

BIOLOGICALLY FRAMED SCHIZOPHRENIA AS A BARRIER TO BELIEF IN
FREE WILL

By

Nicholas L. Ortiz

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Committee Membership

Dr. Christopher Aberson, Committee Chair

Dr. Amber Gaffney, Committee Member

Dr. Kauyumari Sanchez, Committee Member

Dr. Christopher Aberson, Program Graduate Coordinator

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Abstract

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Biologically framing mental illness has certain influences on social-psychological processes related to morality and retribution. The attribution of moral responsibility is thwarted when others believe a transgressor has biologically caused mental illness. Belief in free will works as a function for attributing moral responsibility, which represents an intimate, interdependent connection between both concepts. The current study tested whether or not telling participants a transgressor has biologically caused schizophrenia reduces the belief she is morally responsible, has free will, and reduces general belief in free will. Results found partial evidence to show biologically framing a transgressor's schizophrenia can diminish belief in free will and moral responsibility. Implications of findings, limitations, and directions for future research are discussed.

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Introduction

Accepting biological causes of mental illness continues to grow among the public, especially for schizophrenia (Reavley & Jorm, 2014; Schomerus, Matschinger, & Angermeyer, 2006). Individuals are more likely to consider genetic and neurochemical causes of schizophrenia than they are with other mental illness (Angermeyer & Matschinger, 2003; Scior & Furnham, 2016). Biological framings of mental illness affect how individuals hold the afflicted responsible for their actions, specifically immoral/criminal acts. Individuals hold transgressors less morally responsible for their misdeeds when it is known they have mental illness caused by a genetic factor rather than an environmental factor, such as being abused as a child (Monterosso, Royzman, & Schwartz, 2005). Biologically framing mental illness can also mitigate punishment toward transgressors (Shariff et al., 2014).

Both moral responsibility and punishment are conceptually connected with each other. Both are dependent on belief in free will. Belief in free will promotes personal accountability and prosocial behavior while also deterring antisocial behavior (Baumeister & Brewer, 2012). Belief in free will is a function for holding transgressors morally responsible for their misdeeds, thus belief in free will predicts the attribution of moral responsibility. This, in turn, justifies the use of appropriate punishment (Clark et al., 2014). Higher belief in free will promotes prosocial behavior (MacKenzie, Vohs, & Baumeister, 2014), while weakening belief in free will promotes antisocial behavior, such as aggression or an unwillingness to help others (Baumeister, Masicampo, & DeWall,

2009). A new theoretical model of free will has been introduced by social psychologists, which is connected to the idea free will functions as justification for holding wrongdoers morally responsible (Baumeister, 2008).

This concept, called *choice-capacity*, defines free will as having control over one's conscious ability to think and act without other influence or manipulation (Monroe & Malle, 2010). The term "choice-capacity" indicates having self-control also means someone has alternative choice(s). Belief in free will entails the choice to behave or think in any given way; the choice is one's own. An individual with free will also has the capacity to choose another alternative behavior or thought (Baumeister & Monroe, 2014). A young student may see the opportunity to cheat on a test and get away with it; with no internal/external manipulations influencing her, she is able to use her volition and decide to cheat, or she can also choose the alternative and not cheat. This scenario exemplifies the choice-capacity model of free will.

Free will as choice-capacity reflects the social function it plays in holding others accountable for their thoughts and behavior. Free will as having choice or alternative possibilities works as a straightforward concept people use in their daily lives to understand why others behave or think the ways they do, especially in terms of attributing moral responsibility (Monroe, Dillon, & Malle, 2014). If there is evidence a transgressor consciously made the choice to commit an immoral act (i.e. had free will while committing the immoral act), there is justification for holding the individual morally responsible (Clark et al., 2014). Belief a transgressor has free will is

characterized by the idea she had alternative choices, and the immoral behavior was not an immanent one.

Some factors can be barriers to holding others morally responsible. Biologically framing the causes of schizophrenia mitigates blaming those ailed for having the illness itself (Haslam & Kvaale, 2015; Kvaale, Gottdiener, & Haslam, 2013a). Biologically explaining immoral behavior inhibits the attribution of moral responsibility. Knowing a transgressor has a genetic illness, for example, weakens one's ability to fully hold the transgressor responsible for his behavior (Monterosso et al., 2005). No research, to the best of my knowledge, has specifically focused on how free will and moral responsibility may be affected by biologically framing perceptions of schizophrenia.

