

HOW METAPHOR AND POLITICAL IDEOLOGY SHAPE LAY THEORIES OF MENTAL DISORDERS

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Lay theories of mental disorders impact social attitudes, stigma, and treatment seeking. We investigated whether common metaphors in mental health discourse shape lay beliefs about clinical disorders. Participants ($N = 685$) read a paragraph describing drug addiction (Experiment 1) or depression (Experiment 2) as either a *demon* or *brain disease*. They then reported their beliefs about and attitudes toward the condition. Participants exposed to the *brain disease* frame expressed more support for a “medicalized” lay theory associated with a belief in underlying biological causes. We also found that participants with conservative political views held a more “moralized” view of both addiction and depression. This view is associated with a belief in personal causes, support for informal—as opposed to medical or psychological—treatments, and greater attributions of personal responsibility. These findings help illuminate the factors that shape lay theories of mental disorders and have important implications for health communications.

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On February 2, 2014, Oscar award winning actor Philip Seymour Hoffman died of an accidental drug overdose in his Manhattan home. Amid the outpouring of grief, journalists and fans

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did their best to make sense of the unexpected tragedy. In *Time* magazine, David Sheff lamented: “[It] wasn’t Hoffman’s fault that he relapsed. It was the fault of a disease that often includes relapse as a symptom and the fault of the ineffective treatment he received . . . We don’t know what treatments Hoffman received, but it’s unlikely that it was state-of-the-art care rooted in the fact that addiction is a brain disease” (Sheff, 2014). Not everyone described Hoffman’s addiction and death in these terms, however. Writing for FoxNews.com, psychiatrist Keith Ablow argued: “No quirk of neurochemistry can make you rate getting high as more important than getting your kids through life. Only a disorder of character can do that . . . Philip Seymour Hoffman never faced and wrestled to the ground whatever demons had him on the run from his own life story” (Ablow, 2014).

The words used in these statements communicate very different beliefs about the nature of drug addiction. For Sheff, addiction is a “brain disease” that requires better medical treatments. For Ablow, addiction reflects a failure to defeat one’s personal “demons,” or a weakness of will—not a “quirk of neurochemistry.” These conventional metaphors¹—addiction as a *brain disease* vs. *demon*—offer competing answers to questions such as the following: (a) What are the *causes* of the condition (e.g., is it largely biological in origin, or is it a result of poor life choices)? (b) How should it be treated at the individual level (e.g., do addicts require a medical intervention or are they just not trying hard enough)? (c) How should it be treated at the *societal* level (e.g., should the government invest more in healthcare)? (d) How we should *feel* about individuals with addictions (e.g., are they responsible for what happens to them)? How people respond to such questions provides a window into their “lay theory” of addiction (Furnham, 1988; Haslam, 2005; Haslam & Giosan, 2002; see also Knettel, 2016). Research on lay theories sits at the intersection of work on social cognition, decision-making, and communications. Investigating lay theories of mental disorders is important for scholars, clinicians, and policymakers interested

1. Whether you view brain disease as a metaphorical or literal description of addiction depends on your definition of disease and your understanding of addiction. While the brain disease model of addiction is popular, many scholars have pushed back, arguing that it does not accurately capture the nature of the condition (e.g., Levy, 2013; Lewis, 2017). We sidestep this issue in our studies by invoking a particular type of disease that can apply to clinical disorders only in a metaphorical way: an infectious brain disease.

in reducing stigma and promoting effective treatment seeking (Corrigan et al., 2014; Link et al., 1997). It also has implications for individuals with mental disorders, since their behavior and pursuit of treatment may be influenced by the particular “theory” they hold about their condition (Furnham, 2017).

According to Haslam and colleagues’ “Folk Psychiatry Model” (FPM), people conceptualize mental disorders along four dimensions: pathologizing, moralizing, medicalizing, and psychologizing (Haslam, 2005; Haslam et al., 2007). Each dimension is supported by a unique set of social-cognitive mechanisms. The pathologizing dimension reflects the degree to which people consider a pattern of behavior to be disordered in the first place. Judgments along this dimension are driven by basic cognitive processes like the availability heuristic and the tendency to view socially deviant groups as homogeneous entities. When a pattern of behavior is *pathologized*, the remaining three dimensions function as distinct—though not mutually exclusive—explanatory schemas for making sense of the disorder. The moralizing dimension, for example, reflects the degree to which an individual is viewed as morally culpable for their actions. This arises when their behavior is perceived as an intentional violation of social norms or a result of personal weakness. Keith Ablow’s account of Hoffman’s death indicates a fair amount of *moralizing*. The medicalizing dimension, on the other hand, reflects the degree to which the individual’s behavior is believed to be caused by biological factors outside their control. This reflects a more essentialist mode of reasoning associated with a “disease” model of mental disorders (Haslam & Ernst, 2002). David Sheff’s account of Hoffman’s fatal overdose is highly *medicalizing*. Finally, the psychologizing dimension reflects the degree to which psychological factors are to blame for a person’s behavior. These factors may lie outside the individual’s awareness and be driven by unique life experiences, like growing up in a dangerous neighborhood. Ablow’s reference to Hoffman’s “demons” can be understood as *psychologizing* the condition (see Table 1).

A fundamental concern for researchers is to understand the factors that shape lay theories of mental disorders. Widespread socio-cultural attitudes are one such factor. Throughout the 20th century, many Americans viewed homosexuality as a mental illness that resulted from intentional deviancy or “lifestyle choices.” This view was enshrined in the *Diagnostic and Statistical*

TABLE 1. Dimensions of Explanations for Mental Disorders Based on Haslam's (2005) Folk Psychiatry Model (FPM)

Dimension	Moralizing	Medicalizing	Psychologizing
Example	"Every addict has reasons to begin using, reasons to continue, and reasons to quit. To act on a reason is to choose" (Satel, 2013)	"Addiction is defined as a chronic, relapsing brain disease that is characterized by compulsive drug seeking and use, despite harmful consequences." (NIDA, 2016)	"At the bottom of every person's dependency, there is always pain. Discovering the pain and healing it is an essential step in ending dependency." (Prentiss, 2007)
Cause	Personal and controllable	Biological and uncontrollable	Personal or Environmental but uncontrollable
Attitude	Most blameworthy, stigmatized	Least blameworthy, may increase stigma	Less blameworthy, but does not necessarily reduce stigma
Implications for treatment	Individuals should have the willpower to change pathologized behavior	Individuals need medical treatment to change pathologized behavior	Individuals need help—like psychotherapy—to change pathologized behavior

Note. A fourth dimension, *pathologizing*, reflects the extent to which a pattern of behavior is perceived as disordered.

Manual of Mental Disorders (DSM) until 1973 (Drescher, 2015). In other words, same-sex attraction was highly pathologized and moralized. These attitudes have shifted dramatically over the past two decades, so that most people no longer view homosexuality as pathological (Fingerhut, 2016).

Lay theories of mental disorders also vary across cultures (Giosan et al., 2001; Hwang et al., 2008; Knettel, 2016). For example, one study found that Chinese participants were more likely to draw on religious and supernatural explanations for the causes of schizophrenia than British participants. British participants were more likely to rely on biological, psychological, and sociological explanations (Furnham & Wong, 2007). These preferred explanations were in turn associated with support for different treatments (see also Furnham & Chan, 2004).

Media and public health campaigns also shape lay theories of health-related issues. This is often an explicit goal for public health officials. In recent years, for example, there have been efforts to "medicalize" various conditions in the hope this will reduce stigma and encourage effective treatment seeking. One study examined the impact of the American Medical Association's (AMA) move to classify obesity as a "disease." Participants either read a newspaper article that described the AMA's

decision or a control article that provided generic information about managing weight (Hoyt et al., 2014). Reading about how obesity is like a disease led to improvements in body image for overweight participants but reduced their concern for making healthy food choices. Biological explanations for depression and anxiety have a similar impact on lay theories, leading to lower ascriptions of personal responsibility and increased prognostic pessimism (Lebowitz & Ahn, 2014; Lebowitz et al., 2013; 2014; Mehta & Farina, 1997; for review, see Lebowitz & Appelbaum, 2019). Perhaps surprisingly, receiving a biological explanation can also result in reduced empathy for people with the disorder. These findings suggest that “medicalizing” a condition by emphasizing underlying biological causes may reduce blame attributions while increasing stigma, possibly by promoting a more essentialist lay theory (Lebowitz & Appelbaum, 2019; Read, 2007; but see Kvaale et al., 2013).

