Published in final edited form as:
J Health Polit Policy Law. 2010 December ; 35(6): . doi:10.1215/03616878-2010-034.

Images of Illness: How Causal Claims and Racial Associations Influence Public Preferences toward Diabetes Research Spending

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Abstract

Despite the salience of health disparities in media and policy discourse, little previous research has investigated if imagery associating an illness with a certain racial group influences public perceptions. This study evaluated the influence of the media's presentation of the causes of type 2 diabetes and its implicit racial associations on attitudes toward people with diabetes and preferences toward research spending. Survey participants who viewed an article on genetic causation or social determinants of diabetes were more likely to support increased government spending on research than those viewing an article with no causal language, while participants viewing an article on behavioral choices were more likely to attribute negative stereotypes to people with diabetes. Participants who viewed a photo of a black woman accompanying the article were less likely to endorse negative stereotypes than those viewing a photo of a white woman, but those who viewed a photo of a glucose-testing device expressed the lowest negative stereotypes. The effect of social determinants language was significantly different for blacks and whites, lowering stereotypes only among blacks. Emphasizing the behavioral causes of diabetes, as is common in media coverage, may perpetuate negative stereotypes. While drawing attention to the social determinants that shape these behaviors could mitigate stereotypes, this strategy is unlikely to influence the public uniformly.

Introduction

In his seminal work on public opinion, Lippmann (1922) proposed that public opinion is produced from the "pictures in the heads" or the "stereotypes" that people draw from when they consider issues in public affairs. Not having direct experience with most policy issues, Lippmann claimed, the public relies on heuristics based on impressions shaped by the media and broader culture. Numerous scholars over the past two decades have supported Lippmann's argument that media imagery can influence the public's opinion about policy matters (Gilens 1999; Iyengar 1991; Iyengar and Kinder 1987; Zaller 1992; McLeod, Kosicki, and McLeod 2002). The impact of media images may be particularly salient in health policy, as cultural constructions of sinners and the stigmatized have shaped the public health agenda (Morone 1997, 2003). As Morone (2005: 15) argued, echoing Lippmann, "The politics of social policy always turns on the mental images we create of the beneficiaries."

In this article, we experimentally assess the impact of two types of messages that are central to public discourse about health issues: claims about the causes of illness and associations with racial groups. The first, causal claims, can influence attitudes toward people with the illness and opinions about the appropriateness of policy strategies, as many researchers have confirmed, through the influence of causal perceptions on attributions of policy responsibility and perceptions of blame (Iyengar 1991; Weiner, Perry, and Magnusson 1988; Stone 1989). But in contemporary health discourse, *who* is sick, not just how they came to be sick, is also a central theme. In media presentations of health disparities, racial imagery, a proven powerful influence on American public opinion (Kinder and Sanders 1996), may affect public attitudes and policy priorities. Scholars have recently argued for more research on the effects of media communication about health disparities (Niederdeppe et al. 2008; A. E. Kim et al. 2010). Communicating about these issues could increase public awareness and mobilize the public, but may also have unintended consequences if media images activate underlying negative stereotypes about disadvantaged social groups.

Type 2 Diabetes as a Case Study

Using the case of type 2 diabetes, we assess how causal frames and racial imagery influence public preferences toward resource allocation for diabetes research and the endorsement of stereotypes about people with diabetes. The term *stereotype*, following Lippmann's original usage, refers to the application of characteristics to a collective or group (Lester and Ross 2003). We focus on type 2 diabetes for several reasons: its incidence and prevalence have increased rapidly in the United States; it leads to expensive and burdensome health complications, costing the U.S. $218 billion in 2007 in direct medical expenses and in lost productivity (Dall et al. 2010); and its epidemiology suggests multiple features of diabetes that the news media could describe in their coverage. While type 2 diabetes is commonly associated with health behaviors (particularly poor diet, lack of physical activity, and concomitant obesity), these risk factors occur within a context of social and economic influences, including neighborhood environments (e.g., food marketing, price of fruits and vegetables, school concessions) that facilitate unhealthy diets and social stressors that can directly affect insulin resistance (Abraham et al. 2007; Brown et al. 2004). At the same time, genetic causal narratives have growing explanatory power, as scientists catalog numerous genetic variants that increase susceptibility to type 2 diabetes (Lyssenko et al. 2008). Rates of diabetes in the United States among African Americans are twice those of non-Hispanic whites, and rates among the poorest Americans are three times that of the wealthiest (Kanjilal et al. 2006; Cowie et al. 2009).

In their coverage of social problems, the news media emphasize certain facets of issues. These facets, or "frames," are the central organizing ideas or symbols in the media's presentation of an issue (Gamson and Modigliani 1989). Because journalists cannot cover every aspect of a topic, they rely on their sources and their instincts to select features to highlight, making these features more salient or meaningful to the reader (Entman 1993; Scheufele 1999). In discussing diabetes, journalists can frame the problem in several ways. In a content analysis of news media presentations of diabetes, we found that news articles frequently feature the causes of diabetes, describing genetic predispositions, behavioral choices, associations with obesity, and social determinants (Gollust and Lantz 2009). The news media also emphasize the associations of type 2 diabetes with racial minorities, either through explicit mentions of disparities or through inclusion of photographs of affected individuals. Research demonstrates that when people view photos accompanying a news article, they infer that the particular racial or ethnic group pictured has an elevated risk for the health condition discussed (Gibson and Zillman 2000), and that implicit racial cues in the news media can lead whites to incorporate racial stereotypes in their evaluations of policies (Mendelberg 2001; Valentino, Hutchings, and White 2002). Thus an image of a

member of a racial minority accompanying an article about diabetes could have a powerful impact on public responses to the issue.

Causal Frames and Racial Images

Previous empirical research has demonstrated the impact of causal perceptions of health conditions on public attitudes toward policy (Barry et al. 2009; Oliver and Lee 2005; Reutter, Harrison, and Neufeld 2002). In general, when people believe that a disease's onset is controllable (or self-caused), they express less pity, convey less empathetic attitudes and more stigma toward people with that disease, and are less likely to want to help people with that disease than when they believe the disease is outside the individual's control (Corrigan et al. 2003; Ubel et al. 2001; Weiner, Perry, and Magnusson 1988; Murphy-Berman, Berman, and Campbell 1998; Lenton, Blair, and Hastie 2006). These findings suggest that if people perceive the cause of diabetes to be under individuals' control or personal responsibility (such as individuals choosing to eat unhealthily), they will be less likely to support increased spending on diabetes research. In contrast, if people believe that diabetes results from factors beyond individuals' control, such as neighborhood environments or other social determinants, people may have more sympathetic attitudes toward diabetes. While there has been limited research directly assessing public attitudes toward social explanations for health conditions (Reutter, Harrison, and Neufeld 2002; Niederdeppe et al. 2008; Robert et al. 2008), sociological research about the determinants of social class indicates that when people believe that class differences are the result of social structural factors, instead of individual factors (such as laziness or motivation), they express more support for government spending on the poor (Kluegel and Smith 1986).

Considering the impact of genetic causal narratives on public policy preferences is more complicated, mainly because it is not clear whether a genetic cause signals a noncontrollable risk (which might suggest sympathetic attitudes) or whether it signals an inevitability or essentialism of risk (which might suggest less sympathetic attitudes) (Shostak et al. 2009). Much of the research on genetic attribution and public attitudes has concerned mental illness, with varying results. While Martin, Pescosolido, and Tuch (2000) found that when people attributed mental illness to genetics, rather than "bad character," they held less stigma toward those with mental illness, other research has suggested a more mixed view of the association between genetic explanations and holding stigmatizing attitudes toward the mentally ill (Phelan 2005; Schnittker 2008). Regardless of stigma's origin, research indicates that higher levels of stigma toward the mentally ill were associated with preferences toward decreased federal spending on mental health (McSween 2002).

In contrast with the large body of health-related research on causal attributions, there has been little previous research on how racial associations with a particular disease might influence opinion toward health policy. Yet given the social epidemiology of type 2 diabetes, which includes higher rates among African Americans, the public's attitudes toward race may be important predictors of their policy opinions on diabetes. And to the extent that the media identify racial disparities in their coverage, such attitudes should become even more prominent.