If biologically framing bad behavior obstructs both moral responsibility and punishment, it would be rational to suggest free will is affected as well (Meynen, 2010). Belief in free will is a prerequisite for attributing moral responsibility. That is, one must believe a transgressor acted using his own free will in order to hold him morally responsible for his transgression. The obstruction of moral attribution would suggest free will is weakened (Clark et al., 2014).

While the shift in public perception toward those with schizophrenia inhibits blame for being ailed, it also leads to certain negative outcomes, such as fear and avoidance toward those with schizophrenia (Dietrich, Matschinger, & Angermeyer, 2006). People believe having schizophrenia is positively associated with dangerous, unpredictable behavior (van 't Veer, Kraan, Drosseart, & Modde, 2006). These stigmatizing responses are not surprising if the public believes a person with

schizophrenia's free will is suppressed by biological factors. Individuals under the impression a person with schizophrenia lacks volition may believe she is also dangerous and unpredictable, which could likely lead to fear and avoidance.

A biological understanding of schizophrenia will continue to grow, which suggests a dubious future for those ailed. The need to understand how biologically framing mental illness affects people's views toward those with schizophrenia is necessary. The current study tested whether or not biologically framing schizophrenia weakens the belief those ailed, and people in general, have free will.

Literature Review

Growing Familiarity with Biological Causes of Schizophrenia

A biological perspective of mental health continues to grow among the public (Schnittker, 2008). People more often believe genetic/hereditary and neurochemical factors are causes of mental illness than in the 1990s (Reavley & Jorm, 2014). One reason for this trend is the growing influence of neuroscience in social media and the medical field (Haslam, 2011; O'Connor, Rees, & Joffe, 2012). People had commonly believed the causes of mental illness are due to environmental/psychosocial factors (e.g. stress at work), while dismissing the idea mental health is biologically based.

Accepting a biological basis is also illness-specific. People are more likely to attribute the cause of schizophrenia to genetics or a neurochemical imbalance than they do for other mental illness. Individuals, for example, attribute biologically based factors to schizophrenia more so than intellectual disability (Scior & Furnham, 2016) and depression. Individuals tend to believe major depression is caused by psychosocial factors, such as major life events or stress at work (Angermeyer & Matschinger, 2003; Dietrich, Beck, Bujantugs, Kenzine, Matschinger, & Angermeyer, 2004). People are twice as likely to endorse biological causes of schizophrenia than major depression (Angermeyer, Millier, Rémuzat, Refai, & Toumi, 2013).

Contemporary Belief in Free Will and Moral Responsibility

The current study also examines the intimate relationship between moral responsibility and belief in free will. The choice-capacity model defines free will as the capability (i.e. capacity) to make decisions using one's own volition, without any internal or external manipulation (Monroe & Malle, 2010; Nahmias, Shepard, & Reuter, 2014). Individuals associate free will with having choices or alternative possibilities. People are more confident in their actions when they believe they had the choice to act (Feldman, Baumeister, & Wong, 2014). Having alternative possibilities is an essential characteristic of free will, as it shows a person is not constrained or manipulated by other external factors where only one option is possible (Baumeister, 2008; Meynen, 2010).

Self-control is also related to having free will (Monroe et al., 2014) and is another fundamental component to the choice-capacity model (Baumeister, 2008; Lavazza & Inglese, 2015). Research supports this rationale. Reducing belief in free will weakens self-control (Rigoni, Kühn, Gaudino, Sartori, & Brass, 2012) and diminishes self-agency, or the idea one is in control of her thoughts and behavior (Lynn, Muhle-Karbe, Aarts, & Brass, 2014).

Moral responsibility. Moral responsibility is often conceptualized in terms of how it relates to free will. Moral responsibility focuses on holding others accountable for their behavior, as their actions were based on their own conscious choice to engage in the behavior (Kozuch & McKenna, 2015). The concept *responsible autonomy* connects moral responsibility with free will. Responsible autonomy describes free will as a

capability to make conscious decisions while acknowledging such freedom requires the understanding one is self-governing (Baumeister & Monroe, 2014). Free will and moral responsibility work, in part, at a societal level to promote cooperation and prosocial behavior by reminding people of their own accountability (Baumeister, 2008; Clark et al., 2014). Free will reminds individuals their actions have consequences.