In this study, we assess the impact of conventional metaphors on lay theories of mental disorders. As the debate over Phillip Seymour Hoffman’s death illustrates, metaphors are often used to express beliefs about mental health issues, promoting more or less medicalized conceptions. This is hardly surprising: metaphors are pervasive in every aspect of public discourse (Lakoff & Johnson, 1980). Metaphors help us communicate and think about complex and abstract subjects, like addiction, by grounding them in more familiar and concrete concepts, like demons and diseases. An extensive literature has shown that metaphors are potent in the context of persuasion and explanation, shaping how people reason about complex social issues like crime, policing, and the environment (Flusberg et al., 2017; Sopory & Dillard, 2002; Thibodeau & Boroditsky, 2011; Thibodeau et al., 2019). For example, describing police officers as “guardians,” as opposed to “warriors” of a community leads people to hold more positive attitudes toward law enforcement (Thibodeau et al., 2017). Subtle metaphoric framing of this kind has not been extensively studied in the context of clinical disorders, despite the prevalence of metaphors in this discourse (though see Reali et al., 2016; Thibodeau et al., 2015a). Therefore, this study represents a novel contribution with potentially important real-world applications.

To test whether conventional metaphors affect lay theories of mental disorders, participants in Experiment 1 read a brief

paragraph about drug addiction where the condition was described either as a “*demon preying on*” or a “*brain disease infecting*” millions of Americans². They then responded to a series of questions about the causes and treatment of the condition. We hypothesized that exposure to the infectious brain disease metaphor would activate a biomedical schema for thinking about addiction. This would result in a more medicalized lay theory, which would be reflected in judgments of the causes and treatments for the condition.

We chose to investigate lay theories of addiction for several reasons. First, drug addiction has received a great deal of attention in the media in recent years, driven in part by a series of high-profile celebrity deaths (e.g., Phillip Seymour Hoffman, Michael Jackson, Prince), which itself is symptomatic of the alarming increase in drug overdose deaths in the past two decades (Overdose Death Rates, 2022). Second, though research on lay theories of mental illness has advanced considerably in recent years, almost none of this work has examined the folk psychiatry of addiction (but see Furnham & Thomson, 1996). Therefore, this study represents an important opportunity to situate lay theories of addiction within the larger framework of research on folk psychiatric reasoning. Third, though the scientific community has made extensive efforts to medicalize the public’s understanding of substance abuse (Pescosolido et al., 2010), it is still a highly moralized condition (Haslam, 2005). Therefore, addiction represents a conservative test case for investigating whether biological metaphors foster medicalizing beliefs, since people tend *not* to view the condition in this way.

As a secondary research question, we were also interested in exploring whether there are any stable individual differences that reliably predict the structure of people’s lay theories of mental disorders. Specifically, we hypothesized that people with conservative views—which are characterized by an emphasis on personal responsibility and associated with less tolerance for behaviors, individuals, and groups that are perceived as violating

2. In many parts of the world, demonic possession has been invoked as an explanation for aberrant behavior (Forcén & Forcén, 2014; Knettel, 2016). In recent decades, however, it has become a conventional, metaphoric way to describe psychological distress in the United States. While many people view mental illnesses as literal diseases, they are not conceived of as infectious diseases. The use of this language in our stimuli is therefore metaphorical.

social norms (Jost et al., 2008; Skitka et al., 2002)—would express a greater degree of moralizing in thinking about mental disorders. Studies show, for instance, that individuals who identify as politically conservative are reluctant to support explanations for obesity that attribute less blame to overweight individuals, like biological or environmental accounts (Oliver & Lee, 2005; Thibodeau et al., 2015b). There is also some evidence that this pattern may hold for lay thinking about depression (Thibodeau et al., 2015a) and heroin abuse (Furnham & Thomson, 1996). David Sheff and Keith Ablow's comments on Phillip Seymour Hoffman's death provide anecdotal support for this possibility as well: the media outlets they represent are commonly thought to reflect liberal (*Time* magazine) versus conservative (Fox News) perspectives. Thus, we predicted that individuals with more conservative views would hold more moralized conceptions of addiction. This would be reflected in judgments of personal responsibility and endorsement of personal causes and informal treatments for the condition.

To test whether the effects observed in Experiment 1 generalize beyond the domain of drug addiction, we replicated the basic study design in Experiment 2 using a different mental disorder: depression. Depression is a useful point of comparison because conceptions of addiction and depression are quite different, even though the two disorders are often associated with one another. According to the FPM, depression is a more paradigmatically psychologized condition, making it a good test case for examining the effects of biomedical framing (Haslam, 2005). In fact, evidence suggests that recent efforts to reframe depression in biomedical terms has been somewhat successful in shifting lay understanding (Blumner & Marcus, 2009; Pescosolido et al., 2010).

EXPERIMENT 1: ADDICTION

METHODS

Participants. We recruited 700 participants via Amazon's Mechanical Turk crowdsourcing platform for Experiments 1 and 2, for which the data were collected simultaneously. The MTurk population is more representative than most convenience samples and has been shown to be valid for studies of political

ideology in the US (Berinsky et al., 2012; Buhrmester et al., 2016; Clifford et al., 2015). We restricted our sample to people who were at least 18 years old, living in the US, and who had a good performance record on previous tasks ($\geq 90\%$ approval). Fifteen participants did not complete the study, leaving data from 685 for analysis. Table 2 shows demographic information for participants in both experiments. This study was reviewed and approved by the SUNY Purchase College Institutional Review Board, and the procedures followed were in accordance with the Helsinki Declaration as revised in 2013. Participants provided their informed consent to participate in this study by checking a box at beginning of the experiment after reading the informed consent form.

Materials and Procedure. In Experiment 1, participants first read a brief media report about drug addiction. The first sentence framed the issue either as a metaphorical *disease* (“Drug addiction is a brain disease infecting millions of Americans”) or *demon* (“Drug addiction is a demon preying on millions of Americans”). We contrasted these two specific labels because (a) they both appear in popular media discourse about addiction and other mental health issues; (b) they align with different dimensions of folk psychiatric reasoning (brain disease = medicalized; demon = psychologized and moralized); and (c) they are relatively matched in other linguistic properties, such as affective valence.³ The remainder of the paragraph read:

Using drugs often causes a decline in work performance as well as a reduction in health and quality of relationships. Sometimes, drug use can mask symptoms of other issues or even cause other problems. Socially unacceptable actions are common among drug addicts. These include lying to friends and family and voluntary isolation, which may help keep loved ones in the dark about the addiction. About 8% of Americans aged 12 or older need help for substance dependence, but only about 11% of those needing help for the condition actually receive it. Unfortunately, more people are experiencing drug addiction now than at any time in the past 50 years

3. Using a putatively “neutral” baseline control condition with no metaphor or a “neutral” label like “problem” would introduce a confound. Specifically, the “neutral” condition would differ from the disease and demon conditions on a variety of linguistic dimensions. See Thibodeau & Boroditsky (2015) and Thibodeau & Flusberg (2017) for thorough discussion and analysis of this issue.

TABLE 2. Demographic Information for Participants in Experiment 1, about Addiction, and Experiment 2, about Depression

Variable	Exp 1: Addiction	Exp 2: Depression
	(<i>n</i> = 331)	(<i>n</i> = 354)
Gender: Male	57%	56%
Age	<i>M</i> = 35 (<i>SD</i> = 11)	<i>M</i> = 35 (<i>SD</i> = 12)
Political affiliation: Democrat, Republican	48%, 18%	45%, 21%
Political ideology	<i>M</i> = 38 (<i>SD</i> = 28)	<i>M</i> = 39 (<i>SD</i> = 29)
Education: At least some college	88%	92%
Experience with addiction or depression	47%	50%
Ethnicity: White	77%	82%

The symptoms and statistics cited in the paragraph were inspired by real-world data on the incidence and nature of substance abuse in the United States, taken from the Centers for Disease Control website (www.cdc.gov). However, we shifted the numbers slightly to better approximate rates of depression so that the stimuli could be reused with minimal changes in Experiment 2. Though this resulted in a minor loss in accuracy in the presented statistics and symptomology of addiction, it enabled us to better control the information participants were exposed to about each condition. This allowed us to better assess the effects of the framing manipulation and compare results across experiments more reliably.