Research supports the general concept that public policy opinions are shaped by people's attitudes toward the targets of policies, particularly whether these targets are perceived to be sympathetic and deserving of help (Schneider and Ingram 1993; Kinder and Sanders 1996; Nelson and Kinder 1996; Gilens 1999; Pollock 1994). Citizens reduce what could be a complicated policy consideration into a simpler question of how they feel about a particular group. Indeed, attitudes toward African Americans have proved a particularly potent group heuristic in U.S. public opinion (Kinder and Sanders 1996). Research in non – health policy arenas such as welfare and crime demonstrates that racial stereotypes evoked or "primed" by

media presentations can shape policy preferences: media coverage that emphasizes blacks as policy targets tends to activate negative racial stereotypes (that blacks are lazy or dangerous), leading to reduced support for welfare and higher support for punitive crime policy (Gilens 1999; Hannah and Cafferty 2006; Peffley, Hurwitz, and Sniderman 1997).

Furthermore, racial associations with health conditions may combine with causal attributions to produce potentially powerful effects on policy opinion (see, e.g., Lenton, Blair, and Hastie 2006). Research shows that Americans rely on racial stereotypes when interpreting policy issues ostensibly unrelated to race when media coverage emphasizes particular traits or characteristics that have become implicitly associated with racial groups (Winter 2008). For instance, media frames of Social Security tend to emphasize benefits for hardworking, motivated Americans — attributes the public may implicitly associate with whites (Winter 2006). A media frame that emphasizes behavioral choices as the cause of diabetes, in contrast, might evoke laziness, risky choices, and lack of motivation to diet and exercise, stereotypes that causal attributions theory predicts would lead to lower levels of support for diabetes spending (Weiner, Perry, and Magnusson 1988). Moreover, such an emphasis on diabetes' behavioral causes could also implicitly evoke historically stereotypical attributes of blacks violating the American work ethic — being lazy, unmotivated, or not dependable (Peffley, Hurwitz, and Sniderman 1997). Thus when the news media link poor health behaviors and African Americans to diabetes, two negative sets of stereotypes might combine to shape public preferences.

Study Goals and Predictions

Our research addresses two distinct literatures, one on causal attributions and the other on social group attitudes in American public opinion, by considering a policy realm where each is highly salient — racial health disparities. We test whether public preferences toward research spending are influenced by how the media depict the cause of type 2 diabetes (genetics, behaviors, or social determinants) and by whether the media highlight a particular racial group (by showing a picture of a black or a white individual with diabetes).

Contributing to the literature on causal attributions, we expect that emphasizing the behavioral causes (i.e., diet, lack of exercise) of diabetes will lead to decreased support of federal spending on diabetes, as a result of perceptions that diabetes is under the individual patient's control and thus does not warrant allocation of public dollars. In contrast, we expect that emphasizing the social determinants of diabetes will signal that diabetes is outside the patient's control, leading to higher levels of support for research spending. While the literature on genetic causal attributions is ambiguous, we expect that an emphasis on genetic causes of diabetes will signal less individual blame and thus more support for research spending. Since previous literature posits that causal attributions influence perceptions of individuals' laziness, blameworthiness, or otherwise undeservingness, we expect that any observable impact of the causal frames on resource allocation preferences can be explained, or mediated, by the frames' impact on negative stereotypes about people with diabetes.

Second, we expect that when articles about type 2 diabetes are accompanied by a photo of a black woman (an implicit racial cue), negative racial stereotypes will be activated, leading to reduced support for government spending on diabetes. Given that previous research has most often observed these types of implicit racial effects among whites in particular (see, e.g., Kinder and Sanders 1996; Valentino, Hutchings, and White 2002), we expect to find differential effects of the media frames on whites and blacks. Finally, we expect to observe interactive effects between causes and photos, particularly when the media associate diabetes with behavioral choices *and* with African Americans.

Data and Methods

Sample

We surveyed members of an Internet panel, maintained by Survey Sampling International (SSI), comprising more than 1 million ethnically diverse adults who have agreed to take Internet-based surveys for research purposes. Panel members are recruited via random-digit dialing, banner ads, and other opt-in techniques. Given the nonprobability method of recruitment and the fact that all panel members have Internet access, the SSI panel is not representative of the U.S. population. However, the goal of this study is not to produce accurate population estimates but to understand an experimental effect, conditions under which survey experts agree that a nonprobability online panel can be an appropriate choice (see American Association for Public Opinion Research [AAPOR] 2010).

To have sufficient power to detect small to moderate experimental effects, SSI recruited a sample of at least two thousand panel members from the United States in the following proportions: 60 percent white, 25 percent African American, 12 percent Hispanic, and 3 percent Asian American. The oversampling of African Americans was necessary to have sufficient sample size to stratify by race. Within each racial or ethnic stratum, SSI drew three age-group samples of 37.5 percent aged 18 – 39, 37.5 percent aged 40 – 59, and 25 percent aged 60+ (to approximate the U.S. age distribution). SSI adjusted the number of e-mail invitations to participate in the study in each demographic subsample until the specified quotas were achieved. To meet these demographic quotas, 2,838 people were enrolled in the study, and in late April 2007 2,490 (87.7 percent) completed the section of the survey that included the diabetes news article and diabetes-related variables. Participants completing the survey were entered into a drawing administered by SSI for cash prizes. The survey was completely anonymous, and SSI handled all correspondences with participants.

Experimental Design

Every study participant was randomly assigned to view a hypothetical news article about type 2 diabetes, designed to resemble an article from an online news source. The articles, modeled after existing news articles and a press release from the American Diabetes Association, described lobbying activities in Washington and the increasing prevalence of type 2 diabetes. Articles were identical except for which one of four causal frames (genetics, behavior, socioeconomic environment, or no causal language) was embedded in the text. The article texts were reviewed by the research team and other experts in research design and were assessed for the scientific accuracy of claims made and maximum comparability across articles. We acknowledge, nonetheless, that there are differences across the text treatments (e.g., length and complexity) that cannot be perfectly matched as a result of the differing causal language in each. See appendix A for the text of the articles.

One of three images (a black woman, a white woman, or a glucose-testing device) was randomly assigned to accompany the article, yielding a 4 (causes) × 3 (images) between-subjects design. If photos of only one black woman and one white woman were used, it would be impossible to determine whether any differences in these photographs' effects on opinion were the result of the woman's race or some other unmeasured characteristics (facial expression, body mass, etc.). To deal with this issue, two pairs of photos of women were selected that were matched (based on the research team's and ten other observers' judgments) as much as possible in terms of body mass, pose, and facial expression and only differed by the women's race.[1] For those participants assigned to view an image of a

[1]One set of photos showed heavier women, standing with happier facial expressions (photo set 1); the other (photo set 2) showed thinner women, seated, with sadder facial expressions. Photos available to view on request, from the first author.

woman, they were first randomly assigned to one of the two matched sets of photos, and then randomly assigned to the photo of a black woman or a white woman within that set. The photo of the glucose-testing device was chosen as a "neutral" stimuli.

Measures

Treatment Variables—The key treatment variables were (1) the randomly assigned causal frames and (2) the subject of the photo, a black woman or a glucometer. The "no causal language" (or "control") condition and the photo of a white woman served as the reference groups in the analyses.

Dependent Variables—The main dependent variables were participants' preferences for allocating federal dollars toward research for diabetes treatment or prevention. Participants were asked: "Please indicate whether the government should spend more or less on research about new treatments for diabetes" and "Please indicate whether the government should spend more or less on research about ways to prevent diabetes." Response categories were as follows: 1 = spend much less, 2 = spend less, 3 = spend about the same, 4 = spend more, 5 = spend much more. Pollock (1994), Nelson and Kinder (1996), and McSween (2002), among others, have used similar survey items as a generic way to measure public support for other health conditions. Moreover, we used these dependent variables because political scientists studying democratic responsiveness have found that similar measures of public preferences for government spending correlate with actual changes in federal spending over time (Wlezien 1995; Soroka and Lim 2003).

Mediating Variables—We tested whether the influence of media frames on allocation preferences is mediated by holding negative stereotypes toward people with diabetes. According to Link and Phelan (2001), a key component of stigma is labeling a group or individual with negative or undesirable characteristics. Using the semantic differential technique, participants were asked to indicate on a scale from 1 to 7 how intelligent (1 = not at all intelligent, 7 = extremely intelligent), lazy (1 = not at all lazy, 7 = extremely lazy), and dependable (1 = not at all dependable, 7 = extremely dependable) people with diabetes are (Link et al. 2004). These particular characteristics were chosen to capture negative stereotypical attitudes toward people with diabetes, particularly if diabetes is perceived to result from poor health behaviors. A scale of stereotypical attitudes was created by reversing the values for intelligent and dependable and creating an average of all three characteristics (Cronbach's alpha = 0.72).