Several studies support this concept. Disbelief in free will increases aggressive behavior, reduces helpfulness (Baumeister et al., 2009), and facilitates cheating (Vohs & Schooler, 2008). Increasing belief in free will promotes gratitude (Mackenzie et al., 2014) and reduces prejudiced beliefs toward racial outgroups (Zhao, Liu, Zhang, Shi, & Huang, 2014). These results serve as strong evidence free will promotes prosocial behavior by reminding people of their own responsible autonomy. When people are under the impression they do not have free will, they feel less responsible for their actions, which is related to an increase in bad behavior. Self-accountability is thwarted when the belief in free will is weakened.

Consequences of Biologically Based Public Perceptions of Schizophrenia

One consequence of biologically framing perceptions of mental illness is it mitigates attribution of responsibility for being ailed (Kvaale, Haslam, & Gottdiener 2013b; Rüsç, Todd, Bodenhausen, & Corrigan, 2010). Individuals are less willing to blame others for having schizophrenia when it is introduced as a biological illness, rather than a psychosocial illness (Haslam & Kvaale, 2015; Kvaale et al., 2013a; Lincoln,

Arens, Berger, & Rief, 2008). Framing schizophrenia as a chemical imbalance can even reduce self-blame for being ailed (Deacon & Baird, 2009).

Under most conditions, people are motivated to hold transgressors morally responsible for their behavior, sanctioning punitive measures when necessary to promote social cohesion (Carlsmith, Darley, & Robinson, 2002; Clark et al, 2014; Ditto, Pizarro, & Tannenbaum, 2009). Knowing a transgressor has a biologically caused mental illness, however, is a barrier to holding him morally responsible for his actions, even for unscrupulous acts. Individuals are less likely to hold even a murderer fully culpable when his actions are explained biologically rather than psychosocially (Monroe et al., 2014; Monterosso et al., 2005).

Belief in Free Will and Biological Schizophrenia

Knowing a transgressor has a biologically caused illness limits attribution of moral responsibility. This leads to the question: Is belief in free will also affected when biologically framing schizophrenia? If free will is intimately connected to moral responsibility, and biologically framing mental illness mitigates the attribution of responsibility, is belief in free will weakened?

No research I am aware of focuses on whether or not biologically framing schizophrenia mitigates the belief those with schizophrenia have free will. I believe free will likely plays a role in past findings showing biologically framed mental illness blocks the attribution of moral responsibility. First, there is already research showing biological perceptions of mental illness lead to less attribution of moral responsibility (Monroe et

al., 2014). Free will functions as a prerequisite for the attribution of moral responsibility and the justification of punishment. If there is evidence to show this, it would be logical free will would also be diminished. The inability to hold a transgressor morally responsible would suggest the transgressor was not in control of her behavior. She, in other words, did not have complete free will. This is clear because attributing moral responsibility requires the belief the transgressor has free will (Clark et al., 2014).

The mere consideration of one's own physiological state can be enough to inhibit belief in free will. Feelings of sexual desire, physical fatigue, and the desire to relieve one's bladder can weaken belief in free will. Those with epilepsy and panic disorder, illnesses characterized by a lack of self-control, report less belief in free will than those without such illnesses (Ent & Baumeister, 2014). Similar results have shown focusing on physiological processes (e.g. heart rate) reduces the desire to hold a transgressor morally responsible (Gray, Knobe, Sheskin, & Bloom, 2011). When individuals consider themselves and others as tangible, complex physiological system, their willingness to believe in free will and attribute moral responsibility is diminished. People believe transgressors have less self-control or free will when behavior is explained using neuroscientific evidence (Cheung & Heine, 2015; Schooler, Nadelhoffer, Nahmias, & Vohs, 2014). Behavior from this perspective is based more on biological, automatic behavior than free will.

Describing schizophrenia as a brain or hereditary disease leads to the belief those with schizophrenia lack self-control (Dietrich et al., 2006). Describing mental illness in biological terms, or even the exposure to neuroscientific literature leads to mitigated

punishment toward transgressors with mental illness (Shariff et al., 2014). The justification of punishment for bad behavior is dependent on knowing the accused had free will and is morally responsible for the transgression (Clark et al., 2014). Although individuals are motivated to hold transgressors morally responsible and punish them, biologically framing mental illness mitigates these processes.