Participants were then asked: (a) why they think people become addicted to drugs; (b) how an individual should deal with drug addiction; and (c) what we, as a society, should do about drug addiction. The questions were presented one at a time on the screen and each one included three response factors. Participants made their response using slider bars that ranged from 0 to 100. We allowed participants to rate each factor independently instead of forcing them to pick just one. This is consistent with the view that the dimensions of folk psychiatry are orthogonal and supported by different social-cognitive processes (Haslam, 2005). We find empirical support for this claim in the current data: the internal consistency of participants' ratings of the three causes (Cronbach's $\alpha = 0.20$) and the three individual treatments ($\alpha = 0.22$) were both low; participant's ratings

of the three societal treatments showed more internal consistency ($\alpha = 0.69$) but were still only moderate. Therefore, this method enabled us to assess a more realistic and nuanced representation of people's lay theories, which can vary on all three key dimensions. See Table 3 for questions, factors, and scales.

The specific factors included for each question were selected based on theoretical considerations of the dimensions underlying folk psychiatric reasoning as well as pilot testing and prior research (Flusberg, et al., 2015; Haslam, 2005; Thibodeau, et al., 2015a). For example, for the question "Why do people become addicted to drugs?" the factors included "biological reasons," "social reasons," and "personal reasons." These categories correspond to the medicalizing, psychologizing, and moralizing dimensions of the FPM, respectively (Haslam, 2005). The individual-level treatments options map onto these dimensions in a parallel fashion. The societal-level treatments were inspired by participant-generated responses during pilot testing, as well as media discussions of these issues (e.g., Sheff, 2014).

As a more explicit measure of moralizing, participants were also asked about the level of personal responsibility that they attribute to people who experience drug addiction ("How responsible for the current state of their lives are those who are experiencing drug addiction?"; 0 = not at all responsible, 100 = fully responsible), and about the level of stigma that they perceive to be associated with drug addiction ("How much of a social stigma do you think is associated with drug addiction?"; 0 = no stigma at all; 100 = extremely high stigma). The question about stigma was presented in the context of several other issues, including depression, cigarette smoking, obesity, anorexia, dropping out of school, and adultery. That is, participants were asked to rate the degree to which they perceived a stigma to be associated with seven social issues, all of which were rated on the same 100-point scale. This allowed us to situate perceptions of addiction-related stigma in a broader context.

In addition to the target questions, one question in the survey was included to ensure that participants had read the paragraph closely: "According to the paragraph you read at the start of this survey, about what percentage of Americans age 12 or over suffer from a substance abuse problem?" (Multiple choice options: 4%, 6%, 8%, 10%, or 12%; the correct answer is 8%). Most of the

TABLE 3. Questions about the Causes of Addiction and Approaches to Treating Addiction at the Individual and Societal Levels

Causes: Why do people become addicted to drugs?

Scale: 0 = this factor does not contribute to addiction/depression at all; 100 = this factor contributes a great deal to addiction

- a) Biological reasons. For example, a chemical imbalance, genetic problems, or a brain abnormality.
- b) Social reasons. For example, bad parenting, living in a bad neighborhood, or social pressure from others.
- c) Personal reasons. For example, self-medication, poor life decisions, lack of self-discipline or willpower.

Individual: How should an individual deal with drug addiction?

Scale: 0 = would not recommend at all; 100 = highest recommendation

- a) Medical treatment. For example, taking medication prescribed by a physician or psychiatrist.
- b) Psychological treatment. For example, receiving therapy or joining a support group.
- c) Informal treatment. For example, spending more time with friends and family, learning self-discipline, seeing a local spiritual figure.

Societal: What should we as a society do to deal with the problem of addiction?

Scale: 0 = would not recommend at all; 100 = highest recommendation

- a) Improve education. For example, teaching young people about the condition, working against stigmas by raising awareness.
- b) Improve healthcare. For example, better health services, more research into genetic testing and medical treatment options.
- c) Improve policies. For example, implement policies to reduce income inequality or legalize drugs.

participants answered this question correctly (77%); participants who responded incorrectly tended to select 10% or 12% (21% of participants)—possibly because the paragraph included a second statistic (that about 11% of people suffering from addiction receive the help they need). As a result, we compared the results of the analyses from the full sample to the results of analyses only on participants who answered this question correctly (i.e., who selected 8%). The patterns were consistent on the two analyses. Therefore, we report findings of analyses conducted with the full sample of participants.

Finally, participants were asked their age, ethnicity, political affiliation (Democrat, Independent, or Republican), political ideology (from 0 = very liberal, to 100 = very conservative), education, and whether they or someone they know suffers from addiction or depression (see Table 2).

ANALYSIS

Our analysis focused on the research questions outlined in the introduction: (a) Does the metaphor framing manipulation affect people's beliefs about the causes and treatment of addiction? (b) What role does self-reported political ideology play in people's beliefs about addiction? We addressed these questions by comparing a series of structural equation models using the *lavaan* package in *R* (Rosseel, 2012). Figure 1 illustrates how the model was initially specified: with the framing manipulation and political ideology as predictors of all four sets of ratings data (i.e., causes, individual-level treatments, societal-level treatments, attitudes); and with ratings of the causes of addiction as predictors of the remaining three sets of ratings data (i.e., individual-level treatments, societal-level treatments, attitudes). Of note, Figure 1 has been simplified for readability; the statistical model tested for relationships between, for example, the framing manipulation and each of the three causes of addiction (biological, social, and personal). A total of 46 regression coefficients were computed in parallel in this multilevel linear regression model.

In addition to the directional relationships specified in Figure 1, the model also computed, and thus controlled for, covariances between rated variables. For example, the model computed the covariance between (a) the extent to which people thought biological causes contributed to addiction, and (b) the extent to which people thought personal causes contributed to addiction. We present the 29 covariances computed by the model in the Supplemental Materials. Finally, the model also computed a variance for each of the 13 variables, which are also included in the Supplemental Materials. Accounting for the variance of each variable and the covariances between variables allows us to more precisely quantify the relationships between target variables shown in Figure 1 (by, e.g., controlling for response biases of individual participants; see Westfall & Yarkoni, 2016).

To conduct the analysis, we first fit the fully specified model ($\chi^2(3) = 20.69, p < 0.001$; RMSEA = 0.13 [0.08, 0.19]; AIC = 36886). Then we identified relationships between variables that were non-significant. Finally, we tested whether removing these non-significant relationships led to a more parsimonious account of the data in both a stepwise and holistic fashion (i.e., testing

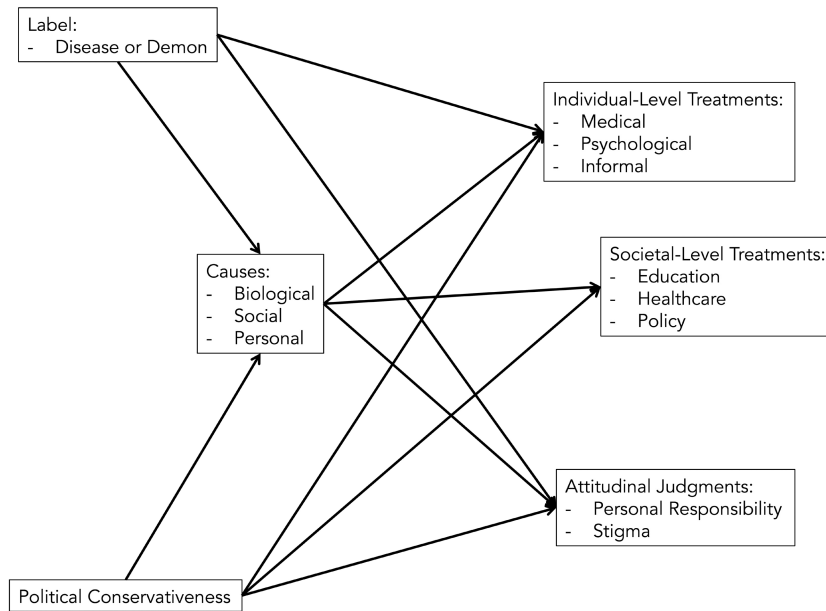


FIGURE 1. Depiction of fully specified structural equation model used to test for (a) an effect of the labeling manipulation and (b) an influence of political ideology on judgments of the causes, individual-level treatments, societal-level treatments, and attitudes toward addiction.