Control Variables—Each of the twelve experimental groups was compared based on demographic characteristics (age, gender, race/ethnicity, income, political partisanship, ideological self-identification, education, diabetes status, family or friends with diabetes, and body mass index) using *F*-tests and chi-squared tests. Because of random sampling variation, there was one significant ($p < 0.05$) difference across the groups, in ideological self-identification. Thus all analyses were conducted using a control variable for ideological identification (a seven-point scale ranging from 1 = liberal to 7 = conservative, and rescaled to run from 0 to 1) to address this random imbalance. We also included controls for additional variables that predict research spending preferences and have been shown to correlate with political ideology (e.g., McSween 2002): personal experience with diabetes (whether the participant indicated that he or she had ever been told by a physician that he or she had diabetes and whether the participant indicated he or she has a close friend or family with diabetes), political party identification (a seven-point scale ranging from 1= strong Democrat to 7 = strong Republican, and rescaled from 0 to 1), race (black, white, and other, for those analyses not stratified by race), and total family income (an eleven-point scale, rescaled to run from 0 to 1).[2] Finally, we included a control variable in all analyses for the

randomly assigned version of the photo set to which participants were assigned. While not strictly speaking necessary as a control variable, since this variable was successfully balanced across groups, we include this variable to statistically adjust for any (albeit small) variation in the random assignment of photo set and thus improve the precision of the estimates. Moreover, the coefficient on this "photo set" variable can be interpreted as the effect of any non-racial differences between the image sets (e.g., pose, body mass, facial expression).

Analysis

We tested the influence of the treatment variables by estimating a series of ordinary least squares (OLS) regression models. First, we regressed spending preferences on the causal frames (genetic causal frame, behavioral causal frame, social determinants frame, compared with no causal language) and images (black woman or glucometer, compared with a white woman). Next, we estimated this model with interaction terms included between the frames and photos. We estimated each model separately for the full sample, for whites, and for blacks. In the second set of models, we regressed negative stereotypes on the causal frames and images. As with the first models, we also estimated these models including interaction terms and stratifying by race. Results were substantively and statistically similar when the dependent variables were divided into five ordinal categories and estimated with ordered probit regression, but we present the OLS models here for ease of interpretation of coefficients.

To assess whether stereotypical attitudes mediate the impact of the frames and photos on government spending opinions, we estimated the model of spending preferences again, but including negative stereotypes as a covariate. If stereotypical attitudes mediate the relationship between the frames and opinions about government spending, the coefficients on the causal frames and photo variables should become significantly closer to zero when the models include the mediating variable (Baron and Kenny 1986). We conducted all analyses with STATA 10.1, using the Clarify program (Tomz, Wittenberg, and King 2001) to generate predicted values, standard errors, and confidence intervals based on the multivariate regression results.

Results

Although the study participants were not recruited so as to be representative of U.S. adults as a whole, the sample is diverse across a variety of sociodemographic characteristics (table 1). Table 1 reveals key differences between the study population sample and the national U.S. population. Of note, more study participants identified that they had diabetes than report diabetes diagnoses in the United States based on the National Health Interview Study; this is likely a result of the fact that we oversampled for African Americans (who have higher rates of type 2 diabetes than whites) and that the SSI sample is slightly more obese than the national population.

Table 2 shows the distribution of participants' preferences for federal spending on diabetes prevention and treatment research. The correlation between the two variables was 0.75, suggesting that participants did not distinguish between spending on prevention or treatment. Thus all subsequent analyses use a combined variable representing participants' overall preferences for research spending on diabetes by creating an average of the two spending variables. The mean of the combined variable was 4.02 (standard deviation = 0.79), indicating high overall support for spending on diabetes research. The mean level of

[2]Any participant who indicated "don't know" for ideological identification $n = 388$) or political party identification ($n = 277$) was assigned the midpoint of the scale (i.e., moderate or independent) when this variable was used as a control.

stereotyping in the sample was 2.69 (standard deviation = 1.19) on the scale ranging from 1 to 7, indicating relatively low levels of applying negative stereotypes to people with diabetes.

Media Frames' Effects on Spending Preferences

Table 3 shows the results of the regression model of preferences for government spending on diabetes research, for the full sample, for white study participants only, and for black study participants only. In the full sample, exposure to the genetic frame and the social determinants frame boosted support for spending on diabetes research, relative to exposure to the frame that included no causal language about diabetes. The effect of the behavioral frame on spending preferences was no different from the version of the diabetes news article without causal language. None of the photos (the black woman, the white woman, or the glucometer) had significant effects ($p < 0.05$) on participants' spending preferences. Contrary to expectations, we did not find evidence of any statistically significant interactive effects between the causal frames and images, meaning that the effects of the causal messages did not differ depending on which image accompanied the article.

We observed similar effects for blacks and for whites as for the full sample (table 3), with respondents who viewed the genetic frame and the social determinants frame preferring more spending on diabetes research. In addition, blacks, but not whites, who viewed the photo of the glucometer were more likely to support increased diabetes research spending compared with viewing the photo of a white woman. To test whether the effects of the frames and images were constant across racial groups, we reestimated model 1 for the sample of blacks and whites pooled ($N = 1,806$) and included interaction terms between each variable in the model and participants' race (for the fully interacted regression model, see appendix table B4). There were no significant ($p < 0.05$) coefficients on any of the interaction terms with participants' race and the treatment variables. This indicates that the effects of the media stimuli were consistent for all participants, black or white.

Media Frames' Effects on Negative Stereotypes

Table 4 shows the effect of the causal frames and images on stereotypical attitudes toward people with diabetes. As expected, participants exposed to the behavioral choices causal frame were significantly more likely ($p < 0.05$) to endorse negative stereotypical attitudes about people with diabetes, relative to those who viewed the frame without causal language. For the full sample, neither the genetic frame nor the social determinants frame had a significant effect on stereotypes, which means that people viewing these frames were no less likely to attribute negative stereotypes to people with diabetes than were those who viewed the frame without causal language.

Table 4 demonstrates that the photographs did have a statistically significant influence on stereotypical attitudes, but in an unexpected direction. Relative to those who viewed a photo of a white woman, participants in the full sample who viewed the photo of a black woman were less likely ($p < 0.10$) to endorse negative stereotypes about people with diabetes, in contrast to our expectation that the racial image would lead to greater expression of bias. This effect was stronger among whites ($p < 0.05$), but not statistically significant among blacks.

Viewing a photo of a glucometer, however, had an even stronger effect on stereotypical attitudes. Relative to viewing the photo of a white woman, participants viewing the photo of a glucometer endorsed significantly lower levels of negative stereotypes about people with diabetes ($\beta = -0.22$, $p < 0.001$). In fact, reestimating the same regression model in table 4 (column 1) but including a variable representing either personalizing image (reference group

is the glucometer) reveals that participants exposed to an article personalized with a photo of a woman with diabetes were significantly more likely (β = 0.16, $p = 0.002$) to express negative stereotypes about people with diabetes than those exposed to the photo of a glucometer (see figure 1 for an illustration of these differences).

As with the spending preferences outcome, we observed no statistically significant interactive effects of the causal frames and the images on endorsement of negative stereotypes.

The causal frames and images appear to have affected blacks' and whites' endorsement of stereotypes differently (table 4). For instance, the effect of the social determinants frame was negative among blacks (β = − 0.38, $p < 0.01$), suggesting lower endorsement of stereotypes, whereas it was positive (β = 0.12, $p > 0.10$) among whites, suggesting higher endorsement of stereotypes. To test whether these apparent racial differences were statistically significant, we reestimated model 1 in table 4 on the pooled sample of black and white participants (n = 1,797), fitted with interaction terms between each variable in the model and participants' race (appendix table B4). The coefficient on the interaction between the social determinants frame and participants' race was negative (β = − 0.50, $p = 0.003$) (and none of the other frame × respondent race or photo × respondent race interaction terms approached statistical significance). We calculated the predicted levels of stereotyping for blacks and whites for the control and social determinants conditions, setting all other covariates to their means. Whereas blacks and whites expressed statistically indistinguishable levels of stereotypes on viewing the frame with no causal language (for whites: 2.71, 95 percent confidence interval [CI] = 2.58 – 2.84; for blacks: 2.52, CI = 2.33 – 2.73), levels of stereotyping were significantly different on viewing the social determinants condition, as blacks expressed less stereotyping compared with the no causal language frame (2.15, CI = 1.96 – 2.33) and whites expressed more (2.82, CI = 2.71 – 2.95). These results demonstrate that the social determinants frame had an opposing effect on blacks' and whites' levels of stereotyping.

