Abuse and Newborns (Florida Office of the Attorney General 2014).

We divided these policy proposals into punitive policies, which include responses that punish pregnant women for their addiction, and public health–oriented policies, which focus on prevention or increased supportive services for this population. Punitive policy proposals included defining nonmedical opioid pain reliever use during pregnancy as criminal child abuse and requiring health care providers to report pregnant women with problematic opioid pain reliever use to state authorities. Potential public health–oriented responses included improving treatment access by prioritizing services for pregnant women with addiction, expanding insurance benefits, and passing immunity laws to protect pregnant women using opioid pain relievers nonmedically from being charged with drug crimes if they seek treatment. We also tested support for Medicaid lock-in programs, which require enrollees suspected of nonmedical use of opioid pain relievers to use one physician prescriber and one pharmacy. The latter policy did not fit clearly into either the public health–oriented or the punitive policy category because while it complicates access to opioid pain relievers among individuals potentially at risk of becoming addicted (a

public health benefit), this inconvenience does not translate to improved access to services for those who may need substance use treatment.

Given research indicating that emotion may be one of the mechanisms through which message frames influence perceptions of societal problems and support for policies to address these issues (Dillard and Nabi 2006; Gross 2008; Miller 2007; Weiner 2006), we also assessed the emotional response measures as potential mediators.

Analysis

To assess the representativeness of the sample in comparison to the national population, we compared sociodemographic characteristics of the study participants to data from the Current Population Survey (CPS). Weighted sociodemographic characteristics of the analytic sample were similar to these national figures (see table 1). We used chi square tests to compare participants in the six groups on measured sociodemographic characteristics to assess randomization. These randomization checks showed no significant differences in characteristics across the study groups (see table 1). Although we measured all outcomes on Likert scales, for descriptive purposes, we also collapsed these scales into dichotomized measures (see table 2). We conducted all analyses in Stata 12 (StataCorp 2011) and included survey weights generated by GfK in order to correct for potential biases in sampling and non-response.

We estimated ordered logistic regression models to assess the effects of the narrative exposures on outcomes. Tests of the proportional odds assumption supported the use of ordered logistic regression models (Wolfe and Gould 1998). Given that we randomly assigned participants to the narrative groups, the regression models did not include covariates (Mutz 2011). To test the effects of portraying a high or a low SES woman in the narratives on outcomes, our independent variable in the regression models was a categorical measure of exposure to a narrative portraying a low SES woman, a narrative portraying a high SES woman, or no exposure. The no exposure control group served as the reference category. We used Wald post-estimation tests to assess whether attitudes were significantly different among participants randomized to read the low SES narrative versus those randomized to read the high SES narrative.

Next, to estimate the effects of portraying barriers to treatment, we created binary variables in which we coded exposure to the base narrative as zero (reference group) and exposure to the narrative describing barriers to treatment access as one. The regression models tested the association

Table 1 Characteristics of Survey Participants Compared with National Rates and Tests of Randomization across Study Groups

	Unweighted	Weighted[a]	National Comparison[b]	Test of randomization across 6 groups[c]
Female (%)	51.1	51.6	51.9	Pearson $X^2 = 0.316$; $p = 0.998$
Age (%)				Pearson
Ages 18–24	9.7	12.2	12.7	$X^2 = 14.854$;
Ages 25–34	15.9	18.4	17.5	$p = 0.978$
Ages 35–44	15.5	15.9	16.8	
Ages 45–54	18.2	16.5	18.4	
Ages 55–64	21.8	19.7	16.3	
Age 65 +	19.0	17.4	18.3	
Race (%)				Pearson
White only	73.4	65.4	66.0	$X^2 = 0.372$;
Black only	9.6	11.4	11.6	$p = 1.000$
Other	17.0	23.1	22.5	
Hispanic ethnicity				Pearson
Hispanic	9.8	15.2	15.0	$X^2 = 0.221$;
Non-Hispanic	90.2	84.8	85.0	$p = 0.999$
Education (%)				Pearson
< High school degree	10.7	12.3	12.6	$X^2 = 0.671$; $p = 1.000$
High school degree	31.5	29.7	29.6	
Some college	26.9	28.7	28.9	
Bachelor's degree or higher	30.9	29.3	28.9	
Household income (%)				Pearson
Under $10,000	5.0	5.2	5.2	$X^2 = 6.876$;
$10,000–24,999	14.1	12.6	13.3	$p = 0.999$
$25,000–49,999	22.1	22.4	22.7	
$50,000–74,999	19.0	18.8	18.4	
$75,000 or higher	39.9	41.1	40.5	
Employment status (%)				Pearson
Employed	57.7	59.1	59.9	$X^2 = 15.301$;
Unemployed	7.5	8.5	4.9	$p = 0.586$
Retired	19.8	18.0	17.2	
Other	15.1	14.4	18.1	