whether removing a causal relationship worsened the fit of the model; see Kline, 2015). Below, we report the results of the best-fitting (most parsimonious) model, which includes 25 regression coefficients ($\chi^2(21) = 35.18$, $p = 0.03$; RMSEA = 0.05, [0.02, 0.07]; AIC = 36864). Removing 18 non-significant regression coefficients from the model did not adversely affect the model's fit, $\chi^2(18) = 14.49$, $p = 0.697$.

We complement our use of structural equation models with confirmatory analyses using more traditional statistical tests. This allowed us to further investigate theoretically motivated predictions where appropriate. We also tested for indirect effects of the framing manipulation on participants' ratings (see Corrigan et al., 2003). Finally, we conducted a series of analyses to compare how people think about addiction and depression (i.e., combining data from Experiments 1 and 2), which we have included in the Supplemental Materials.

RESULTS

The regression coefficients for the best-fitting structural equation model are shown in Table 4. With respect to the framing manipulation, the table shows that describing addiction as a “brain disease” made people more likely to think the condition was rooted in biological causes and to think that a policy approach to addressing the issue at the societal level would be less effective. The effect of the framing manipulation on ratings of the role of biology in causing addiction was confirmed by an independent samples *t*-test, $t(335) = 2.70$, $p = 0.007$; the effect of the labeling manipulation on support for a policy-based approach to treatment, however, was not, $t(334) = 0.87$, $p = 0.383$. This suggests it may be important to control for the interrelationships between the ratings data to detect this effect. The framing manipulation did not affect ratings of the other causes of addiction or societal-level treatments for addiction; nor did the labeling manipulation affect ratings of the individual-level treatments or attitudinal judgments.

With respect to political ideology, Table 4 shows that, in line with our hypothesis, people with conservative views were more likely to think of depression as being caused by individual factors (i.e., higher moralizing), though they were no more or less likely to think that the condition was caused by biological or social factors. These individuals tended to oppose medical and psychological treatments for individuals suffering from addiction (but not informal treatments), as well as all the societal-level treatments for addiction—especially a health or policy-based approach. Finally, people with conservative views were more likely to attribute individual responsibility for addiction, and they were less likely to recognize a stigma associated with addiction. Each of these effects was confirmed by the results of a simple linear regression model. There was no interaction between the framing manipulation and political ideology on perceived causes of addiction, $\chi^2(3) = 6.21$, $p = .102$ (or any of the other dependent variables).

Table 4 also reveals several predictable relationships between thinking about the underlying causes of and treatments for addiction that provide general support for the structure of the FPM (Haslam, 2005). For instance, people with a more medicalized

TABLE 4. Standardized Regression Coefficients from Best-Fitting Structural Equation Model for Experiment 1 (Addiction)

Dependent variables	Predictor variable				
	Label: Disease	Political conservativeness	Biological cause	Personal cause	Social cause
Causes					
Biological	.15**		NA	NA	NA
Personal		.13*	NA	NA	NA
Social			NA	NA	NA
Individual-level treatment					
Medical		−0.11*	.33***		.22***
Psych		−.21***	.18***	.13*	.32***
Informal				.18***	.23***
Societal-level treatment					
Education		−.13*	.19***		.31***
Healthcare		−.31***	.31***		.23***
Policy	−.10*	−.34***	.23***		.15**
Attitudes					
Responsibility		.15**	−.15**	.37***	
Stigma		−.21***		.17**	

Note. NAs indicate no relationship was tested between the given pair of variables; empty spaces indicate that the relationship was not significant and, thus, removed for parsimony. Asterisks indicate statistical significance at the * $p < .05$, ** $p < .01$, and *** $p < .001$ levels.

understanding of addiction (i.e., those who gave higher ratings to biological causes) tended to support a medical approach to treatment at the individual level and a healthcare-based approach to treatment at the societal level. These participants were also less inclined to attribute individual responsibility for addiction. On the other hand, people who viewed addiction as more highly moralized (i.e., gave higher ratings to personal causes) tended to show the most support for informal treatment approaches. These participants also attributed more personal responsibility for addiction.

Finally, structural equation modeling also allowed us to quantify the indirect effect of the labeling manipulation on ratings of the treatments for and attitudes toward people with an addiction (i.e., to test for moderated mediation through ratings of biology as a cause of addiction). In other words, Figure 2 shows

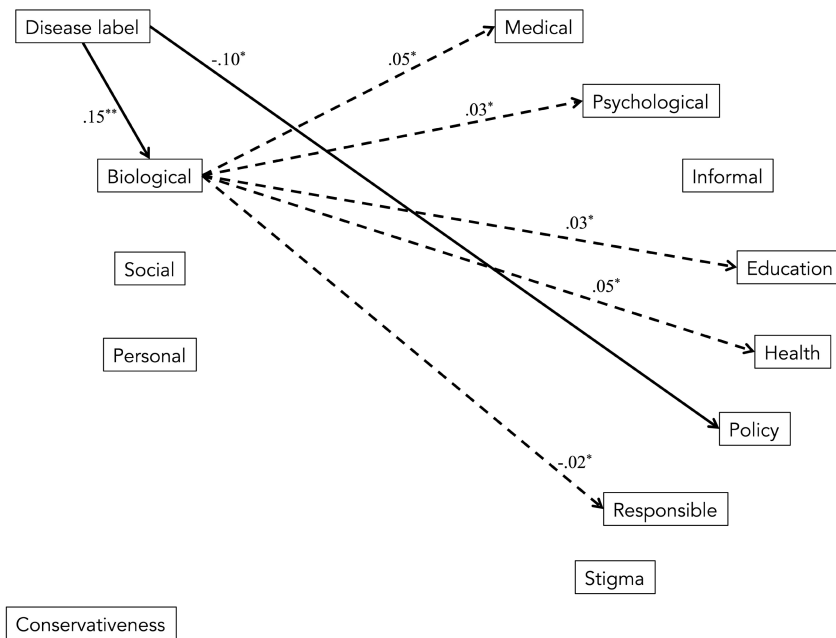


FIGURE 2. Direct (solid lines) and indirect (dashed lines) effects of labeling addiction a “disease.” Asterisks indicate statistical significance at the $*p < .05$ and $**p < .01$ levels.

whether and how much the labeling manipulation affected the ratings data. The solid lines indicate direct effects: the brain disease metaphor increased ratings of the role of biology as a cause of addiction and decreased support for a policy-based treatment approach at the societal level. The dashed lines indicate indirect effects: the labeling manipulation increased ratings of the role of biology as a cause of addiction, which, in turn, affected certain ratings of individual-level treatments, societal-level treatments, and attitudinal judgments. Specifically, the labeling manipulation indirectly increased support for medical and psychological treatment at the individual level; it increased support for education-based and health-based approaches at the societal level; and it decreased attributions of personal responsibility for addiction.

DISCUSSION

This study offers two novel contributions. First, describing addiction as a “brain disease,” as compared to a “demon,” leads people to think biological factors play more of a role in addiction and to think a policy-based approach to the issue at a societal level will be less effective. That is, one consequence of using a subtle disease metaphor for addiction is to highlight the role of biological factors as a cause of addiction, leading to a more medicalized conception of the condition. Interestingly, describing addiction as a disease did not lead people to think that personal and social factors played less of a role in addiction. This supports the claim that the dimensions underlying people’s lay theories of mental disorders are distinct and supported by different social-cognitive processes (Haslam, 2005).