Stereotypes as Mediators of Frames' Effects on Spending Preferences

We evaluated whether the effects of the genetic and social determinants causal frames on spending preferences were mediated through negative stereotypical attitudes about people with diabetes (table 5). For the full sample, the inclusion of stereotypes in the model of spending preferences left the magnitude of the coefficients on the genetic frame and the social determinants frame virtually unchanged from their values in model 1 in table 3. The coefficient on the behavioral frame increased slightly in magnitude, suggesting that once we account for the mediating influence of the behavioral frame on participants' negative stereotyping, participants would be more likely to support increased spending for research. These results are similar for whites and for blacks, although for blacks the expectation that stereotypical attitudes mediate the effect of the social determinants frame was somewhat supported, as the coefficient on the social determinants frame decreased 21 percent (from 0.19 to 0.15) when stereotypical attitudes were accounted for and no longer reached statistical significance. For blacks, some of the positive effect of the social determinants frame on support for diabetes spending can be explained by its reducing stereotyping of people with diabetes. These descriptive results were confirmed with Sobel statistical tests of mediation (shown in table 5).

Results also revealed that negative stereotypes about people with diabetes are robust predictors of opinions on government spending on diabetes research (table 5). In the full sample, an increase in stereotyping from the lowest to highest possible levels was associated with a decrease in spending preferences of more than 1 unit on the five-point scale. Using more easily interpretable changes, an increase in stereotyping of one standard deviation

would decrease spending preferences by 0.22 units, twice the magnitude of the effect of the genetic or social determinants causal frames.[3]

Discussion

The results from this experimental study demonstrate that relatively subtle manipulations in media messages about diabetes influence public preferences toward governmental spending on diabetes research. Study participants exposed to a media frame that suggested that diabetes has a genetic origin or that diabetes results from living in an impoverished neighborhood were more likely to support increased spending on diabetes research. These findings suggest that participants who view diabetes as being beyond individual control are more supportive of increases in publicly funded research, supporting other researchers' claims about the policy-relevance of causal explanations (Barry et al. 2009; Oliver and Lee 2005). However, study participants exposed to a media frame describing behavioral choices as the cause of diabetes were no more or less likely to support diabetes research compared with a version of the news article with no causal language at all. This may be because the standard view of diabetes, most common in media depictions (Gollust and Lantz 2009), is one that emphasizes behavioral causes of type 2 diabetes.

Nonetheless, we also found that participants exposed to a news article that framed the causes of diabetes in terms of individuals' behavioral choices were more likely to express negative stereotypes of people with diabetes: that they are lazy, unintelligent, and not dependable. This finding is consistent with previous studies that have found that people hold stigmatizing attitudes toward those whose health conditions they perceive to be their fault (Corrigan et al. 2003; Martin et al. 2000; Weiner, Perry, and Magnusson 1988). Spence (2010) found that media representations of HIV/AIDS that focused on black individuals' sexual behavior led to higher levels of negative attitudes toward blacks and reinforced blame toward people with HIV/AIDS, among a sample of black respondents. Moreover, our finding that the behavioral causal frame was associated with higher levels of stereotyping is consistent with other research assessing the effect of causal attributions on bias toward the overweight (Teachman et al. 2003). Contrary to expectations, however, stereotypes did not mediate the causal frames' effects on research spending preferences, suggesting some other unmeasured construct (such as deservingness) might explain why the genetic and social determinants frames influenced spending preferences as they did.

To our surprise, we found that associating diabetes with a particular racial group did not have any impact on participants' spending preferences, nor did the racial image interact with behavioral attributes to affect opinions or attitudes. In fact, our results indicated that whites who saw a photo of a black woman were actually *less likely* to endorse negative stereotypical traits about people with diabetes, in contrast to other research that has found strong negative effects of racial imagery on welfare policy opinion (Gilens 1999; Hannah and Cafferty 2006).

This unexpected finding may be interpreted in several ways. First, the public may have more positive views of blacks suffering from health issues (i.e., that they are more deserving), in

[3]To appreciate the relative size of the effects of the experimental stimuli, it is useful to compare their coefficients to that of the control variables; see appendix B. While not a focus of this analysis, it is interesting to note that demographic and political variables had stronger effects on both spending preferences and stereotyping than did the experimental stimuli. For instance, Republicans, conservatives, and those with higher incomes were significantly less likely to support increased federal research spending on diabetes, while people with diabetes, those with family or friends with diabetes, and blacks were more likely to support increased spending (appendix table B1). In contrast, Republicans and those with higher incomes were more likely to endorse negative stereotypes with diabetes, while people with diabetes, people with family and friends with diabetes, and blacks were less likely to endorse these negative stereotypes. These findings are consistent with those of McSween (2002), demonstrating robust associations between political orientation and experience with illness on policy-relevant attitudes.

contrast to more negative perceptions of blacks on welfare. This explanation is consistent with other research that has not identified prejudicial effects in the context of health, using either an image-based racial cue (Lenton, Blair, and Hastie 2006) or text-based identification of racial group identity (Murphy-Berman, Berman, and Campbell 1998; Gollust and Lynch 2010). Second, whites may have identified the subtle race manipulation and the racialized content of the stereotype scales (e.g., "lazy") and rated people with diabetes less negatively, to avoid violating the norm against reporting racially stereotypical opinions (Mendelberg 2001). Third, our results may mask heterogeneity among whites in our study, as Peffley and colleagues (1997) and Fong and Luttmer (2007) observed in their studies of the effect of racial imagery on opinions about welfare and crime and charitable giving to victims of Hurricane Katrina. Racial liberals in our study might have become more sympathetic toward people with diabetes when they were exposed to a picture of a black woman with diabetes, thus driving the observed effects, even if a subset of racial conservatives became less sympathetic. Fourth, the particular images used in this study may not have triggered strong racial stereotypes; different images, including photos of men, may have resulted in different findings.

While we found relatively limited effects of the racial image manipulation, we found stronger effects of personalization. Personalizing an article with a photo of a woman (compared with a glucometer) produced significantly more negative stereotypes toward people with diabetes, a stronger relationship even than emphasizing behavioral choices as the cause of diabetes. This finding is consistent with Iyengar's (1991) observation that personalizing news stories about social problems (by emphasizing specific episodes involving individuals instead of discussing problems generally) led to more negative attitudes about individual responsibility. Yet this finding runs counter to social psychological research on the "identified victim" phenomena, in which people are inclined to allocate more money and feel more sympathy toward identified people than toward unidentified or statistical victims (Small and Loewenstein 2003; Small, Loewenstein, and Slovic 2007). One possible explanation for the differences between Small and colleagues' work and our work is the underlying level of blame or stigma people attribute to people with type 2 diabetes. Whereas victims of poverty in developing countries, the type of individual Small and colleagues describe in their studies, may be perceived as completely blameless, people with type 2 diabetes in America, even regardless of the reported cause of their illness, may carry some social stigma. This may be particularly true given the dominant ideology of personal responsibility for health in the United States (Brownell et al. 2010; Leichter 2003) and the strong stigma associated with the overweight and obese (Puhl and Heuer 2009). An additional final caveat about the interpretation of the image effects we observed is worth noting. From our data, we cannot discern whether it was *personalizing* the article, per se, with a photographic image of a person with diabetes that caused a seemingly more stigmatizing reaction or whether this effect was really driven by negative stereotypes associated with women.

Finally, our analysis identified one important difference in the effects of diabetes frames on participants' opinions. Compared with whites, blacks expressed lower levels of stereotypes on viewing the social determinants frame than expected based on the condition without causal language. Previous research has suggested that blacks are more likely to endorse social structural explanations for poverty compared with whites (Kluegel and Smith 1986) and that blacks are less likely to agree with genetic explanations for mental illness (Schnittker, Freese, and Powell 2000). Our research, contributing to this growing literature on racial differences in causal attributions, suggests that blacks may have more sympathetic attitudes than whites toward people whose illness results from the social and economic conditions in which they live. This finding, combined with previous work showing differential effects of social determinants explanations by political party orientation (Gollust,

Lantz, and Ubel 2009), suggests that the current focus in policy discourse of publicizing the social determinants of health (Marmot and Bell 2009; Smedley 2006) is unlikely to achieve a uniform impact on the public.