While no research has focused on schizophrenia as a possible threat to free will, one study focused on biologically related mental illness as a direct threat to belief in free will. Monroe et al. (2014) found participants attributed lower choice-capacity, self-control, and free will to a transgressor if his behavior was attributed to a brain disease. This work found choice-capacity and acting with intent are positively associated with belief in free will. More importantly, explicitly depicting immoral behavior being caused by a brain disease, not the transgressor himself, can obstruct belief in free will. These findings suggest biologically framing schizophrenia obstructs belief in free will.

The current study used the theoretical relationship between moral responsibility and increased belief in free will to test the potential effect biologically framing schizophrenia has on moral responsibility and two forms of belief in free will. By having individuals consider immoral behavior, they are motivated to hold a transgressor morally responsible, which influences them to believe in free will. People have higher belief in free will when they consider immoral behavior than morally neutral behavior (Clark et al., 2014). I believe telling people a transgressor has biologically caused schizophrenia will be enough for people to believe this transgressor's free will is diminished. This finding would be especially interesting when considering individuals are otherwise

motivated to hold transgressors responsible and believe they have free will. Ultimately, people will hold the illness itself morally responsible rather than the transgressor.

Statement of the Problem

This study asks whether or not knowing a transgressor has schizophrenia largely caused by a neurochemical imbalance weakens belief in free will. This question is important for two reasons. First, it would test for empirical evidence showing biologically framing public perceptions of schizophrenia mitigates belief in free will. Second, diminished belief in free will may explain avoidance, perceived dangerousness, and fear toward those with schizophrenia.

Individuals report anger and uneasiness toward those with schizophrenia more than those with depression. They also believe those with schizophrenia are more aggressive and dangerous than depressed people (Angermeyer & Matschinger, 2003; Schomerus, Matschinger, & Angermeyer, 2014). Having free will is seen as an essential component to being human (Ogletree, Oberle, Harlow, & Bahruth, 2010). The belief a person with schizophrenia lacks self-control may suggest those with schizophrenia are fundamentally different from the rest of the population. These beliefs could induce negative responses toward those with schizophrenia.

Hypotheses

Hypothesis 1. Participants who read descriptions of an immoral act committed by a transgressor with schizophrenia caused by a chemical imbalance will show less belief the transgressor is morally responsible for her behavior than those who evaluate descriptions of a transgressor with schizophrenia caused by childhood abuse, or when no

mental health information is provided. No difference in moral responsibility will be observed between psychosocial causation and no causal information.

Hypothesis 2. Participants who read descriptions of an immoral act committed by a transgressor with schizophrenia caused by a chemical imbalance will show reduced perceptions of the transgressor's free will than those who evaluate descriptions of a transgressor with schizophrenia caused by being abused as a child, or when no mental health information is provided. No difference in specific belief in free will will be observed between psychosocial causation and no causal information.

Hypothesis 3. Participants who read descriptions of an immoral act committed by a transgressor with schizophrenia caused by a chemical imbalance will show reduced general beliefs about free will compared to those who read descriptions with a transgressor with schizophrenia caused by being abused as a child, or when no mental health information is provided. No difference in general belief in free will will be observed between psychosocial causation and no causal information.

Method

Participants were randomly assigned to one of three groups. Participants in each group read identical descriptions of an immoral behavior. An initial group (biological) was informed the transgressor has schizophrenia caused by a chemical imbalance in the brain. A second group (psychosocial) was told the transgressor was abused as a child, which caused her schizophrenia. The third group did not receive mental health information (control). All participants were asked to report their belief the transgressor has free will and was morally responsible for her transgression.

Participants

Two hundred forty-five participants were initially recruited using Amazon's Mechanical Turk (MTurk) and Qualtrics. MTurk is an effective and economic method for collecting data (Buhrmester, Kwang, & Gosling, 2011; Crump, McDonnell, & Gureckis, 2013). Issues regarding spammers (i.e. fake responses) and bots compromising data were approached using attention checks, manipulation checks, and assigned random five-digit identification numbers (Mason & Suri, 2011). Fourteen participants failed attention or manipulation checks and were omitted from the dataset.

A total of 231 participants (111 female), with an average age of 39.6 ($SD = 12.8$, range 21-75), were used for final analyses. Seventy-five percent (75.3 percent, $n = 174$) of participants were White ($n = 174$), 7.8 percent were Asian ($n = 18$), 7.4 percent were African American ($n = 17$), 6.1 percent were Hispanic or Latino ($n = 14$), 2.6 percent

were mixed-race ($n = 6$), and less than 1 percent were Native American ($n = 2$), respectively. Table 1 provides demographic frequency counts and associated percentages.