The second novel contribution of the study is to highlight the role of political ideology in people’s thinking about addiction. Participants who identified more strongly with conservative political ideology held more moralized views of addiction: they attributed more responsibility to the individual and preferred causal explanations that emphasized personal factors, like bad decision-making or weakness of will. This, in turn, was associated with less support for a medical or psychological approach to individual treatment and all three approaches to addressing the issue at a societal level. People with conservative views also tended to think there was less of a stigma associated with addiction than those with liberal views, even though moralizing a condition is typically thought to increase stigma. One possibility is that the way we asked about stigma affected responses to this question in unexpected ways. Because participants were instructed to indicate how much social stigma they thought was associated with the condition, they may have made this judgment based on what they perceived *other people*, rather than they, felt about the condition. By the same token, since we included other conditions and behaviors in this question, the relative degree of stigma people associated with addiction may have been thrown off by the amount of stigma they associated with these other issues. On the other hand, it may also be that, in some cases at least, moralizing a condition can humanize the afflicted, which could paradoxically reduce perceptions of stigma. See the

Supplemental Materials for additional analyses of the stigma data.

Experiment 1 also confirmed that the way people think about the causes of addiction is a reliable predictor for how they think about treating the condition, as well as their attitudes toward those suffering from an addiction. We return to these results in the General Discussion. In Experiment 2, we tested the generalizability of the overall pattern of findings by examining how people think about depression using nearly identical methods.

EXPERIMENT 2: DEPRESSION

METHODS

Experiment 2 was identical to Experiment 1, with the exception that references to addiction in the brief paragraph and target questions were replaced by references to depression (see Supplemental Materials for full text of the paragraph). See Table 2 for demographic information about the sample.

ANALYSIS

Data from Experiment 2, like those of Experiment 1, were analyzed with structural equation models. An initial structural equation model was fit to the data ($\chi^2(3) = 97.27, p < 0.001$; RMSEA = 0.30 [0.25, 0.35]; AIC = 39378). Then we removed non-significant regression coefficients to find a more parsimonious account of the data ($\chi^2(23) = 113.53, p < 0.001$; RMSEA = 0.10 [0.08, 0.12]; AIC = 39355). In this case, removing 20 parameters did not worsen the fit of the model, $\chi^2(20) = 16.26, p = 0.700$.

RESULTS

The regression coefficients for the best-fitting structural equation model are shown in Table 5. Replicating our findings from Experiment 1, with respect to the framing manipulation, the table shows that describing depression as a “brain disease” made people more likely to think the condition was rooted in biological

TABLE 5. Standardized Regression Coefficients from Best-Fitting Structural Equation Model for Experiment 2 (Depression)

Dependent variables	Predictor variable				
	Label: Disease	Political conservativeness	Biological cause	Personal cause	Social cause
Causes					
Biological	.14**	-.21***	NA	NA	NA
Personal		.14*	NA	NA	NA
Social			NA	NA	NA
Individual-level treatment					
Medical			.59***		
Psych			.33***		.39***
Informal		.12***	-.12**	.34***	.32***
Societal-level treatment					
Education		-.09*	.25***		.22***
Healthcare		-.22***	.32***		.26***
Policy		-.32***			.41**
Attitudes					
Responsibility		.25***	-.10*	.35***	
Stigma		-.10*	.22***		.25***

Note. NAs indicate no relationship was tested between the given pair of variables; empty spaces indicate that the relationship was not significant and, thus, removed for parsimony. Asterisks indicate statistical significance at the * $p < .05$, ** $p < .01$, and *** $p < .001$ levels.

causes and to think that a policy approach to addressing the issue at the societal level would be less effective. The effect of the framing manipulation on ratings of the role of biology in causing addiction were confirmed by an independent samples t-test, $t(353) = 2.23$, $p = 0.027$. The labeling manipulation did not affect ratings of the other causes of addiction, or any of the individual-level or societal-level treatments for addiction; nor did the labeling manipulation directly affect attitudinal judgments.

Again, largely replicating our findings from Experiment 1, Table 5 shows that people with conservative views were more likely to think of depression as being caused by individual factors, though they were also less likely to think of depression as being caused by biological factors. Political conservativeness was also associated with more support for informal treatment approaches at the individual level and opposition toward all

treatment approaches—especially policy-based ones—at the societal-level. Finally, those with conservative views were more likely to attribute personal responsibility for depression, and they were less likely to recognize a stigma associated with the condition. Each of these effects was confirmed by the results of a simple linear regression model. There was no interaction between the labeling manipulation and political ideology on perceived causes of depression, $\chi^2(3) = 6.21, p = .102$ (or any of the other dependent variables). Table 5 shows that the expected relationships between thinking about the underlying causes of and treatment for depression mirrors what we found for addiction.

Figure 3 illustrates the direct and indirect effects of labeling depression a *disease*. It shows that the framing manipulation directly increased ratings of the role of biology as a cause of depression. In turn, the framing manipulation also indirectly increased support for medical and psychological treatments for depression at the individual level (but not informal treatments); it indirectly increased support for education- and health-based approaches at the societal level; and it increased recognition of the stigma posed by depression.

DISCUSSION

The results of Experiment 2 replicated the key findings from Experiment 1. Describing depression as a “brain disease” increased belief in the biomedical underpinnings of the condition. Additionally, participants with conservative views expressed a more moralized view of depression. More conservative participants reported higher ratings for personal causes of the condition, greater attributions of personal responsibility, and increased support for informal treatments at the individual level. This suggests that the effects of biomedical metaphors and political ideology generalize to other mental disorders beyond addiction.

We did observe some differences between Experiments 1 and 2. For example, the “brain disease” frame did not cause any reduction in support for policy treatments at the societal level for depression like it did for addiction. Moreover, conservative

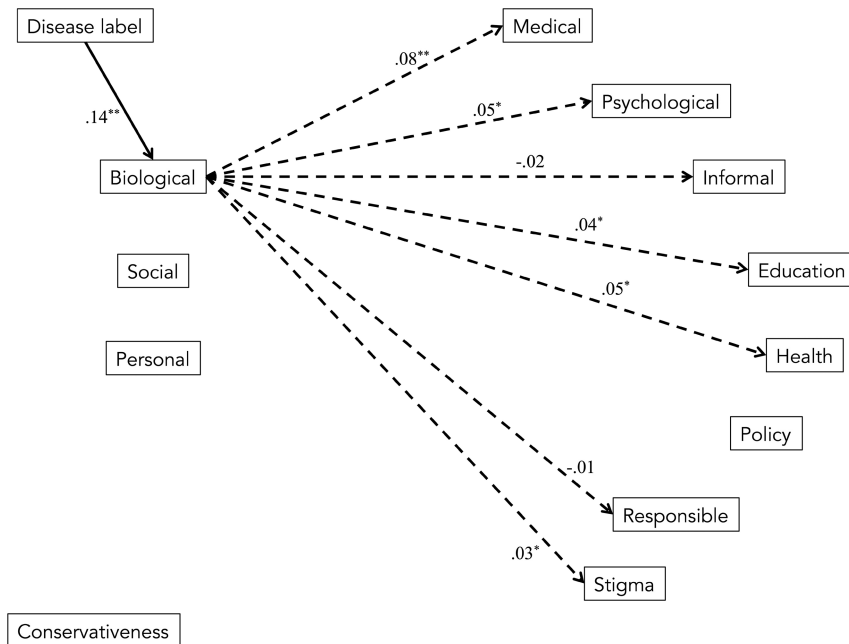


FIGURE 3. Direct (solid lines) and indirect (dashed lines) effects of labeling depression a “disease.” Asterisks indicate statistical significance at the * $p < .05$ and ** $p < .01$ levels.

views were associated with reduced support for biological causes for depression, but not addiction. While people with conservative views thinking about addiction were less likely to endorse medical and psychological treatments at the individual level, for depression they were simply more likely to support informal treatments. Finally, only in the case of depression was a belief in biological causes associated with increased perceptions of stigma for the condition. Taken together, these findings highlight key differences in how people conceptualize addiction and depression (an issue we address in more detail in the Supplemental Material). Despite these differences, with respect to our central hypotheses the overall pattern of responding was similar across the two domains. This provides strong support for our primary conclusions about the role of conventional metaphors and political ideology in lay theories of mental disorders.