Limitations

Our results must be interpreted in light of several limitations. First, the sample came from an Internet panel of research participants, which leads to several sources of potential selection bias: undercoverage of non-Internet users, older Americans, and racial minorities (AAPOR 2010). Our strategic recruiting was designed to overcome this limitation by including more elderly Americans and an oversample of African Americans, but the resulting sample was more educated than the national population. Thus they may have been more willing and able to read and comprehend the news articles. Since panel members were not told about the survey's specific topic, only that it was about health, the participating sample was unlikely to be biased in ways directly related to their diabetes-related judgments.

Second, because the study design was an experiment, the focus was its internal validity. While the media messages were designed to be as externally valid as possible (e.g., modeled after a press release and media articles), they do not exactly replicate the real-world media environment. In particular, we know that mass media messages about type 2 diabetes tend to convey multiple competing causes simultaneously (Gollust and Lantz 2009), not the single causal frame we employed in the experiment.

Third, several aspects of the research design warrant additional acknowledgment. While the study team and outside experts judged the stimuli for suitability for the study goals, we did not conduct quantitative pretesting, so the treatments may have differed in unmeasured ways. In addition, our "neutral" image was a photo of a medical device (which may evoke sympathy, not neutrality), instead of a true control condition, so we cannot compare participants' attitudes with those from a condition with no causal language and no image whatsoever. In keeping with research on implicit racial imagery (see, e.g., Mendelberg 2001), our racial stimulus was a photo, not a text-based reference to health disparities. Given the prevalence of news media reporting on racial disparities, however (A. E. Kim et al. 2010), future research might evaluate the influence of textual disparities frames on health policy opinions. Nicholson and colleagues' (2008) work on the effect of mentioning racial disparities in colorectal cancer on health behavioral intentions and Rigby and colleagues' (2009) recent research on how support for government intervention to address disparities depends on the type of disadvantaged group identified offer directions for this research agenda.

Finally, while we chose our dependent variable (preferences for federal spending on diabetes research for prevention and treatment) as a general measure to gauge study participants' opinions about government support for a particular disease, as other researchers have done (McSween 2002; Pollock 1994), this variable has limitations. These findings apply only to this relatively restrictive outcome, not to other health policy attitudes. Critics may argue that the relationship between the causal frames and the research spending outcome was not conceptually clear. For instance, a person exposed to the social determinants frame may not consider funding for diabetes research a logical or effective policy solution, instead favoring policy interventions that target the social environment (McKinlay and Marceau 2000).

Policy, Politics, and Ethics Implications

Morone (2005) argued that fundamental issues in public health policy can be interpreted as debates revolving around Americans' moral judgments of and mental images of policy targets. Our study supports these claims, providing new evidence that media framing of a

seemingly neutral health problem, diabetes, to emphasize its behavioral attributes increases negative stereotypes toward people with that disease — stereotypes that powerfully predict support for federal spending on diabetes. Just as with other public health "sins" that have been socially stigmatized, including alcoholism, drugs, and promiscuity (Morone 1997), our analysis offers compelling evidence that contemporary sins responsible for public health and economic burdens, eating unhealthily and not exercising, also convey negative stereotypes, a key component of social stigma.

An assessment of previously published media content analyses of chronic health conditions (obesity, diabetes, and cancer) confirms that the "behavioral frame" — associating these conditions with individualized lifestyle and behavioral attributes — is the dominant mode of news media coverage (Sei-Hill Kim and Willis 2007; Lantz and Booth 1998; Lawrence 2004; Rock 2005; Saguy and Almeling 2008). In fact, nearly 80 percent of a sample of newspaper articles that identified any cause of type 2 diabetes emphasized behavioral causes (Gollust and Lantz 2009). While we only observed, in the experimental setting, the effects of a single "dose" of the behavioral-oriented coverage on participants' stereotypical attitudes, our results suggest that the dominance of individual behavioral depictions of causes of ill health in the media, across multiple news outlets and over time, may cultivate negative stereotypes among the public. Moreover, a policy emphasis on individual responsibility for health (Schmidt, Voigt, and Wikler 2010) could also have the unintended consequence of increasing negative stereotypes and ultimately stigma toward people whose illness are presumed to be self-caused. These framing effects have ethical implications for how to interpret and incorporate public preferences into policy making. Demonstration that public preferences are malleable and subject to framing challenges efforts to systematically incorporate public views into policy making, raising questions about whose opinions to measure given that subgroups will differ in their opinions based on media influences and other experiences (Hausman 2006; Ubel, Richardson, and Menzel 2000).

Finally, our results speak to the salience of race and racial sentiment in health policy and politics. While we did not observe strong racial effects on opinion about diabetes research spending (from data collected in spring 2007, well before debates about health care reform), this does not mean that race-related attitudes are irrelevant to Americans' health policy opinions. Research shows that the degree to which group-based attitudes influence Americans' policy opinion changes over time, depending on the prominence of group-specific frames in public discourse (Winter 2008). For instance, new evidence demonstrates that racial prejudice predicts opposition to health reform proposals when connected to President Obama, but not when the same proposals are linked to former President Clinton (Knowles, Lowery, and Schaumberg 2010). Given the prominence of media coverage of racial disparities in health and health care (Taylor-Clark et al. 2007; A. E. Kim et al. 2010) as well as the prominence of racial imagery — and Obama's central role — in public discussion of health reform, understanding the conditions under which racial attitudes influence public opinion in the health context is an important area for future research.

Acknowledgments

We received funding for this study from a small grant from the Robert Wood Johnson Foundation Health and Society Scholars Program at the University of Michigan as well as the Center for Behavioral and Decision Sciences in Medicine (NIH grant R01 CA087595). Ubel also received funding from the Robert Wood Johnson Foundation Investigator Awards in Health Policy, and Gollust received funding from a University of Michigan Rackham Graduate School predoctoral fellowship. We acknowledge very useful feedback on study design and data collection support from Brian Zikmund-Fisher, as well as helpful comments on an earlier version of this article from Renée Anspach, Scott Greer, Nicholas Valentino, and Donald Kinder. We also acknowledge feedback from the program directors and scholars at the Health and Society Scholars Program at the University of Pennsylvania. Finally, we thank the Robert Wood Johnson Foundation Health and Society Scholars Program for its financial support.

Appendix A: News Articles about Diabetes

Control ("No Frame") Group "People with Diabetes Lobby Congress This Week"

Washington**,** March 28—About 1000 patients with type 2 diabetes (also commonly known as adult-onset or non-insulin-dependent diabetes) have converged here as advocates for the American Diabetes Association (ADA). They will be meeting with their members of Congress to discuss their condition and advocate for federal policies to address their disease. In addition, they will hold a rally on Thursday of this week on the National Monument grounds, to attract popular attention to their disease.

According to the Centers for Disease Control and Prevention, nearly 21 million Americans have diabetes, but one-third of these people do not yet know they have the disease. More than 90% of people with diabetes have type 2 diabetes, a form of diabetes which typically emerges when people are adults but which may develop during childhood. The number of people diagnosed with type 2 diabetes has been increasing every year. There were over 1 million new cases of diabetes diagnosed in 2005 among adults. [Insert Causal Claim 1 here.]

People with type 2 diabetes develop a problem with the way their body secretes or responds to insulin, a hormone that regulates blood glucose levels. As a result, they have elevated blood sugar levels, which they must check multiple times per day and monitor their food intake.

Researchers are working hard to understand more about what causes type 2 diabetes. [Insert Causal Claim 2 here.]

If left untreated, people with diabetes can become blind, have kidney damage, lose their limbs, or die. Physicians, health plans, employers, and policymakers are considering new ways to prevent diabetes, help patients manage their diabetes, and reduce this deadly epidemic. It is expected that the U.S. Senate Committee on Health, Education, and Labor will consider several bills about diabetes in the upcoming session of Congress.

Caption (for control article): Shirley Jackson, 42, has diabetes. She has to check her blood sugar several times a day.

Caption (for glucometer): People with diabetes check their blood sugar with a device called a glucometer.