Table 1

Demographic Frequency Counts and Percentages

	Frequency	Percentage
Education		
High School	27	11.7%
Some College	52	22.5%
Associate Degree	29	12.6%
Bachelor's Degree	99	42.9%
Graduate Degree	24	10.3%
Total	231	100.0%
Political Affiliation		
Democrat	96	41.6%
Independent	71	30.7%
Republican	54	23.4%
None	7	3.0%
Other	3	1.3%
Total	231	100.0%
Group		
Biological	79	34.2%
Control	77	33.3%
Psychosocial	75	32.5%
Total	231	100.0%
Age		
21-35	112	48.5%
36-50	71	30.7%
51-65	37	16.0%
66-75	11	4.8%
Total	231	100.0%

Measures and Manipulation

Participants were randomly assigned to read one of three vignettes describing a character who either has schizophrenia caused by a chemical imbalance in the brain (biological condition), schizophrenia caused by childhood abuse (psychosocial condition), or no mental health problems to mention (control).

Biological condition. Participants in the biological group were asked to read a vignette adapted from Phelan (2005) describing a woman with schizophrenia. The vignette reads:

Imagine Anne. She is a single, 25-year-old. Anne usually gets along well with her family, friends, and coworkers. She enjoys reading and going out with friends. The other day, Anne broke into her neighbor's home and took several items. Anne has schizophrenia. Medical experts believe Anne's schizophrenia is caused by a chemical imbalance in her brain.

Psychosocial condition. Participants in the psychosocial condition read the same vignette used in the biological condition, except the transgressor's schizophrenia is caused by childhood abuse. The vignette reads:

Imagine Anne. She is a single, 25-year-old. Anne usually gets along well with her family, friends, and coworkers. She enjoys reading and going out with friends. The other day, Anne broke into her neighbor's home and took several items. Anne has schizophrenia. Medical experts believe Anne's schizophrenia is caused by her being abused as a child.

Control condition. The control condition had participants read the same vignette used in the previous conditions, however, no mental health information was provided.

The vignette reads:

Imagine Anne. She is a single, 25-year-old. Anne usually gets along well with her family, friends, and coworkers. She enjoys reading and going out with friends.

The other day, Anne broke into her neighbor's home and took several items.

Moral responsibility measure. Participants were asked "how responsible is Anne for breaking into her neighbor's house?" on a seven-point scale ranging from 1 (*not at all responsible*) to 7 (*entirely responsible*).

Belief in free will. Free will was measured in two ways, participants perception of the transgressor's free will capacity and a general measure of belief in free will not specific to any individual (i.e. general belief in free will).

Transgressor's free will. Participants were asked how much they agree or disagree "[the vignette character] has free will" using a seven-point scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*).

General belief in free will. Participants completed the Free Will (FW) subscale of the FAD-Plus (Paulhus & Carey, 2011a, 2011b). The FW subscale is composed of seven items, each rated on a five-point scale (*strongly disagree* to *strongly agree*). An example of scale items is a question asking participants how much they agree or disagree "people have complete free will". The FW subscale showed acceptable internal consistency ($\alpha = .91$) and was used to provide a verified measure of belief in free will. An attention check

item was included at the end of the FW subscale. Participants who failed this attention check were not considered for analyses.

Manipulation checks. Participants were asked two questions to make sure the manipulation phase was successful. First, participants in the biological and psychosocial condition were asked “what caused [the character vignette’s] schizophrenia?” Participants answered using a multiple-choice question (severe childhood abuse, car accident, chemical imbalance in the brain). Second, all participants were asked “what did [the character vignette] do that was immoral?”. Participants answered using a multiple-choice question (beat up a convenience store clerk, broke into and stole from neighbor’s home, took money from her boss). Participants who failed these manipulation checks were omitted from analyses.

Procedure

Manipulation phase. Following consent, participants were randomly assigned to read one of the three vignettes. Each group was informed the vignette character had broken into and stolen from her neighbor’s house.

Measures of responsibility and belief in free will. Participants then completed the moral responsibility measure, followed by both measures of free will (transgressor’s free will then general belief in free will). Once completing these measures, participants answered both manipulation checks followed by a number of demographic questions.