GENERAL DISCUSSION

In this article, we investigated whether and how conventional metaphors and political ideology shape lay theories of mental disorders. Participants read a brief paragraph about drug addiction (Experiment 1) or depression (Experiment 2) in which the condition was metaphorically described as a “demon preying on” or a “brain disease infecting” millions of Americans. This was followed by a series of questions probing participants’ beliefs and attitudes about the condition. Consistent with our hypothesis that a biomedical metaphor would lead people to adopt a more medicalized lay theory, we found that participants who read that addiction or depression was a “brain disease” reported thinking that biological factors played a bigger causal role. While the framing manipulation did not have a direct effect on support for various individual and societal-level interventions, structural equation modeling revealed that it did have an *indirect* effect on these outcomes (see also Corrigan et al., 2003). Belief in biological causes was consistently associated with increased support for medical and psychological treatments at the individual level, education and healthcare interventions at the societal level, and reduced attributions of personal responsibility. In the case of depression, belief in biological causes was also associated with increased perceptions of stigma for those suffering from the disorder, in line with prior research (e.g., Read, 2007).

Our second hypothesis was that political conservativeness would be associated with a more moralized view of mental disorders. Political ideology has emerged as an important factor in how people reason about a variety of health issues (e.g., Thibodeau et al., 2015a, 2015b). Consistent with our predictions and with previous work, we found that participants who identified as more conservative expressed more belief in personal causes of addiction and depression and attributed more personal responsibility to those experiencing these mental disorders. People with conservative views also preferred informal treatment options at the individual level, compared to medical or psychological treatments, and were relatively averse to societal-level interventions.

Importantly, the overall pattern of responding across the two experiments helps to validate our methods. The results revealed

principled relationships between beliefs about causes of and treatments for mental disorders, as well as attitudes toward those suffering from these conditions. In particular, the belief in underlying biological causes was associated with increased support for both medical and psychological treatments, as well as opposition to informal treatments (especially for depression). The opposite was the case for belief in underlying personal causes. Belief in biological causes was also predictive of support for health-related interventions at the societal level, and weakly predictive of support for education and policy-based approaches (especially for addiction). Consistent with previous research, belief in biological causes was also associated with lower attributions of personal responsibility for those with addiction and depression (Lebowitz & Ahn, 2014; Lebowitz et al., 2013; 2014), but an increase in feelings of stigma associated with depression (Read, 2007). Together, this reflects a coherent “medicalized” lay theory (Haslam, 2005).

Belief in social causes was associated with increased support for all individual-level treatments, especially in the case of drug addiction, as well as for policy-related interventions at the societal level. Support for social causes did not, however, affect attributions of responsibility, though it did lead to increased recognition of the stigma associated with depression. This seems to reflect a more psychologized lay theory (Haslam, 2005). Belief in personal causes of a disorder, on the other hand, was associated with greater attributions of responsibility in the case of addiction, but also greater perceptions of stigma for those suffering from depression. This reflects a more moralized lay theory (Haslam, 2005). Taken together, these findings reveal coherent schemas underlying people’s folk psychiatric reasoning about addiction and depression, illuminating similarities and differences in how people reason about the two conditions.

Though this study generated a rich dataset about lay theories of addiction and depression, there are several limitations that should be addressed in future research. First, having participants rate three broad factors for each question about causes and treatment is a coarse measure of belief. Scientific theories often distinguish between different types of biological causes (e.g., genetic vs. neurological), and our “informal treatments” lumped together social, personal, and spiritual measures. Additionally, we lumped all policies together as a societal intervention

without asking people about specific policy options. Recent work on lay theories of obesity distinguishes between “protective” versus “punitive” policies to address the issue, revealing important differences in how people respond to each policy type (Thibodeau et al., 2015b). One could imagine analogs for addiction and depression. For instance, a more protective policy for addiction might ask whether people think alcoholism and drug addiction should be protected under the Americans with Disabilities Act. A more punitive policy might allow health insurers to charge higher premiums to people with a history of drug or alcohol abuse. Future work is needed to address these more nuanced distinctions (see Knettel, 2016).

A related issue concerns our reliance on the Folk Psychiatry Model (Haslam, 2005) as a framework for assessing lay theories of mental disorders. While we found support for some aspects of the model in our data, other researchers have developed different ways of conceptualizing and measuring lay theories (Furnham, 2017; Furnham & Telford, 2011). Additionally, the FPM seems to ignore possible relationships between the different dimensions. For instance, attributing a mental illness to the fact that someone grew up poor in a dangerous neighborhood is a *psychologizing* explanation. Research shows, however, that poverty has many negative impacts on brain development, with downstream consequences for physical and mental health (Blair & Raver, 2016; Johnson et al., 2016). This calls into question the neat differentiation between *psychologizing* and *medicalizing* dimensions (though it remains an empirical question whether lay people maintain this distinction).

Another limitation is the fact that the metaphors we used have more complex entailments than we were able to probe in our experiments. For example, infectious diseases are associated with contagion, while hereditary diseases are associated with genetic predispositions. Both types of diseases may activate a general biomedical schema, which was the focus of our study. However, they entail different modes of transmissibility, which we did not assess in our measures. Additionally, the demon metaphor may suggest spiritual or supernatural causal factors, which we did not fully consider (see Knettel, 2016). Future work is needed to assess whether these conventional mental illness metaphors shape reasoning in line with these more specific entailments.

Finally, there are limitations associated with our sampling procedures that should be addressed in future research. The use of Amazon's Mechanical Turk is widespread in the social and behavioral sciences, and many studies conducted in the lab or with representative population samples replicate on the platform (e.g., Berinsky et al., 2012; Buhrmester et al., 2016; Clifford et al., 2015; Mullinix et al., 2015). However, scholars have recently highlighted key issues with MTurk, including poor data quality and the presence of bots (e.g., Webb & Tangney, 2022). While we designed our study to avoid some of these issues—for example, by recruiting only experienced participants with strong performance ratings and by keeping our study brief—future work should aim to replicate these findings with alternative samples. We would also recommend that scholars conduct more comprehensive longitudinal research to examine how the media portrays different mental disorders, and how lay conceptions of the conditions may be changing over time.

In sum, our findings provide valuable insights for clinicians, policy makers, and others who wish to use written or spoken materials to educate the public about addiction and depression. Even subtle linguistic factors—like the conventional metaphors we deploy when talking about mental health—can shape how people conceptualize mental disorders, with downstream consequences for treatment and policy support. To the extent that biological causes have been identified for a given disorder, and biomedical treatments are proven effective, using the brain disease metaphor may be advisable. But communicators also need to think carefully about individual differences such as political ideology to maximize the efficacy of messaging and outreach efforts. There is a political divide in how people conceptualize mental disorders, which has significant implications for policy support at the individual and societal levels. With rising rates of mental illness, researchers should investigate ways to align the lay theories of people across the political spectrum to promote mental wellbeing.

Our findings also have implications for how people think about their own mental health, including those suffering from addiction, depression, and other psychopathologies. While we were unable to make any clinical assessments of our participants, other research suggests that lay theories of mental disorders impact

treatment seeking and other outcomes for individuals with mental health problems (Furnham, 2017). Therefore, it may be that the same metaphorical messages that influenced lay theories of addiction and depression in our studies would have a similar impact on a clinical population. While future research is needed to investigate this hypothesis directly, this raises the possibility that subtle, conventional expressions in language may affect people's mental health outcomes more than we might think.

Supplemental materials. Supplemental materials are available at https://osf.io/js65y/?view_only=d1a5b37ca988490b9aa6116a4a07385a.