Table A1

Text Included in Article and Captions, by Treatment Group

	Genetic Predisposition Frame	Behavior Choices Frame	Social Determinants Frame
Causal claim 1	Researchers believe that certain genes increase the chances of getting type 2 diabetes.	Researchers believe that the way people behave increases their chances of getting type 2 diabetes.	Researchers believe that the conditions in the neighborhoods where people live increase their chances of getting type 2 diabetes. Rates of diabetes are highest among people living in poor neighborhoods.
Causal claim 2	Diabetes expert Dr. Howard Smith says, "People who have a specific genetic variation in the TCF7L2 gene on chromosome 10 are much more likely to develop	Diabetes expert Dr. Howard Smith says, "People who choose to eat too much and choose not to exercise are much more likely to	Diabetes expert Dr. Howard Smith says, "People who live in neighborhoods where the majority of stores sell food with high calories and low nutritional

	Genetic Predisposition Frame	Behavior Choices Frame	Social Determinants Frame
	diabetes than people who do not have this variation." Several other scientific studies have supported the idea that genes are associated with the development of diabetes.	develop diabetes." Several other scientific studies have supported the idea that lifestyle choices are associated with the development of diabetes.	value, such as fast food restaurants or convenience stories, are much more likely to develop diabetes." Several other scientific studies have supported the idea that people's neighborhoods, including not having convenient or safe places to exercise, and being exposed to many advertisements selling high-calorie foods, are associated with the development of diabetes.
Caption (for photo of woman)	Shirley Jackson, 42, has type 2 diabetes. She recently found out that she carries the genetic variant that makes her more susceptible to diabetes. "Since both of my parents had diabetes," she said, "I wasn't surprised when I got it too."	Shirley Jackson, 42, has type 2 diabetes. She said, "What can I say, I just love to eat junk food and I hate to exercise. I guess it finally caught up to me."	Shirley Jackson, 42, has type 2 diabetes. She said, "It's really hard for me to eat well. Where I live, there are no grocery stores with any fresh vegetables. When I walk down the street, all I see are fast food restaurants."

Note: Each of the treatment group articles was identical to the story shown to the control group (see above) but included the text in this table in the article and captions, where indicated.

Appendix B

Table B1

Impact of Causal Frames and Photos on Preferences for Spending on Diabetes Research (Full Models)

	Full Sample (*N* = 2,197)		Whites (*N* = 1,306)		Blacks (*N* = 500)	
	(1)	(2)	(3)	(4)	(5)	(6)
Experimental treatments and interactions						
Genetic frame (ref = control)	0.09* (0.04)	0.04 (0.08)	0.11† (0.06)	0.00 (0.10)	0.15† (0.08)	0.31* (0.16)
Behavioral frame (ref = control)	0.03 (0.04)	−0.03 (0.08)	0.09 (0.06)	−0.01 (0.10)	−0.01 (0.08)	0.11 (0.14)
Social determinants (ref = control)	0.09* (0.04)	0.09 (0.07)	0.11* (0.06)	0.07 (0.10)	0.19* (0.08)	0.23† (0.14)
Photo: Black woman (ref = white woman)	0.07† (0.04)	0.04 (0.08)	0.03 (0.05)	−0.04 (0.10)	0.11 (0.07)	0.19 (0.14)
Photo: Glucometer (ref = white woman)	0.06 (0.04)	0.01 (0.08)	0.04 (0.05)	−0.08 (0.11)	0.15* (0.07)	0.28* (0.14)
Genetic × black photo		0.09 (0.11)		0.17 (0.15)		−0.21 (0.20)
Behavior × black photo		0.06 (0.11)		0.11 (0.14)		−0.21 (0.20)
Social × black photo		−0.03 (0.10)		0.01 (0.14)		0.04 (0.19)
Genetic × glucometer		0.07 (0.11)		0.18 (0.14)		−0.23 (0.19)
Behavior × glucometer		0.14 (0.11)		0.19 (0.14)		−0.15 (0.20)
Social × glucometer		0.02 (0.10)		0.12 (0.14)		−0.16 (0.19)
Control variables						
Political party identification	−0.32*** (0.06)	−0.32*** (0.06)	−0.30** (0.09)	−0.30** (0.09)	−0.11 (0.12)	−0.11 (0.12)
Political ideology	−0.33*** (0.08)	−0.34*** (0.08)	−0.37** (0.11)	−0.37** (0.11)	−0.35* (0.14)	−0.35* (0.14)
Diabetes status	0.35*** (0.04)	0.36*** (0.04)	0.45*** (0.06)	0.45*** (0.06)	0.16* (0.07)	0.15* (0.08)
Family/friends have diabetes	0.16*** (0.03)	0.16*** (0.03)	0.18*** (0.04)	0.18*** (0.04)	0.20** (0.06)	0.20** (0.06)

	Full Sample (N = 2,197)		Whites (N = 1,306)		Blacks (N = 500)	
	(1)	(2)	(3)	(4)	(5)	(6)
Black race (ref = white)	0.21*** (0.04)	0.21*** (0.04)				
Other race (ref = white)	0.06 (0.04)	0.06 (0.04)				
Income	−0.17*** (0.05)	−0.17*** (0.05)	−0.22** (0.07)	−0.22** (0.07)	0.01 (0.09)	0.01 (0.09)
Photo set 1 (versus set 2)	−0.03 (0.03)	−0.03 (0.03)	−0.08* (0.04)	−0.08* (0.04)	0.16** (0.05)	0.17** (0.06)
Constant	4.12*** (0.06)	4.16*** (0.06)	4.16*** (0.08)	4.22*** (0.10)	4.06*** (0.10)	3.97*** (0.13)
Adjusted R^2	0.13	0.14	0.11	0.11	0.08	0.08

Notes: Table entries are OLS coefficients with standard errors in parentheses. The dependent variable runs from 1 to 5, with higher values indicating belief that the federal government should spend more on diabetes research. All control variables are coded to run from 0 to 1. Political party identification is coded to run from strong Democrat to strong Republican; political ideology is coded from very liberal to very conservative; ref = reference.

† $p < 0.10$;

* $p < 0.05$;

** $p < 0.01$;

*** $p < 0.001$ (two-tailed)

Table B2

Impact of Causal Frames and Photos on Negative Stereotyping (Full Models)

	Full Sample (N = 2,185)		Whites (N = 1,302)		Blacks (N = 495)	
	(1)	(2)	(3)	(4)	(5)	(6)
Experimental treatments and interactions						
Genetic frame (ref = control)	0.01 (0.07)	0.03 (0.13)	0.03 (0.09)	−0.11 (0.16)	−0.15 (0.14)	0.18 (0.27)
Behavioral frame (ref = control)	0.17* (0.07)	0.25* (0.12)	0.18† (0.09)	0.21 (0.16)	0.00 (0.15)	0.19 (0.26)
Social determinants (ref = control)	0.05 (0.07)	0.03 (0.12)	0.12 (0.09)	0.13 (0.15)	−0.38** (0.14)	−0.33 (0.25)
Photo: Black woman (ref = white woman)	−0.11† (0.06)	−0.07 (0.12)	−0.17* (0.08)	−0.21 (0.16)	−0.01 (0.13)	0.23 (0.25)
Photo: Glucometer (ref = white woman)	−0.22*** (0.06)	−0.20 (0.12)	−0.23** (0.08)	−0.26 (0.16)	−0.20 (0.13)	−0.04 (0.25)
Genetic × black photo		0.01 (0.18)		0.32 (0.23)		−0.39 (0.37)
Behavior × black photo		−0.08 (0.17)		−0.01 (0.22)		−0.15 (0.37)
Social × black photo		−0.10 (0.17)		−0.08 (0.21)		−0.45 (0.35)
Genetic × glucometer		−0.06 (0.17)		0.12 (0.22)		−0.50 (0.35)
Behavior × glucometer		−0.16 (0.18)		−0.08 (0.22)		−0.41 (0.37)
Social × glucometer		0.14 (0.17)		0.08 (0.22)		0.24 (0.35)
Control variables						
Party identification	0.46*** (0.10)	0.46*** (0.10)	0.36** (0.13)	0.36** (0.13)	0.69** (0.23)	0.65** (0.23)
Political ideology	−0.17 (0.13)	−0.14 (0.13)	−0.11 (0.17)	−0.08 (0.17)	−0.08 (0.25)	−0.00 (0.25)
Diabetes status	−0.40*** (0.07)	−0.40*** (0.07)	−0.39*** (0.10)	−0.40*** (0.10)	−0.34* (0.14)	−0.31* (0.14)
Family/friends have diabetes	−0.25*** (0.05)	−0.24*** (0.05)	−0.31*** (0.06)	−0.31*** (0.07)	−0.23* (0.12)	−0.22† (0.12)
Black race (ref = white)	−0.21** (0.07)	−0.21** (0.07)				
Other race (ref = white)	−0.06 (0.07)	−0.06 (0.07)				
Income	0.28*** (0.08)	0.29*** (0.08)	0.50*** (0.10)	0.51*** (0.10)	−0.23 (0.16)	−0.22 (0.16)

	Full Sample (*N* = 2,185)		Whites (*N* = 1,302)		Blacks (*N* = 495)	
	(1)	(2)	(3)	(4)	(5)	(6)
Photo set 1 (versus set 2)	0.08 (0.05)	0.07 (0.05)	0.18** (0.06)	0.18** (0.06)	−0.03 (0.10)	−0.05 (0.10)
Constant	2.72*** (0.10)	2.69*** (0.12)	2.63*** (0.13)	2.63*** (0.15)	2.82*** (0.20)	2.65*** (0.24)
Adjusted R^2	0.07	0.07	0.07	0.07	0.06	0.07

Notes: Table entries are OLS coefficients with standard errors in parentheses. The dependent variable runs from 1 to 7, with higher values indicating more endorsement of negative stereotypes toward people with diabetes. All control variables are coded to run from 0 to 1. Political party identification is coded to run from strong Democrat to strong Republican; political ideology is coded from very liberal to very conservative; ref = reference.