Table 1 (*continued*)

	Unweighted	Weighted[a]	National Comparison[b]	Test of randomization across 6 groups[c]
Region (%)				Pearson
Northeast	19.3	18.4	18.2	$X^2 = 0.390$;
Midwest	23.6	21.4	21.4	$p = 1.000$
South	35.4	36.6	37.1	
West	21.7	23.5	23.4	
Political Party				Pearson
Affiliation (%)				$X^2 = 16.156$;
Republican	26.8	24.9	23.5	$p = 0.160$
Independent	41.0	41.2	43.3	
Democrat	32.2	33.9	32.5	

[a] GfK KnowledgeNetworks sample weights applied to calculate descriptive statistics.
[a] Comparison data extracted from the March 2013 Current Population Survey and the 2012 American National Election Study (NES).
[c] Chi square tests were conducted to assess differences across study groups.

between exposure to the narrative describing barriers to treatment and the outcomes. We followed the same process to estimate the effects of exposure to narratives portraying successfully treated addiction to opioid pain relievers. In these latter analyses, we compared exposure to the high or low SES narrative describing successful treatment for addiction to the corresponding high or low SES base narrative that did not mention treatment. Given that the message frames we tested in this study portray a woman, and pregnant women with substance use disorders may face greater condemnation from the public (Campbell 2000; Murphy and Rosenbaum 1999), we also tested gender as an effect modifier of the relationships detailed above.

To test whether the four emotional responses measured in this survey experiment mediated the relationship between the narrative exposure and the other outcomes, we conducted a mediation analysis using the Preacher and Hayes approach (Preacher and Hayes 2008). This method enables the testing of multiple mediators simultaneously, which was appropriate for our purposes given that participants theoretically could have felt more than one emotion at the same time. To estimate 95 percent confidence intervals (CIs), we used bootstrap resampling (Preacher and Hayes 2008). We identified emotional responses as consistent mediators if the indirect effect through the emotion was the same sign (positive or negative) as the direct effect estimate. We deemed emotional responses inconsistent mediators if the

directionality of the indirect effect through the mediator differed from that of the direct estimate, which indicated that the emotion had a suppressing influence on the relationship between the narrative and the outcome.

Results

Table 2 displays the proportion of participants in the control group (N = 264) that endorsed each statement or policy in order to provide a sense of public attitudes at baseline. In the control group, we found high baseline levels of stigma toward people with addiction to opioid pain relievers. Slightly more than half of participants thought that people with this addiction are to blame for the problem. Substantial minorities of participants also expressed acceptance of discriminatory practices on the part of employers and landlords. Many participants in the control group reported confidence in the availability of effective treatment for opioid pain reliever addiction and the possibility of recovery. However, support for punitive policies also was quite high among control group participants. Support for the reporting requirement policy was higher among female participants in the control group but we observed no other gender differences at baseline. The policy with the highest levels of support among participants in the control group was requiring Medicaid enrollees suspected of problematic opioid pain reliever use to see a single physician prescriber and pharmacy (the so-called Medicaid "lock-in" program). The remaining public health–oriented policies garnered support among approximately half of participants.

Effects of Socioeconomic Status (SES) in Narrative Messages on Public Attitudes

Table 3 indicates that participants reading the high SES base narrative (N = 269) were less likely to view people addicted to opioid pain relievers as to blame for their addiction compared to the no-exposure control group, whereas there was no difference between the low SES base narrative (N = 285) and control group participants. We also found significant differences in levels of social stigma expressed by participants randomized to the low SES versus those randomized to the high SES narrative. Those randomized to read the narrative about the low SES pregnant woman generally expressed more negative attitudes than those randomized to read the narrative about the high SES pregnant woman. Participants randomized

Table 2 Public Attitudes among Control Group Participants Not Exposed to a Narrative (N = 264), 2014