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REFERENCES

- Ablow, K. (February 6, 2014). Drug dealers didn't kill Philip Seymour Hoffman – Hoffman did. *FoxNews.com Opinion*. Retrieved from <http://www.foxnews.com/opinion/2014/02/06/drug-dealers-didn't-kill-philip-seymour-hoffman-hoffman-did/>
- Adriaens, P. R., & De Block, A. (2013). Why we essentialize mental disorders. *Journal of Medicine and Philosophy*, 38, 107–127. <https://doi.org/10.1093/jmp/jht008>
- Berinsky, A.J., Huber, G.A., & Lenz, G.S. (2012). Evaluating online labor markets for experimental research: Amazon.com's Mechanical Turk. *Political Analysis*, 20, 351–368. <https://doi.org/10.1093/pan/mpr057>
- Blair, C., & Raver, C. C. (2016). Poverty, stress, and brain development: New directions for prevention and intervention. *Academic pediatrics*, 16(3), S30–S36. <https://doi.org/10.1016/j.acap.2016.01.010>
- Blumner, K. H., and Marcus, S. C. (2009). Changing perceptions of depression: Ten-year trends from the general social survey. *Psychiatric Services*, 60, 306–312. <https://doi.org/10.1176/ps.2009.60.3.306>
- Bransford, J. D., & Johnson, M. K. (1972). Contextual prerequisites for understanding: Some investigations of comprehension and recall. *Journal of*

- verbal learning and verbal behavior*, 11(6), 717–726. [https://doi.org/10.1016/S0022-5371\(72\)80006-9](https://doi.org/10.1016/S0022-5371(72)80006-9)
- Buhrmester, M., Kwang, T., & Gosling, S. D. (2016). "Amazon's Mechanical Turk: A new source of inexpensive, yet high-quality data? In A. E. Kazdin (Ed.), *Methodological issues and strategies in clinical research* (pp. 133–139). American Psychological Association. <https://doi.org/10.1037/14805-009>
- Clifford, S., Jewell, R. M., & Waggoner, P. D. (2015). Are samples drawn from Mechanical Turk valid for research on political ideology? *Research and Politics*, 2(4), 1–9. <https://doi.org/10.1177/2053168015622072>
- Corrigan, P. W., Druss, B. G., & Perlick, D. A. (2014). The impact of mental illness stigma on seeking and participating in mental health care. *Psychological Science in the Public Interest*, 15(2), 37–70. <https://doi.org/10.1177/1529100614531398>
- Corrigan, P., Markowitz, F. E., Watson, A., Rowan, D., & Kubiak, M. A. (2003). An attribution model of public discrimination towards persons with mental illness. *Journal of Health and Social Behavior*, 162–179. <https://doi.org/10.1007/BF01858104>
- Drescher, J. (2015). Out of DSM: Depathologizing homosexuality. *Behavioral Sciences*, 5(4), 565–575. <https://doi.org/10.3390/bs5040565>
- Dunteman, G. H. (1989). *Principal components analysis* (No. 69). Sage.
- Fingerhut, H. (May 12, 2016). Support steady for same-sex marriage and acceptance of homosexuality. *Pew Research Center*. Retrieved from: <http://www.pewresearch.org/fact-tank/2016/05/12/support-steady-for-same-sex-marriage-and-acceptance-of-homosexuality/>
- Flusberg, S. J., DellaValle, M., & Thibodeau, P. H. (2015). Framing effects and the folk psychiatry of addiction. In Noelle, D. C., Dale, R., Warlaumont, A. S., Yoshimi, J., Matlock, T., Jennings, C. D., & Maglio, P. P. (Eds.). *Proceedings of the 37th Annual Meeting of the Cognitive Science Society*. Austin, TX: Cognitive Science Society.
- Flusberg, S. J., Matlock, T., & Thibodeau, P. H. (2017). Metaphors for the war (or race) against climate change. *Environmental Communication*, 11(6), 769–783. <https://doi.org/10.1080/17524032.2017.1289111>
- Forcén, C. E., & Forcén, F. E. (2014). Demonic possessions and mental illness: discussion of selected cases in late medieval hagiographical literature. *Early Science and Medicine*, 19(3), 258–279. <https://doi.org/10.1163/15733823-00193p03>
- Furnham, A. F. (1988). *Lay Theories: Everyday Understanding of Problems in the Social Sciences*. Pergamon Press
- Furnham, A. (2017). How lay theories influence our mental health. In Zedeilius, C. M., Müller, B. C. N., and Schooler, J. W. (eds.) *The science of lay theories: How beliefs shape our cognition, behavior, and health*, 355–374. DOI 10.1007/978-3-319-57306-9
- Furnham, A., & Chan, E. (2004). Lay theories of schizophrenia. *Social psychiatry and psychiatric epidemiology*, 39(7), 543–552. <https://doi.org/10.1007/s00127-004-0787-8>
- Furnham, A., & Telford, K. (2011). Public attitudes, lay theories and mental health literacy: The understanding of mental health. In Labate, L. (ed.), *Mental illnesses: Understanding, prediction and control*, 3–22. <https://doi.org/10.5772/1235>

- Furnham, A., & Thomson, L. (1996). Lay theories of heroin addiction. *Social Science & Medicine*, 43(1), 29–40. [https://doi.org/10.1016/0277-9536\(95\)00330-4](https://doi.org/10.1016/0277-9536(95)00330-4)
- Furnham, A., & Wong, L. (2007). A cross-cultural comparison of British and Chinese beliefs about the causes, behaviour manifestations and treatment of schizophrenia. *Psychiatry research*, 151(1), 123–138. <https://doi.org/10.1016/j.psychres.2006.03.023>
- Giosan, C., Glovsky, V., & Haslam, N. (2001). The lay concept of ‘mental disorder’: a cross-cultural study. *Transcultural Psychiatry*, 38(3), 317–332. <https://doi.org/10.1177/136346150103800303>
- Goodboy, A. K., & Kline, R. B. (2017). Statistical and practical concerns with published communication research featuring structural equation modeling. *Communication Research Reports*, 34, 68–77. <https://doi.org/10.1080/08824096.2016.1214121>
- Haslam, N. (2005). Dimensions of Folk Psychiatry. *Review of General Psychology*, 9(1), 35. <https://doi.org/10.1037/1089-2680.9.1.35>
- Haslam, N., Ban, L., & Kaufmann, L. (2007). Lay conceptions of mental disorder: The folk psychiatry model. *Australian Psychologist*, 42(2), 129–137. <https://doi.org/10.1080/00050060701280615>
- Haslam, N., & Ernst, D. (2002). Essentialist beliefs about mental disorders. *Journal of Social and Clinical Psychology*, 21, 628–644. <https://doi.org/10.1521/jscp.21.6.628.22793>
- Haslam, N., & Giosan, C. (2002). The lay concept of “mental disorder” among American undergraduates. *Journal of Clinical Psychology*, 58, 479–485. <https://doi.org/10.1002/jclp.1158>
- Hoyt, C.L., Burnette, J.L., & Auster-Gussman, L. (2014). “Obesity Is a Disease”: Examining the Self-Regulatory Impact of This Public-Health Message. *Psychological Science*, 25, 997–1002. <https://doi.org/10.1177/0956797613516981>
- Hwang, W.C., Myers, H.F., Abe-Kim, J., & Ting, J.Y. (2008). A conceptual paradigm for understanding culture’s impact on mental health: The cultural influences on mental health (CIMH) model. *Clinical Psychology Review*, 28, 211–227. <https://doi.org/10.1016/j.cpr.2007.05.001>
- Johnson, S. B., Riis, J. L., & Noble, K. G. (2016). State of the art review: poverty and the developing brain. *Pediatrics*, 137(4). <https://doi.org/10.1542/peds.2015-3075>
- Jost, J. T., Nosek, B. A., & Gosling, S. D. (2008). Ideology: Its resurgence in social, personality, and political psychology. *Perspectives on Psychological Science*, 3(2), 126–136. <https://doi.org/10.1111/j.1745-6916.2008.00070.x>
- Kline, R. B. (2015). *Principles and practice of structural equation modeling*. Guilford publications.
- Knettel, B. A. (2016). Exploring diverse mental illness attributions in a multinational sample: A mixed-methods survey of scholars in international psychology. *International Perspectives in Psychology: Research, Practice, Consultation*, 5(2), 128–140. <https://doi.org/10.1037/ipp0000048>
- Kvaale, E. P., Haslam, N., & Gottdiener, W. H. (2013). The ‘side effects’ of medicalization: A meta-analytic review of how biogenetic explanations affect stigma. *Clinical psychology review*, 33(6), 782–794. <https://doi.org/10.1016/j.cpr.2013.06.002>