† $p < 0.10$;

* $p < 0.05$;

** $p < 0.01$;

*** $p < 0.001$ (two-tailed)

Table B3

Testing Stereotypes as a Mediator of the Impact of Causal Frames and Photos on Preferences for Spending on Diabetes Research (Full Models)

	Full Sample (*N* = 2,182)	Whites (*N* = 1,300)	Blacks (*N* = 495)
Experimental treatments			
Genetic frame (ref = control)	0.09* (0.04)	0.12* (0.06)	0.13† (0.08)
Behavioral frame (ref = control)	0.07 (0.04)	0.12* (0.06)	−0.00 (0.08)
Social determinants (ref = control)	0.10* (0.04)	0.14* (0.06)	0.15† (0.08)
Photo: Black woman (ref = white woman)	0.04 (0.04)	−0.01 (0.05)	0.11 (0.07)
Photo: Glucometer (ref = white woman)	0.02 (0.04)	−0.01 (0.05)	0.13† (0.06)
Mediator			
Negative stereotypes	−1.12*** (0.08)	−1.21*** (0.12)	−0.78*** (0.14)
Control variables			
Party identification	−0.24*** (0.06)	−0.23** (0.08)	−0.00 (0.12)
Political ideology	−0.37*** (0.08)	−0.40*** (0.11)	−0.37** (0.13)
Diabetes status	0.28*** (0.04)	0.37*** (0.06)	0.12† (0.07)
Family/friends have diabetes	0.12*** (0.03)	0.12** (0.04)	0.17** (0.06)
Black race (ref = white)	0.17*** (0.04)		
Other race (ref = white)	0.04 (0.04)		
Income	−0.13** (0.05)	−0.12† (0.06)	−0.03 (0.09)
Photo set 1 (versus set 2)	−0.01 (0.03)	−0.04 (0.04)	0.15** (0.05)
Constant	4.45*** (0.06)	4.48*** (0.08)	4.29*** (0.11)
Adjusted R^2	0.21	0.19	0.13
Statistical tests of mediation			
Sobel statistic for genetic frame	−0.00 (0.01)	−0.00 (0.02)	0.02 (0.02)
Sobel statistic for behavior frame	−0.03* (0.01)	−0.03† (0.02)	−0.00 (0.02)
Sobel statistic for social determinants frame	−0.01 (0.01)	−0.02 (0.02)	0.05* (0.02)

Notes: Table entries are OLS coefficients with standard errors in parentheses. The dependent variable runs from 1 to 5, with higher values indicating belief that the federal government should spend more on diabetes research. All control variables (and the mediator) are coded to run from 0 to 1. Political party identification is coded to run from strong Democrat to strong Republican; political ideology is coded from very liberal to very conservative; ref = reference.

$^{\dagger}p < 0.10$;
$^{*}p < 0.05$;
$^{**}p < 0.01$;
$^{***}p < 0.001$ (two-tailed)

Table B4

Test of Race-of-Respondent Differences in Frame and Image Effects (Sample of Only Blacks and Whites, Fully Interacted by Race of Respondent)

	Research Spending Preferences (N = 1,806)	Stereotypes (N = 1,797)
Experimental treatments		
Genetic frame (ref = control)	0.11* (0.06)	0.03 (0.09)
Behavioral frame (ref = control)	0.09 (0.06)	0.18† (0.09)
Social determinants (ref = control)	0.11* (0.06)	0.12 (0.06)
Photo: Black woman (ref = white woman)	0.03 (0.05)	−0.17* (0.08)
Photo: Glucometer (ref = white woman)	0.04 (0.05)	−0.23** (0.08)
Interactions between treatments and respondent race		
Genetic × black respondent	0.04 (0.11)	−0.17 (0.17)
Behavior × black respondent	−0.10 (0.11)	−0.18 (0.18)
Social determinants × black respondent	0.07 (0.11)	−0.50** (0.17)
Black woman × black respondent	0.08 (0.09)	0.15 (0.15)
Glucometer × black respondent	0.10 (0.09)	0.03 (0.15)
Control variables and interactions		
Black respondent	−0.10 (0.15)	0.19 (0.23)
Party identification	−0.30*** (0.08)	0.36** (0.13)
Political ideology	−0.37** (0.11)	−0.11 (0.17)
Diabetes status	0.45*** (0.06)	−0.39*** (0.10)
Family/friends have diabetes	0.18*** (0.04)	−0.31*** (0.06)
Income	−0.22*** (0.06)	0.50*** (0.10)
Photo set 1 (versus set 2)	−0.08* (0.04)	0.18** (0.06)
Party identification × black respondent	0.19 (0.17)	0.33 (0.26)
Political ideology × black respondent	0.02 (0.19)	0.03 (0.31)
Diabetes × black respondent	−0.29** (0.11)	0.05 (0.17)
Family/friends diabetes × black respondent	0.02 (0.19)	0.08 (0.13)
Income × black respondent	0.23† (0.12)	−0.72*** (0.19)
Photo set × black respondent	0.24* (0.07)	−0.21† (0.11)
Constant	4.16*** (0.08)	2.63*** (0.13)
F-test of joint significance of experimental treatments × race of respondent interactions	$F_{5, 1782} = 0.84$ p = 0.52	$F_{5, 1773} = 2.11$ p = 0.06
F-test of joint significance of all race of respondent interactions (including controls)	$F_{11, 1782} = 2.58$ p < 0.01	$F_{11, 1773} = 2.87$ p < 0.001

Notes: Table entries are ordinary least squares coefficients with standard errors in parentheses. All control variables are coded to run from 0 to 1. Political party identification is coded to run from strong Democrat to strong Republican; political ideology is coded from very liberal to very conservative; ref = reference.

$^{\dagger}p < 0.10$;
$^{*}p < 0.05$;

** $p < 0.01$;

*** $p < 0.001$ (two-tailed)

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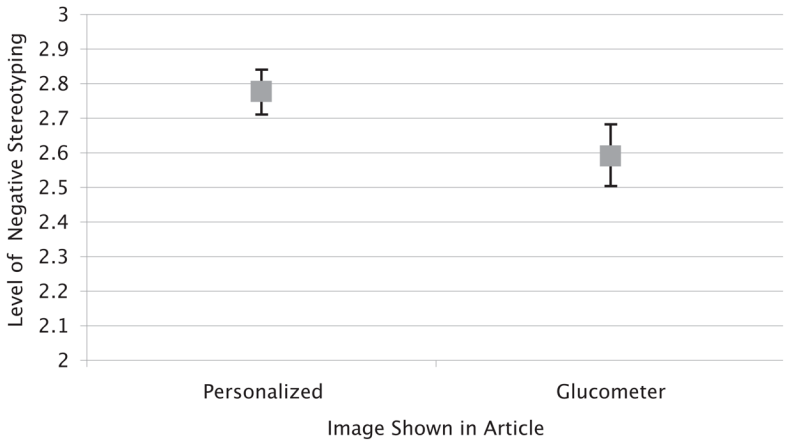

Figure 1.

Personalized Depictions of Diabetes, Regardless of Race of Person Pictured, Lead to More Endorsement of Negative Stereotypes Than Does an Image of a Glucometer

Note: Plot shows predicted mean levels of stereotyping and 95 percent confidence intervals estimated from a model of negative stereotypes (comparing the effect of the glucometer with either personalized image as the reference group) for the full sample, and adjusting for the same covariates in table 4.