	Percent (95% CI)
Attitudes toward people addicted to prescription pain medication	
People who are addicted to opioid pain relievers[a] are to blame for their drug addiction.	54.4 (48.0, 60.8)
People who are addicted to opioid pain relievers are irresponsible.	46.1 (39.8, 52.5)
Unwilling to work closely with a person with an addiction to opioid pain relievers.	45.2 (38.9, 51.5)
Employers should be allowed to deny employment to a person addicted to opioid pain relievers.	46.6 (40.3, 53.0)
Landlords should be allowed to deny housing to a person addicted to opioid pain relievers.	26.1 (20.4, 31.7)
Perceptions of treatment effectiveness	
Most people addicted to opioid pain relievers can, with treatment, get well and return to productive lives.	71.6 (65.8, 77.4)
Effective treatment options are available to help people who are addicted to opioid pain relievers.	67.0 (60.9, 73.1)
Policy attitudes	
Punitive policies	
Prosecute pregnant women who are addicted to opioid pain relievers on criminal child abuse charges.	31.0 (25.1, 36.9)
Require health care providers to report women who have abused opioid pain relievers during pregnancy to state authorities, such as child welfare agencies.	57.9 (51.5, 64.2)
Public health–oriented policies	
Pass immunity laws to protect pregnant women addicted to opioid pain relievers from being charged with drug crimes if they seek treatment for their addiction.	49.2 (42.8, 55.6)
Require government-funded addiction treatment programs to provide priority access for pregnant women.	55.1 (48.8, 61.5)
Expand Medicaid health insurance benefits for low income families to cover treatment for opioid pain reliever addiction.	50.9 (44.5, 57.3)
Require individuals enrolled in Medicaid health insurance that are suspected of abusing opioid pain relievers to use a single physician prescriber and single pharmacy.	64.0 (57.7, 70.2)

Table displays the percentage (%) of respondents who strongly or somewhat endorse statement among no-exposure control group. Seven-point Likert scale responses were dichotomized so that this table displays the percent of responses that were 5, 6, or 7 on the 7-point Likert scale assessing agreement with statement or support for policy.

Percentages are weighted to adjust for the survey sampling design in order to generate estimates that are representative of the US population.

[a] Survey questions used the term *prescription pain medication* rather than *opioid pain relievers* to improve comprehension among participants.

Table 3 Effects of Exposure to a Narrative Portraying a Low Socioeconomic Status Pregnant Woman and Exposure to a Narrative Portraying a High Socioeconomic Status Pregnant Woman on Public Attitudes, in Comparison to the No-Exposure Control Group (N = 818), 2014

	Coefficient (95% CI)		
	Low SES base narrative vs. control group	High SES base narrative vs. control group	Wald test p-value[a]
Attitudes toward people addicted to prescription pain medication			
Agree that people who are addicted to opioid pain relievers[b] are to blame for their drug addiction.	−0.08 (−0.37, 0.22)	−0.38* (−0.70, −0.07)	0.05
Agree that people who are addicted to opioid pain relievers are irresponsible.	0.16 (−0.17, 0.48)	−0.19 (−0.53, 0.15)	0.04
Unwilling to work closely with a person with an addiction to opioid pain relievers.	0.31 (−0.01, 0.62)	−0.11 (−0.43, 0.22)	0.01
Agree that employers should be allowed to deny employment to persons addicted to opioid pain relievers.	0.26 (−0.07, 0.58)	−0.27 (−0.59, 0.05)	< 0.01
Agree that landlords should be allowed to deny housing to persons addicted to opioid pain relievers.	0.29 (−0.03, 0.61)	−0.07 (−0.39, 0.26)	0.03
Perceptions of treatment effectiveness			
Most people addicted to opioid pain relievers can, with treatment, get well and return to productive lives.	0.12 (−0.21, 0.46)	0.01 (−0.30, 0.32)	0.49
Effective treatment options are available to help people who are addicted to opioid pain relievers.	−0.09 (−0.41, 0.22)	−0.36* (−0.69, −0.03)	0.10

Table 3 (*continued*)

	Coefficient (95% CI)		
	Low SES base narrative vs. control group	High SES base narrative vs. control group	Wald test p-value[a]
Policy support			
Punitive policies			
Prosecute pregnant women who are addicted to opioid pain relievers on criminal child abuse charges.	−0.09 (−0.41, 0.22)	−0.36* (−0.69, −0.03)	0.10
Require health care providers to report women who have abused opioid pain relievers during pregnancy to state authorities, such as child welfare agencies.	0.17 (−0.14, 0.48)	−0.43** (−0.74, −0.12)	< 0.01
Public health–oriented policies			
Pass immunity laws to protect pregnant women addicted to opioid pain relievers from being charged with drug crimes if they seek treatment for their addiction.	0.04 (−0.26, 0.34)	0.27 (−0.06, 0.59)	0.17
Require government-funded addiction treatment programs to provide priority access for pregnant women.	0.16 (−0.17, 0.49)	−0.02 (−0.35, 0.30)	0.26
Expand Medicaid health insurance benefits for low income families to cover treatment for opioid pain reliever addiction.	−0.28 (−0.60, 0.05)	−0.02 (−0.34, 0.30)	0.12
Require individuals enrolled in Medicaid health insurance that are suspected of abusing opioid pain relievers to use a single physician prescriber and single pharmacy.	0.32* (0.00, 0.64)	0.40* (0.08, 0.71)	0.65