- Lakoff, G. and Johnson, M. (1980). *Metaphors we live by*. University of Chicago Press.
- Lebowitz, M. S., & Ahn, W. K. (2014). Effects of biological explanations for mental disorders on clinicians' empathy. *Proceedings of the National Academy of Sciences*, 111(50), 17786–17790. <https://doi.org/10.1073/pnas.1414058111>
- Lebowitz, M. S., Ahn, W. K., & Nolen-Hoeksema, S. (2013). Fixable or fate? Perceptions of the biology of depression. *Journal of consulting and clinical psychology*, 81(3), 518. <https://doi.org/10.1037/a0031730>
- Lebowitz, M. S., & Appelbaum, P. S. (2019). Biomedical explanations of psychopathology and their implications for attitudes and beliefs about mental disorders. *Annual Review of Clinical Psychology*, 15, 555–577. <https://doi.org/10.1146/annurev-clinpsy-050718-095416>.
- Lebowitz, M. S., Pyun, J. J., & Ahn, W. K. (2014). Biological explanations of generalized anxiety disorder: Effects on beliefs about prognosis and responsibility. *Psychiatric Services*, 65(4), 498–503. <https://doi.org/10.1176/appi.ps.201300011>
- Levy, N. (2013). Addiction is not a brain disease (and it matters). *Frontiers in psychiatry*, 4, 24. <https://doi.org/10.3389/fpsy.2013.00024>
- Lewis, M. (2017). Addiction and the brain: development, not disease. *Neuroethics*, 10(1), 7–18. <https://doi.org/10.1007/s12152-016-9293-4>
- Link, B. G., Struening, E. L., Rahav, M., Phelan, J. C., & Nuttbrock, L. (1997). On stigma and its consequences: evidence from a longitudinal study of men with dual diagnoses of mental illness and substance abuse. *Journal of Health and Social Behavior*, 177–190. <https://doi.org/10.2307/2955424>
- Malle, B. F. (2011). Attribution theories: How people make sense of behavior. In Chadee, D. (Ed.) *Theories in Social Psychology*, 72–95. Wiley-Blackwell.
- Mehta, S., & Farina, A. (1997). Is being “sick” really better? Effect of the disease view of mental disorder on stigma. *Journal of Social and Clinical psychology*, 16(4), 405–419. <https://doi.org/10.1521/jscp.1997.16.4.405>
- Mullinix, K. J., Leeper, T. J., Druckman, J. N., & Freese, J. (2015). The generalizability of survey experiments. *Journal of Experimental Political Science*, 2(2), 109–138. <https://doi.org/10.1017/XPS.2015.19>
- NIDA. (2016, October 1). Media Guide. Retrieved June 28, 2017: <https://www.drugabuse.gov/publications/media-guide/science-drug-abuse-addiction-basics>
- Oliver, J. E., & Lee, T. (2005). Public opinion and the politics of obesity in America. *Journal of Health Politics, Policy and Law*, 30(5), 923–954. <https://doi.org/10.1215/03616878-30-5-923>
- Overdose Death Rates (2022, January). Retrieved from <https://nida.nih.gov/research-topics/trends-statistics/overdose-death-rates>
- Pescosolido, B. A., Martin, J. K., Long, J. S., Medina, T. R., Phelan, J. C., and Link, B. G. (2010). “A disease like any other”? A decade of change in public reactions to schizophrenia, depression, and alcohol dependence. *American Journal of Psychiatry* 167, 1321–1330. <https://doi.org/10.1176/appi.ajp.2010.09121743>
- Prentiss, C. (2007). *The alcoholism and addiction cure: A holistic approach to total recovery*. BookBaby
- Read, J. (2007). Why promoting biological ideology increases prejudice against people labelled “schizophrenic”. *Australian Psychologist*, 42(2), 118–128. <https://doi.org/10.1080/00050060701280607>

- Reali, F., Soriano, T., & Rodríguez, D. (2016). How we think about depression: The role of linguistic framing. *Revista Latinoamericana de Psicología*, *48*(2), 127–136. <https://doi.org/10.1016/j.rlp.2015.09.004>
- Rosseel, Y. (2012). lavaan: An R package for structural equation modeling. *Journal of Statistical Software*, *48*(2), 1–36. <https://doi.org/10.18637/jss.v048.i02>
- Satel, S. (September 13, 2013). The Science of Choice in Addiction. *The Atlantic*. Retrieved from <https://www.theatlantic.com/health/archive/2013/09/the-science-of-choice-in-addiction/280080/>
- Sheff, D. (February 2, 2014). How Philip Seymour Hoffman Could Have Been Saved. *Time Opinion*. Retrieved from <http://ideas.time.com/2014/02/02/how-philip-seymour-hoffman-could-have-been-saved/>
- Skitka, L. J., Mullen, E., Griffin, T., Hutchinson, S., & Chamberlin, B. (2002). Dispositions, scripts, or motivated correction?: Understanding ideological differences in explanations for social problems. *Journal of personality and social psychology*, *83*(2), 470. <https://doi.org/10.1037/0022-3514.83.2.470>
- Sopory, P., & Dillard, J. P. (2002). The persuasive effects of metaphor: A meta-analysis. *Human communication research*, *28*(3), 382–419. <https://doi.org/10.1111/j.1468-2958.2002.tb00813.x>
- Thibodeau, P. H., & Boroditsky, L. (2011). Metaphors we think with: The role of metaphor in reasoning. *PloS one*, *6*(2), e16782
- Thibodeau, P. H., & Boroditsky, L. (2015). Measuring effects of metaphor in a dynamic opinion landscape. *PloS one*, *10*(7), <https://doi.org/10.1371/journal.pone.0016782>
- Thibodeau, P. H. & Flusberg, S. J. (2017). Metaphors, roles, and controls in framing studies. In G. Gunzelmann, A. Howes, T. Tenbrink, & E. Davelaar (Eds.), *Proceedings of the 39th Annual Conference of the Cognitive Science Society*.
- Thibodeau, P. H., Crow, L., & Flusberg, S. J. (2017). The metaphor police: A case study of the role of metaphor in explanation. *Psychonomic Bulletin & Review*, *24*(5), 1375–1386. <https://doi.org/10.3758/s13423-016-1192-5>
- Thibodeau, P. H., Fein, M. J., Goodbody, E. S., & Flusberg, S. J. (2015a). The depression schema: How labels, features, and causal explanations affect lay conceptions of depression. *Frontiers in Cognitive Science*, *6*:1728, <https://doi.org/10.3389/fpsyg.2015.01728>
- Thibodeau, P. H., Matlock, T., & Flusberg, S. J. (2019). The role of metaphor in communication and thought. *Language and Linguistics Compass*, *13*(5), <https://doi.org/10.1111/lnc3.12327>
- Thibodeau, P. H., Perko, V. L., & Flusberg, S. J. (2015b). The relationship between narrative classification of obesity and support for public policy interventions. *Social Science & Medicine*, *141*, 27–35. <https://doi.org/10.1016/j.socscimed.2015.07.023>
- Venables, W. N. and B. D. Ripley (2002) *Modern Applied Statistics with S*, Springer-Verlag.
- Webb, M. A., & Tangney, J. P. (2022). Too Good to Be True: Bots and Bad Data From Mechanical Turk. *Perspectives on Psychological Science*, <https://doi.org/10.1177/17456916221120027>.
- Westfall, J., & Yarkoni, T. (2016). Statistically controlling for confounding constructs is harder than you think. *PloS One*, *11*(3), <https://doi.org/10.1371/journal.pone.0152719>