Table 1

Descriptive Characteristics of Full Sample (N = 2,409), Compared with the National U.S. Population

	SSI Sample	National U.S. Population
Age		
18–34 years	27.2	27.9
35–54 years	35.2	39.8
55–74 years	35.5	23.9
75 or older	2.0	8.1
Female	50.9	51.4
Race/ethnicity		
White (non-Hispanic)	58.6	76.2
Black (non-Hispanic)	22.9	13.1
Other race/ethnicity	18.5	10.7
Highest level of education completed		
Some high school	2.3	15.5
High school	16.9	29.6
Some college	37.1	27.5
College	21.8	17.3
More than college	11.7	10.1
Annual household income[a]		
Less than $30,000/(Less than $25,000)	25.9	23.3
$30,000–49,999/($25,000–49,999)	26.9	24.9
$50,000–69,999/($50,000–74,999)	18.0	18.8
$70,000–89,999/($75,000–99,999)	11.6	12.5
$90,000+/($100,000+)	17.6	20.7
Political party identification		
Democrat (strong or moderate)	30.9	32.0
Independent (includes “leaning” toward party)	36.7	38.8
Republican (strong or moderate)	20.6	28.9
Other or don’t know	11.8	0.3
Ideological identification		
Liberal	26.5	22.0
Moderate	26.4	25.7
Conservative	18.9	31.8
Don’t know	16.5	20.2
Participants have diabetes	14.1	7.8
Family or friends have diabetes	64.4	—
Body mass index (BMI)		
Obese (30+)	35.7	32.1
Overweight (25.0–25.9)	33.1	33.9
Normal (18.5–24.9)	29.3	32.2
Underweight (< 18.5)	1.9	1.8

Sources: Nationally representative data came from the 2006–2008 American Community Survey estimates (for education attained after age 25, household income, race/ethnicity, and age) (ACS 2008); the 2004 American National Election Studies (for partisanship and ideology) (ANES 2004); the Centers for Disease Control and Prevention National Diabetes Fact Sheet (CDC 2008); and the National Center for Health Statistics (overweight and obesity rates) (NCHS 2007).

Note: SSI = Survey Sampling International

[a]The household income categories were slightly different for the SSI survey and the American Community Survey; categories on the left are those used in SSI, while those on the right are from the ACS.

Table 2

Distribution of Spending Preferences on Diabetes Research

Please indicate whether the government should spend more or less on . . . (responses by %)	Research about new treatments for diabetes	Research about new ways to prevent diabetes
Spend much less	1.6	1.5
Spend less	2.4	2.1
Spend about the same	20.3	16.8
Spend more	48.3	47.0
Spend much more	27.4	32.6
Mean on 5-point scale (95% CI)	3.98 (3.94–4.01)	4.07 (4.04–4.10)

Note: CI = confidence interval

Table 3

Effect of Causal Frames and Photos on Preferences for Spending on Diabetes Research

	Full Sample (*N* = 2,197)		Whites (*N* = 1,306)		Blacks (*N* = 500)	
	(1)	(2)	(3)	(4)	(5)	(6)
Genetic frame (ref = control)	0.09* (0.04)	0.04 (0.08)	0.11† (0.06)	0.00 (0.10)	0.15† (0.08)	0.31* (0.16)
Behavioral frame (ref = control)	0.03 (0.04)	−0.03 (0.08)	0.09 (0.06)	−0.01 (0.10)	−0.01 (0.08)	0.11 (0.14)
Social determinants (ref = control)	0.09* (0.04)	0.09 (0.07)	0.11* (0.06)	0.07 (0.10)	0.19* (0.08)	0.23† (0.14)
Photo: Black woman (ref = white woman)	0.07† (0.04)	0.04 (0.08)	0.03 (0.05)	−0.04 (0.10)	0.11 (0.07)	0.19 (0.14)
Photo: Glucometer (ref = white woman)	0.06 (0.04)	0.01 (0.08)	0.04 (0.05)	−0.08 (0.11)	0.15* (0.07)	0.28* (0.14)
Genetic × black woman photo		0.09 (0.11)		0.17 (0.15)		−0.21 (0.20)
Behavior × black woman photo		0.06 (0.11)		0.11 (0.14)		−0.21 (0.20)
Social × black woman photo		−0.03 (0.10)		0.01 (0.14)		0.04 (0.19)

Notes: Table entries are OLS coefficients with standard errors in parentheses. The dependent variable runs from 1 to 5, with higher values indicating belief that the federal government should spend more on diabetes research. Models control for party identification, ideological identification, diabetes status, family/friends with diabetes, income, photo set, and race (only for the full sample model) and interactions between the causal frames and the glucometer photos (for models 2, 4, and 6). See appendix table B1 for the complete models with all control variables; ref = reference.

† $p < 0.10$;

* $p < 0.05$ (two-tailed)

J Health Polit Policy Law. Author manuscript; available in PMC 2013 December 07.

Table 4

Effect of Causal Frames and Photos on Negative Stereotyping

	Full Sample (*N* = 2,185)		Whites (*N* = 1,302)		Blacks (*N* = 495)	
	(1)	(2)	(3)	(4)	(5)	(6)
Genetic frame (ref = control)	0.01 (0.07)	0.03 (0.13)	0.03 (0.09)	−0.11 (0.16)	−0.15 (0.14)	0.18 (0.27)
Behavioral frame (ref = control)	0.17* (0.07)	0.25* (0.12)	0.18† (0.09)	0.21 (0.16)	0.00 (0.15)	0.19 (0.26)
Social determinants (ref = control)	0.05 (0.07)	0.03 (0.12)	0.12 (0.09)	0.13 (0.15)	−0.38** (0.14)	−0.33 (0.25)
Photo: Black woman (ref = white woman)	−0.11† (0.06)	−0.07 (0.12)	−0.17* (0.08)	−0.21 (0.16)	−0.01 (0.13)	0.23 (0.25)
Photo: Glucometer (ref = white woman)	−0.22*** (0.06)	−0.20 (0.12)	−0.23** (0.08)	−0.26 (0.16)	−0.20 (0.13)	−0.04 (0.25)
Genetic × black woman photo		0.01 (0.18)		0.32 (0.23)		−0.39 (0.37)
Behavior × black woman photo		−0.08 (0.17)		−0.01 (0.22)		−0.15 (0.37)
Social × black woman photo		−0.10 (0.17)		−0.08 (0.21)		−0.45 (0.35)

Notes: Table entries are OLS coefficients with standard errors in parentheses. The dependent variable runs from 1 to 7, with higher values indicating more endorsement of negative stereotypes toward people with diabetes. Models control for party identification, ideological identification, diabetes status, family/friends with diabetes, income, photo set, and race (only for the full sample model) and interactions between the causal frames and the glucometer photos (for models 2, 4, and 6). See appendix table B2 for the complete models with all control variables; ref = reference.

† $p < 0.10$;

* $p < 0.05$;

** $p < 0.01$;

*** $p < 0.001$ (two-tailed)

Table 5

Testing Stereotypes as a Mediator of the Effect of Causal Frames and Photos on Preferences for Spending on Diabetes Research

	Full Sample (*N* = 2,182)	Whites (*N* = 1,300)	Blacks (*N* = 495)
Genetic frame (ref = control)	0.09* (0.04)	0.12* (0.06)	0.13† (0.08)
Behavioral frame (ref = control)	0.07 (0.04)	0.12* (0.06)	−0.00 (0.08)
Social determinants (ref = control)	0.10* (0.04)	0.14* (0.06)	0.15† (0.08)
Photo: Black woman (ref = white woman)	0.04 (0.04)	−0.01 (0.05)	0.11 (0.07)
Photo: Glucometer (ref = white woman)	0.02 (0.04)	−0.01 (0.05)	0.13† (0.06)
Negative stereotypes	−1.12*** (0.08)	−1.21*** (0.12)	−0.78*** (0.14)
Statistical tests of mediation			
Sobel statistic for genetic frame	−0.00 (0.01)	−0.00 (0.02)	0.02 (0.02)
Sobel statistic for behavior frame	−0.03* (0.01)	−0.03† (0.02)	−0.00 (0.02)
Sobel statistic for social determinants frame	−0.01 (0.01)	−0.02 (0.02)	0.05* (0.02)

Notes: Table entries are OLS coefficients with standard errors in parentheses. The dependent variable runs from 1 to 5, with higher values indicating belief that the federal government should spend more on diabetes research. Models control for party identification, ideological identification, diabetes status, family/friends with diabetes, income, photo set, and race (only for the full sample model); ref = reference.

† $p < 0.10$;

* $p < 0.05$;

*** $p < 0.001$ (two-tailed)