(*continued*)

Table 3 Effects of Exposure to a Narrative Portraying a Low Socioeconomic Status Pregnant Woman and Exposure to a Narrative Portraying a High Socioeconomic Status Pregnant Woman on Public Attitudes, in Comparison to the No-Exposure Control Group (N = 818), 2014 (*continued*)

	Coefficient (95% CI)		
	Low SES base narrative vs. control group	High SES base narrative vs. control group	Wald test p-value[a]
Emotions			
Anger	1.26** (0.91, 1.62)	0.83** (0.47, 1.19)	0.01
Disgust	1.36** (1.01, 1.71)	0.83** (0.48, 1.17)	<0.01
Sympathy	1.05** (0.74, 1.37)	1.28** (0.94, 1.62)	0.16
Pity	1.79** (1.46, 2.13)	1.73** (1.35, 2.10)	0.71

Asterisks (*p-value < 0.05 **p-value < 0.01) indicate statistically significant coefficients, comparing the experimental group to the control group, which is the reference category. Ordered logistic regression models were used to produce the coefficients, which are proportional log-odds ratios. Models are weighted to adjust for the survey sampling design; the weights enable estimates that are representative of the US population.

[a] Wald post-estimation tests were conducted to test whether the coefficient for the low SES base narrative group was significantly different from the coefficient for the high SES base narrative group.

[b] Survey questions used the term *prescription pain medication* rather than *opioid pain relievers* to improve comprehension among participants.

to the high SES base narrative were less likely to believe that effective treatment options were available to help those addicted to opioid pain relievers compared to the no-exposure control group, whereas those reading the low SES base narrative displayed no difference from the control group in their perceptions of treatment effectiveness.

Compared to the control group, participants reading the high SES base narrative were less likely to support punitive policies but did not demonstrate significantly greater support for public health–oriented policies. Participants reading the narrative portraying the high SES woman were less likely to endorse prosecution of pregnant women addicted to opioid pain relievers on criminal child abuse charges and requiring health care providers to report pregnant women with problematic opioid pain reliever use to state authorities compared to the no-exposure control group. In contrast, participants reading the narrative portraying the low SES woman did not differ significantly from the control group in their levels of support for these policies. In comparison to participants randomized to the low SES narrative, the high SES narrative participants expressed lower levels of support for requiring health care providers to report women to state authorities. Participants in both narrative groups were more likely than the control group to support lock-in programs requiring Medicaid enrollees suspected of nonmedical opioid pain reliever use to use a single prescriber and pharmacy.

Results displayed in table 3 show that participants exposed to both the high and low SES narratives expressed significantly more emotion than participants in the no-exposure control group. The effect of the narrative on the negative emotions—anger and disgust—was stronger among participants reading the low SES narrative than among those reading the high SES narrative.

Effects of Portraying Barriers to Treatment on Attitudes

Table 4 compares attitudes among participants randomized to read the narrative portraying a low SES woman facing barriers to treatment (N = 268) to those reading the base narrative about a low SES woman which did not mention any barriers to treatment. Participants reading the barriers to treatment version of the low SES narrative were significantly less likely to agree that employers should be allowed to deny employment to persons addicted to opioid pain relievers in comparison to participants reading the low SES base narrative with no mention of barriers to treatment. However, exposure to this narrative was not associated with any

Table 4 Effects of Exposure to a Narrative Portraying a Low SES Pregnant Woman Facing Barriers to Treatment on Public Attitudes in Comparison to Exposure to the Low SES Base Narrative with No Portrayal of Barriers to Treatment (N = 553), 2014

	Coefficient (95% CI) Low SES narrative with barriers to treatment vs. low SES base narrative
Attitudes toward population	
People who are addicted to opioid pain relievers[a] are to blame for their drug addiction.	−0.07 (−0.38, 0.25)
People who are addicted to opioid pain relievers are irresponsible.	−0.15 (−0.48, 0.18)
Unwilling to work closely with a person with an addiction to opioid pain relievers closely on the job.	−0.25 (−0.56, 0.07)
Employers should be allowed to deny employment to persons addicted to opioid pain relievers.	−0.39* (−0.70, −0.07)
Landlords should be allowed to deny housing to persons addicted to opioid pain relievers.	−0.17 (−0.49, 0.16)
Perceptions of treatment effectiveness	
Most people addicted to opioid pain relievers can, with treatment, get well and return to productive lives.	−0.13 (−0.45, 0.20)
Effective treatment options are available to help people who are addicted to opioid pain relievers.	−0.19 (−0.51, 0.14)

Table 4 (*continued*)