Results

Data were imported into R version 3.5.2. After cleaning data, all hypotheses were tested using robust one-way ANOVA and post hoc tests. All three dependent variables were substantially skewed (see Table 2). Robust one-way ANOVA approaches and post hoc tests were used to test all three hypotheses using protocol from the WRS2 package (Mair & Wilcox, 2017). Models for Hypotheses 2 and 3 used a 20 percent trimmed mean approach. Hypothesis 1 used a 15 percent trimmed mean, as a 20 percent trimmed mean would not allow for the computation of standard error due to a Winsorized variance of zero. Multiple comparison tests used the `lincon` function. Table 3 shows initial untrimmed means and standard deviations between conditions for each dependent measure. Table 4 provides robust omnibus test statistics and associated effect sizes, as well as trimmed means and standard errors between conditions for each dependent measure.

Table 2

Skewness and Associated Standard Errors for Moral Responsibility, Specific and General Belief in Free Will

	<i>M (SD)</i>	<i>n</i>	<i>Skew (SE)</i>
Moral Responsibility	5.45 (1.72)	231	-1.04 (3.26)
Specific Belief in FW	5.64 (1.41)	231	-1.25 (3.93)
General Belief in FW	3.72 (0.83)	231	-0.63 (1.98)

Note. Skews and associated standard errors were obtained using the `stat.desc` function from the `pastecs` package. Standard errors larger than one indicate a problem with skewness. FW = Free Will.

Table 3

Initial Descriptive Statistics of Dependent Measures by Experimental Condition

	Biological ^a <i>M (SD)</i>	Psychosocial ^b <i>M (SD)</i>	Control ^c <i>M (SD)</i>
Moral Responsibility	4.98 (1.43)	4.88 (1.76)	6.49 (1.48)
Specific Belief in FW	5.34 (1.17)	5.12 (1.50)	6.44 (1.17)
General Belief in FW	3.54 (0.83)	3.59 (.78)	4.03 (0.78)

Note. ^a*n* = 79. ^b*n* = 75. ^c*n* = 77. FW = Free Will.

Table 4

Mean Scores of Moral Responsibility, Specific and General Belief in Free Will Between Experimental Conditions

ANOVA Model	Experimental Condition			Robust <i>F</i>	ES
	Biological	Psychosocial	Control		
Moral Responsibility	5.08 _a (0.18)	5.09 _a (0.27)	6.98 _b (0.05)	67.9	0.55
Specific Free Will	5.53 _a (0.09)	5.48 _a (0.16)	6.80 _b (0.08)	58.8	0.60
General Free Will	3.59 _a (0.09)	3.66 _a (0.08)	4.11 _b (0.08)	10.4	0.37

Note. All omnibus statistics significant at $p < .001$. Standard errors appear in parentheses below means. Means with differing subscripts within rows differ significantly at $p < .001$, based on post hoc multiple comparison tests accounting for familywise alpha inflation. ES = Effect Size.

Psi hat ($\hat{\psi}$) statistics and their associated 95 percent confidence intervals are provided for each hypothesis. The psi hat statistic indicates pairwise trimmed mean differences between experimental conditions. Confidence intervals were adjusted for multiple comparisons tests. Probability coverage for each confidence interval is $1 - \alpha$, with a familywise error rate of α . Hypothesis 1 predicted participants in the biological condition would attribute less moral responsibility to the vignette character than participants in both the psychosocial and control conditions. No difference in moral responsibility between the psychosocial and control conditions were expected.

Results showed a significant difference in moral responsibility between experimental conditions. Participants in the biological ($\hat{\psi} = -1.81$, 95% CI [-2.33, -1.29]) and psychosocial conditions ($\hat{\psi} = 1.81$, 95% CI [1.26, 2.39]) believed the vignette character was less responsible for breaking into her neighbor's home than participants in the control condition. No difference in moral responsibility was observed between the biological and psychosocial conditions ($\hat{\psi} = -0.01$, 95% CI [-0.78, 0.75]).

Hypothesis 2 predicted participants in the biological condition would have lower belief in specific free will than participants in either the psychosocial or control conditions. No difference in specific belief in free will was expected between the psychosocial and control conditions. Results showed participants in the biological ($\hat{\psi} = -1.27$, 95% CI [-1.58, -0.97]) and psychosocial conditions ($\hat{\psi} = 1.31$, 95% CI [0.87, 1.76]) had less belief in specific free will than did participants in the control condition.

No difference in specific belief in free will was observed between the biological and psychosocial conditions ($\hat{\psi} = 0.04$, 95% CI [-0.41, 0.49]).