	Coefficient (95% CI) Low SES narrative with barriers to treatment vs. low SES base narrative
Policy support	
Punitive policies	
Prosecute pregnant women who are addicted to opioid pain relievers on criminal child abuse charges.	−0.19 (−0.51, 0.14)
Require health care providers to report women who have abused opioid pain relievers during pregnancy to state authorities, such as child welfare agencies.	−0.42* (−0.74, −0.10)
Public health–oriented policies	
Pass immunity laws to protect pregnant women addicted to opioid pain relievers from being charged with drug crimes if they seek treatment for their addiction.	−0.02 (−0.34, 0.29)
Require government-funded addiction treatment programs to provide priority access for pregnant women.	−0.04 (−0.36, 0.27)
Expand Medicaid health insurance benefits for low-income families to cover treatment for opioid pain reliever addiction.	0.31* (0.00, 0.62)
Require individuals enrolled in Medicaid health insurance that are suspected of abusing opioid pain relievers to use a single physician prescriber and single pharmacy.	−0.01 (−0.33, 0.31)

(*continued*)

Table 4 Effects of Exposure to a Narrative Portraying a Low SES Pregnant Woman Facing Barriers to Treatment on Public Attitudes in Comparison to Exposure to the Low SES Base Narrative with No Portrayal of Barriers to Treatment (N = 553), 2014 (*continued*)

	Coefficient (95% CI) Low SES narrative with barriers to treatment vs. low SES base narrative
Emotions	
Anger	0.06 (−0.26, 0.39)
Disgust	−0.23 (−0.55, 0.09)
Sympathy	0.78** (0.46, 1.11)
Pity	0.42** (0.10, 0.74)

Asterisks (*p-value < 0.05 **p-value < 0.01) indicate statistically significant coefficients, comparing participants exposed to the narrative portraying barriers to treatment to participants exposed to the low SES base narrative that does not mention treatment (reference category). Ordered logistic regression models were used to produce the coefficients, which are proportional log-odds ratios. Models are weighted to adjust for the survey sampling design; the weights enable estimates that are representative of the US population.

[a] Survey questions used used the term *prescription pain medication* rather than *opioid pain relievers* to improve comprehension among participants.

other differences in attitudes toward the target population or in perceptions of treatment effectiveness.

In comparison to those reading the low SES base narrative, participants reading the version describing barriers to treatment were less likely to support requiring health care providers to report women with problematic opioid pain reliever use during pregnancy to state authorities. In addition, this group expressed greater support for expanding Medicaid health insurance benefits to cover treatment for opioid pain reliever addiction. Exposure to this narrative elicited different levels of emotional engagement. Participants reading the low SES narrative depicting barriers to treatment reported greater sympathy and pity relative to the low SES base narrative.

Effects of High SES and Low SES Narratives Describing Successful Treatment on Public Attitudes

As indicated in table 5, compared to those randomized to the high and low SES narratives with no mention of treatment, participants reading the narratives depicting successful treatment for addiction did not express significantly more negative attitudes toward people addicted to opioid pain relievers. However, participants exposed to the successful treatment narrative did report greater belief in the possibility of recovery but only among those randomized to read the high SES version ($N = 274$) of this narrative.

In terms of policy attitudes, portraying successfully treated addiction lowered support for punitive policies among those randomized to the low SES version of the narrative ($N = 260$). Compared to participants reading the low SES base narrative that did not mention treatment, participants exposed to the narrative describing successful treatment expressed lower levels of support for health care provider reporting requirements. In addition, participants reading the narrative portraying a low SES woman successfully treated for her addiction expressed lower levels of support for Medicaid lock-in programs compared to the low SES base narrative. Participants randomized to read both the low SES and high SES versions of the narrative portraying successful treatment reported lower levels of anger and disgust compared to those reading the versions of the narratives that did not mention treatment.

For all of the above relationships, we also tested whether gender modified the relationship between narrative exposure and attitudes. However, we found few gender differences of note.

Table 5 Effects of Exposure to Narratives Portraying a High Socioeconomic Status (SES) Pregnant Woman and a Low SES Pregnant Woman Who is Successfully Treated on Public Attitudes in Comparison to Exposure to Narratives Portraying a High and a Low SES Pregnant Woman with no Mention of Treatment, 2014

	Coefficient (95% CI)	
	Low SES narrative with successful treatment vs. low SES base narrative N = 545	High SES narrative with successful treatment vs. high SES base narrative N = 543
Attitudes toward people addicted to prescription pain medication		
People who are addicted to opioid pain relievers[a] are to blame for their drug addiction.	0.12 (−0.20, 0.45)	−0.04 (−0.37, 0.28)
People who are addicted to opioid pain relievers are irresponsible.	−0.29 (−0.64, 0.05)	0.25 (−0.08, 0.59)
Unwilling to work closely with a person with an addiction to opioid pain relievers closely on the job.	−0.14 (−0.46, 0.18)	0.09 (−0.23, 0.42)
Employers should be allowed to deny employment to persons addicted to opioid pain relievers.	−0.05 (−0.37, 0.27)	0.18 (−0.14, 0.49)
Landlords should be allowed to deny housing to persons addicted to opioid pain relievers.	−0.11 (−0.43, 0.21)	0.03 (−0.30, 0.35)
Perceptions of treatment effectiveness		
Most people addicted to opioid pain relievers can, with treatment, get well and return to productive lives.	−0.01 (−0.34, 0.32)	0.37* (0.04, 0.70)
Effective treatment options are available to help people who are addicted to opioid pain relievers.	−0.10 (−0.42, 0.22)	0.18 (−0.14, 0.51)

Table 5 (*continued*)

	Coefficient (95% CI)	
	Low SES narrative with successful treatment vs. low SES base narrative N = 545	High SES narrative with successful treatment vs. high SES base narrative N = 543
Policy support		
Punitive policies		
Prosecute pregnant women who are addicted to opioid pain relievers on criminal child abuse charges.	−0.10 (−0.42, 0.22)	0.18 (−0.14, 0.51)
Require health care providers to report women who have abused opioid pain relievers during pregnancy to state authorities, such as child welfare agencies.	−0.45** (−0.77, −0.12)	0.21 (−0.12, 0.53)
Public health–oriented policies		
Pass immunity laws to protect pregnant women addicted to opioid pain relievers from being charged with drug crimes if they seek treatment for their addiction.	−0.02 (−0.34, 0.30)	−0.22 (−0.55, 0.10)
Require government-funded addiction treatment programs to provide priority access for pregnant women.	−0.32 (−0.64, 0.00)	−0.13 (−0.45, 0.19)
Expand Medicaid health insurance benefits for low income families to cover treatment for opioid pain reliever addiction.	0.01 (−0.30, 0.33)	−0.01 (−0.33, 0.31)
Require individuals enrolled in Medicaid health insurance that are suspected of abusing opioid pain relievers to use a single physician prescriber and single pharmacy.	−0.45** (−0.78, −0.12)	−0.06 (−0.39, 0.27)

(*continued*)

Table 5 Effects of Exposure to Narratives Portraying a High Socioeconomic Status (SES) Pregnant Woman and a Low SES Pregnant Woman Who is Successfully Treated on Public Attitudes in Comparison to Exposure to Narratives Portraying a High and a Low SES Pregnant Woman with no Mention of Treatment, 2014 (*continued*)

	Coefficient (95% CI)	
	Low SES narrative with successful treatment vs. low SES base narrative N = 545	High SES narrative with successful treatment vs. high SES base narrative N = 543
Emotions		
Anger	−0.70** (−1.04, −0.35)	−0.45* (−0.80, −0.10)
Disgust	−0.69** (−1.03, −0.34)	−0.52** (−0.86, −0.17)
Sympathy	−0.02 (−0.34, 0.30)	−0.11 (−0.44, 0.21)
Pity	−0.43* (−0.76, −0.09)	−0.30 (−0.63, 0.03)

Asterisks (*p-value < 0.05 **p-value < 0.01) indicate statistically significant coefficients, comparing the successful treatment narrative groups to the background narrative groups, which are the reference categories. For instance, the high SES successful treatment group is compared to the high SES base narrative group (reference category) while the low SES successful treatment group is compared to the low SES base narrative group (reference category). Ordered logistic regression models were used to produce the coefficients, which are proportional log-odds ratios. Models are weighted to adjust for the survey sampling design; the weights enable estimates that are representative of the US population.

[a] Survey questions used the term *prescription pain medication* rather than *opioid pain relievers* to improve comprehension among participants.

Emotional Responses as Mediators of the Relationship between Narrative Exposure and Attitudes

We found that emotional responses to the narratives partially mediated many of the relationships with public attitudes. The mediation analysis demonstrated that, by eliciting sympathy, the high SES base narrative reduced the extent to which participants perceived individuals as to blame for their addiction, compared to the control group. Sympathy was a consistent mediator because the indirect effect of the high SES base narrative on participants' attributions of blame to the individuals addicted to opioid pain relievers was negative, as was the direct effect of the narrative on perceptions of blame. However, the high SES base narrative's positive effect on disgust also increased attributions of blame for addiction to individuals. Therefore, disgust was an inconsistent mediator because its indirect positive effect blunted some of the total negative direct effect of the narrative exposure on beliefs about blame. In other words, by generating disgust, the total negative impact of the narrative on perceptions that individuals are to blame for their drug addiction was reduced.