Hypothesis 3 predicted participants in the biological condition would have less belief in general free will than participants in either the psychosocial or control conditions. No difference in general belief in free will was expected between the psychosocial and control conditions. Findings were similar to those from the first two models. Participants in the biological ($\hat{\psi} = -0.51$, 95% CI [-0.81, -0.21]) and psychosocial conditions ($\hat{\psi} = 0.44$, 95% CI [0.15, 0.74]) had less general belief in free will than those in the control condition. There was, however, no difference in general belief in free will between the biological and psychosocial conditions ($\hat{\psi} = -0.06$, 95% CI [-0.37, 0.23]).

Bayes Factor Analysis

Measures of moral responsibility, specific and general belief in free will from participants in the biological and psychosocial conditions were significantly lower than those from control participants. Moreover, no significant difference in all three dependent measures between the biological and psychosocial conditions were observed. These results were surprising and contrary to hypotheses.

Mean differences in moral responsibility, specific and general belief in free will between the biological and psychosocial conditions were examined using Bayes Factor (*BF*) analysis. This was an exploratory method to further test for potential mean

differences in all three dependent measures between the biological and psychosocial conditions. *BF* analysis is used as an alternative to classical null hypothesis testing. This method provides a quantitative likelihood index of one hypothesis occurring over another hypothesis given a certain set of empirical data. For example, a *BF* ratio of 5.0 indicates empirical data are five-times more likely to occur if the alternative hypothesis is true rather than if the null hypothesis is true. Ratios were obtained with *BF* t-tests using the ‘Bayes Factor’ package.

The first model tested how likely data support the alternative hypothesis there would be a significant difference in the attribution of moral responsibility between the biological and psychosocial conditions. Moderate support for the null hypothesis was obtained ($BF = 0.18$), suggesting no meaningful difference in the attribution of moral responsibility between both conditions. The second model tested how well the data support the alternative hypothesis specific belief in free will would differ between the biological and psychosocial conditions. Moderate support for the null hypothesis was found ($BF = 0.28$), indicating no difference in specific belief in free will between conditions.

The final model tested how well the data support the alternative hypothesis general belief in free will would differ between the biological and psychosocial conditions. Moderate support for the null hypothesis was found ($BF = 0.18$), suggesting no difference in general belief in free will between conditions. These *BF* ratios support initial results. There was no evidence to suggest measures of moral responsibility,

specific and general belief in free differed significantly between participants in the biological and psychosocial conditions.

Discussion

The current study tested whether or not knowing a transgressor has biologically caused schizophrenia weakens belief in free will. Specifically, exposure to a transgressor who has schizophrenia caused by a neurochemical imbalance would weaken people's belief in both specific and general belief in free will. Biological causes of schizophrenia may evoke the belief behavior is fundamentally based on biological processes, which diminishes the role of volition or self-control (Nahmias, 2006). It was also predicted knowing a transgressor has biologically caused schizophrenia would mitigate the attribution of moral responsibility. Belief in free will works as a function for the attribution of moral responsibility (Clark et al., 2014). Mitigation of moral responsibility would indirectly indicate a weakening of belief in free will.

Partial support for all three hypotheses was found. Participants assigned to the biological condition had less belief in specific and general free will than those in the control condition. Additionally, participants in the biological condition believed the vignette character was less morally responsible for her transgression than those in the control condition. Two statistical patterns contrary to hypotheses were observed in all three models. First, no significant difference in moral responsibility and both measures of belief in free will was observed between the biological and psychosocial conditions. Second, scores from all three dependent measures were significantly lower in the psychosocial condition than in the control condition.

These results were unexpected and may suggest psychosocially framing mental illness has the same, or similar, weakening effect biologically framing mental illness has on belief in free will. Participants in the psychosocial condition, for example, may have felt compassion for the vignette character for having been abused as a child, which diminished blame and belief in free will. Psychosocial causes of schizophrenia evoke compassion more so than biological causes of schizophrenia (Lebowitz & Ahn, 2014). At the same time, participants in the biological condition may have believed the vignette character's chemical imbalance weakened her self-control. Participants in the biological condition were reminded human consciousness, including free will, is ultimately based on physiologically mechanistic processes (neurochemicals).

One study looked at differences in the attribution of moral responsibility between biological and psychological causes of immoral behavior. Participants were told about an immoral act, which was explicitly said to have been caused by either a biological or psychosocial causal explanation. Participants provided biological explanations of an immoral behavior were no more likely to mitigate the attribution of moral responsibility than participants provided with psychosocial explanations of an immoral behavior. These findings suggest psychological causes of mental illness can undermine belief in free will just as effectively as biological causes of mental illness (De Brigard, Mandelbaum, & Ripley, 2009).

Notwithstanding, work from De Brigard et al. and the current thesis do not support the literature. Individuals are less willing to believe a transgressor is blameworthy and in control of her actions when her bad behavior is attributed to a

biologically caused illness rather than a psychosocial illness. For example, people will hold a murderer less culpable when his behavior was said to have been caused by a biological factor rather than a psychosocial factor (Monterosso et al., 2005).

Similar literature shows biologically framing mental illness reduces blame for being ailed more than psychosocially framing mental illness (Crisafulli, Von Holle, & Bulik, 2008; Lincoln et al., 2008). Individuals hold those with depression less morally responsible for their illness when it is caused solely by a chemical imbalance rather than an interaction between biological and environmental factors (Deacon & Baird, 2009). While there is no consensus, the literature suggests biological causes of bad behavior reduce the desire to blame more so than psychosocial causes.

Limitations

The current research has several methodological limitations. First, this study used a United States-based sample. Current results cannot be generalized to populations from non-western cultures. What is more, the free will subscale is not considered a gold standard for measuring general belief in free will. Though many researchers have used this measure and reported its validity and reliability (Paulhus & Carey, 2011b), some believe it does not fully measure an accurate, generalized concept of free will, but rather a measure of both free will and moral responsibility (Ogletree, 2013). Future researchers should consider using multiple measures of belief in free will. Researchers could also incorporate the choice-capacity model by operationalizing belief in free will using terms such as “having choice” (Monroe et al., 2014).

Additionally, this study used a convenience sample from an online crowdsourcing network. Participants completed surveys using their own devices at their own leisure. Some participants may have been distracted while taking the survey (e.g. they were simultaneously listening to music or watching television while taking the survey). Although attention and manipulation checks were used, other factors could have influenced some responses.

Aside from limitations, current findings provide a call for more investigation on biological causes of schizophrenia as a threat to belief in free will. Literature on biological causes of mental illness and belief in free will is insufficient, leaving researchers little guidance for data interpretation and methodological design. The current findings suggest a focus on three main questions for future work. First, does biologically framing schizophrenia reduce belief in free will? Current results provide only partial support for my hypothesis.

Second, do psychosocial causal explanations of mental illness reduce moral responsibility and belief in free will? The literature suggests biological causes reduce blame more so than psychosocial causes, however, research is limited when considering belief in free will. I am also not aware of any research specifically looking at psychosocial causes of mental illness as possible threats to moral responsibility and belief in free will. Researchers have instead focused on comparing blame/responsibility between causal explanations of mental illness and immoral behavior. Testing for differences in belief in free will between causal factors may require more comprehensive investigation than what the current study provides.

Third, if psychosocial causes of schizophrenia reduce belief in free will as biological causes do, does this mean psychosocial causes of schizophrenia result in a unique effect on belief in free will, or is it both causal explanations share another factor? Do biological causal explanations evoke the idea behavior and volition are essentially mechanistic, automatic processes, while psychosocial causal explanations evoke sympathy or pity? Even if both biological and psychosocial causal explanations of schizophrenia reduce belief in free will, would this be the case when considering other mental illness, such as addiction or dementia, or even other biological and psychosocial causal explanations, such as genetics or life stressors? Future research on biologically framed schizophrenia as a barrier to belief in free will depends on the consideration of these questions.

Conclusion

Biological perspectives of mental illness are unlikely to regress in popularity (Goldstein & Rosselli, 2003). The growing influence of neuroscientific evidence among the public may have effects on how people assess the accountability and free will of others. The belief biological processes co-contribute to human thoughts and behavior may grow among the public as neuroscience expands in conjunction with technology, the medical field, and media. Those with mental illness are particularly susceptible to this idea, especially for those with schizophrenia, where biological causes are already a familiar concept among laypeople.

Belief in free will is commonly viewed as a fundamental human quality (Ogletree et al., 2010). It is a familiar concept among society, promoting prosocial behavior and personal accountability (Clark et al., 2014). The suggestion one does not have free will could still be associated with increased fear, social distance, and other negative outcomes associated with biologically framing schizophrenia. Before research extends to this issue, it is important to first confidently confirm or deny biologically framing mental illness can be a barrier to belief in free will.

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