We found that pity mediated the relationship between exposure to the high SES base narrative and support for prosecuting pregnant women addicted to opioid pain relievers on criminal child abuse charges, compared to the control group. By increasing pity, this narrative reduced support for this policy. In contrast, anger was an inconsistent mediator of the relationship between the high SES base narrative and another punitive policy, requiring health care providers to report women to state authorities. Although the total effect of the narrative on this outcome was negative (suggesting that the narrative was associated with reduced support for the policy), the indirect effect through anger was positive, indicating that anger suppressed some of the high SES narrative's overall negative effect on support for the punitive policy.

Rarely were multiple emotional responses simultaneously consistent mediators of the relationship between a narrative exposure and public attitudes. One exception was the low SES narrative portraying barriers to treatment, which, in comparison to the low SES base narrative, had a positive effect on support for expanding Medicaid benefits to cover treatment for opioid pain reliever addiction. This relationship was partly mediated by increases in both sympathy and pity. Anger and disgust were also simultaneous consistent mediators in one case. Compared to the low SES base narrative, the narrative describing successful treatment of a low SES woman reduced support for requiring health care providers to report

women to state authorities partly by lowering participants' anger and disgust. However, lower levels of pity (an inconsistent mediator) somewhat blunted the total negative effect of the narrative exposure on this outcome.

Discussion

In this message framing experiment testing the effects of exposure to narratives portraying opioid pain reliever addiction during pregnancy, we found particular features of these narratives to be important influences on public attitudes: (1) the SES of the woman depicted; (2) the portrayal of barriers to treatment access; and (3) the portrayal of successfully treated addiction. These findings provide insight into the factors that influence public attitudes surrounding opioid pain reliever addiction during pregnancy and can inform the development of communication strategies to reduce stigma and support for punitive policy, and increase support for more public health–oriented approaches to addressing this problem.

Our finding that only the narrative depicting a high SES woman reduced the perception that individuals are to blame for their addiction somewhat contradicts the findings of Gollust and Lynch (2011), whose research indicated that portraying a working-class individual elicited less individual blame for an illness (in this case, diabetes) than the portrayal of a middle-class individual. However, given stereotyping about low-income communities and drug use (Bullock, Wyche, and Williams 2001; Cozzarelli et al. 2001), it is possible that the effectiveness of the narrative portraying a high SES woman in changing attitudes was due more to its contradiction with study participants' preconceptions about who uses substances during pregnancy rather than beliefs about the degree to which members of particular social classes deserve individual blame for their health conditions. This interpretation is supported by our finding that portraying a low SES woman did not significantly heighten negative attitudes toward individuals with opioid pain reliever addiction or support for punitive policy. Rather, the idea that a woman with a good job and high educational attainment, living in a nice house, may nevertheless suffer from addiction appears to have caused study participants to reconsider their emphasis on individual blame for addiction and endorsement of punitive policy targeting these women. This is also consistent with sociological theory on the "othering" component of the stigmatization process (Link and Phelan 2001). In addition to breaking stereotypes, our finding that the effectiveness of this narrative in changing perceptions was due in part to its elicitation of sympathy and pity contributes to the developing research on the importance of

emotional engagement in persuasion (Gross and Ambrosio 2004; Gross 2008). Messages that contradict existing stereotypes and engage the public's sympathy may be promising communication strategies for reducing stigma and lowering support for policies that punish vulnerable groups.

Our findings suggest that narrative messages portraying a low SES woman placed within the broader social context – by describing the challenges she faces while attempting to access treatment - may increase support for public health–oriented policy. Although Iyengar's message framing experiments demonstrated that episodic frames highlighting individual examples of a social condition like poverty reduce perceptions that collective actors, like the government, should play a role in addressing the problem (Iyengar 1996, 1990), recent studies have shown that narrative portrayals are not intrinsically episodic (Niederdeppe et al. 2014 2011). Our study adds to this growing body of research on the persuasive efficacy of narrative messages by demonstrating that a narrative portraying the structural barriers faced by an individual attempting to access addiction treatment can increase support for policies targeting these external factors.

Portraying successfully treated addiction reduced support for punitive policy and increased the perception that treatment can be effective, although these effects varied depending on the SES of the woman portrayed in the narrative. Advocates for less punitive drug policies have hoped that reframing addiction as a brain disease, with supporting neurological research, will reduce public perceptions of addiction as a moral failure, lowering stigma and increasing support for more medically oriented solutions (Courtwright 2010). Yet research suggests that efforts to promote neurobiological explanations for mental and substance use disorders and to reframe these illnesses as "like any other" disease have not been successful either in reducing stigma toward the affected population or in advancing their interests (Hammer et al. 2013; Pescosolido et al. 2010). One explanation for why the disease paradigm has not resonated more with the public is that people may not believe that approaches based on this paradigm have been effective in reducing drug use and addiction (Courtwright 2010). However, in our study, the majority of the control group believed that treatment options for opioid pain reliever addiction are available and can be effective. Adding to emerging research (McGinty et al. 2015), our findings provide additional evidence that individualized depictions of people successfully treated for addiction may be a promising avenue for generating greater public confidence in available treatments. Public confidence in treatment for addiction is important as insurance

coverage expansions under the Affordable Care Act reduce some of the financial barriers to accessing these treatments (Mark et al. 2015).

Limitations

This study had several limitations. While online survey panels are subject to concerns related to external validity, GfK's address-based sampling approach and the application of survey weights in the statistical analyses reduced potential bias. Despite a low recruitment rate, comparing the sociodemographic characteristics of our sample to CPS data, we found no differences on observable characteristics (see table 1), suggesting that findings from this study appear to be generalizable to the US public more broadly. The public obtains information and news about health and social issues in a number of formats, including, but not limited to, narratives. Nevertheless, individualized narrative depictions are a common way of conveying information in news and entertainment media and are employed frequently by policymakers attempting to persuade the public to support particular policy proposals. Examining the role of narratives can help us to determine whether particular aspects of individualized portrayals influence public attitudes surrounding controversial issues.

Although we intentionally used language to neutralize assumptions about race, study participants may have inferred race from the indicators of socioeconomic status. Despite efforts to limit racial indicators, we cannot definitively state that the differences between participant responses among those in the low versus high SES narrative groups were limited to perceptions about socioeconomic status only. The role of race in influencing public perceptions should be explored in future research, particularly given recent suggestion that the rise of heroin use among white communities in the US has elicited less punitive responses (Cohen 2015). Another limitation of the content of these narratives was the lack of mention of buprenorphine, a medication alternative to methadone increasingly used to treat opioid addiction during pregnancy. Stigma associated with methadone may have influenced participant responses to the narratives describing treatment. However, we featured methadone as the medication treatment in the narrative because although evidence is emerging that buprenorphine may reduce the risk of NAS, at the time of the study, the standard of care for treating opioid addiction during pregnancy was still methadone (Committee on Health Care for Underserved Women and the American Society of Addiction Medicine 2012). Future research examining the effects of messages framing opioid addiction during pregnancy

might explore whether the method of treatment, and its reputation, influence public attitudes. In the same vein, language describing substance use disorders is evolving rapidly as updated diagnoses and nomenclature in DSM-V have been disseminated and as concerns have arisen over how language affects and reflects stigma (Broyles et al. 2014; Kelly and Westerhoff 2010; Olsen 2015). While we asked participants to respond to survey questions that included familiar words commonly featured in news media coverage of this issue (McGinty et al. 2016), such as *prescription pain medication*, *addiction*, and *abuse*, as a means of easing comprehension, these word choices also may have influenced responses (although not differentially across study groups). More empirical research is needed to enhance our understanding of how variations in terminology affect attitudes (Kelly and Westerhoff 2010).

Implications for Policy and Politics

In a seminal article on moral panics, Goode and Ben-Yehuda note that "the periodic drug panics that have washed over American society for a century continue to deposit institutional sediment in their wake" (Goode and Ben-Yehuda 1994). Concern over withdrawal in infants, without consideration for the health and wellbeing of mothers, may contribute to the enactment of punitive policies (Lester, Andreozzi, and Appiah 2004), which further alienate this vulnerable population from the health care system (Committee on Health Care for Underserved Women at the American College of Obstetricians and Gynecologists 2011; Poland et al. 1993). Anecdotal reports in Tennessee suggest that since the state defined narcotic use during pregnancy as a form of criminal assault in 2014, women with substance use disorders have been crossing state lines in order to obtain health services (Goldensohn and Levy 2014; Gonzalez and Boucher 2015). However, there has been no empirical research yet evaluating the effects of this law. While some of the narratives in this study were associated with lower support for punitive policies, the barriers to treatment narrative was the only narrative associated with increased support for a public health–oriented policy: expanded access to addiction treatment for Medicaid enrollees. Pregnancy offers an opportunity to intervene and provide services to a population that may be more likely to engage successfully in treatment at this critical juncture (Daley, Argeriou, and McCarty 1998). Given that a substantial proportion of child protective service cases involve problems related to parental substance use (Semidei, Radel, and Nolan 2001), treatment during pregnancy can be an early preventive measure that

increases the odds of future health and wellbeing for families coping with substance use disorders (Lester, Andreozzi, and Appiah 2004). Efforts to increase support for expanded treatment access for this population may consider using narratives to illuminate the barriers to care that pregnant women encounter.

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