

Mental Health Clinicians' Beliefs About the Biological, Psychological, and Environmental Bases of Mental Disorders

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Abstract

The current experiments examine mental health clinicians' beliefs about biological, psychological, and environmental bases of the DSM-IV-TR mental disorders and the consequences of those causal beliefs for judging treatment effectiveness. Study 1 found a large negative correlation between clinicians' beliefs about biological bases and environmental/psychological bases, suggesting that clinicians conceptualize mental disorders along a single continuum spanning from highly biological disorders (e.g., autistic disorder) to highly nonbiological disorders (e.g., adjustment disorders). Study 2 replicated this finding by having clinicians list what they thought were the specific causes of nine familiar mental disorders and rate their bio–psycho–environmental bases. Study 3 further found that clinicians believe medication to be more effective for biologically based mental disorders and psychotherapy to be more effective for psychosocially based mental disorders. These results demonstrate that even expert mental health clinicians make strong distinctions between psychological and biological phenomena.

Keywords: Concept; Clinical reasoning; Causal explanation; Dualism

1. Introduction

People readily distinguish between psychological and biological phenomena by assuming that these phenomena involve different content, structure, and causal mechanisms (e.g., Carey, 1985; Inagaki & Hatano, 1993; Kalish, 1996). For instance, preschoolers know that bodily symptoms (e.g., coughing) but not behavioral abnormalities (e.g., obsessively washing hands) are contagious (Keil, 1992), and infants appear to understand human action, but not object motion, as being goal directed (Woodward, 1998). Lynch and Medin (2006)

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found that undergraduates and nurses rarely mentioned interactions between mental and physical causes in illness models. Notaro, Gelman, and Zimmerman (2001) found that children do not believe psychological events, such as feeling nervous, can cause physical health outcomes, such as getting a tummy ache. Reviewing numerous cognitive and developmental literatures, Bloom (2004) concluded “we are dualists who have two ways of looking at the world: in terms of bodies and in terms of souls” (p. 191). That is, biological and psychological causes for phenomena appear to be fairly distinct in people’s minds.

This study examines the domain of mental disorders, because this domain presents perplexing cases that are not readily classified as either biological or psychological phenomena. Mental disorders are often thought to be illnesses, and in Western culture, illnesses are thought to have biological bases (but see, for instance, Murdock, 1980; Rubel, O’Neill, & Collado-Ardon, 1985 for evidence of the prevalence of psychosocial explanations for illnesses in nonindustrial societies). However, the term “mental” in mental disorders seems to contradict the idea of a biomedical basis for these conditions. The Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR, American Psychiatric Association, 2000) explicitly acknowledges this problem:

the term mental disorder unfortunately implies a distinction between “mental” disorders and “physical” disorders that is a reductionistic anachronism of mind/body dualism. A compelling literature documents that there is much “physical” in “mental” disorders and much “mental” in “physical” disorders. The problem raised by the term “mental” disorders has been much clearer than its solution, and, unfortunately, the term persists in the title of DSM-IV because we have not found an appropriate substitute. (p. xxx)

Indeed, there has been a long-standing, well-known debate about the ontological status of mental disorders, as the field of psychiatry has shifted under the influence of different therapeutic movements such as psychodynamics, psychopharmacology, behavioral modification, cognitive therapies, and so on. In an ethnography of modern American psychiatry, Luhrmann (2000) eloquently sums up the coexistence of two ways of thinking about and treating mental illness:

Sometimes [psychiatrists] talk about mental anguish as if it were cardiac disease: you treat it with medication, rest, and advice about the right way to eat and live. ... Sometimes, though, psychiatrists talk about distress as something ... that involves the kind of person you are: your intentions, your loves and hates, your messy, and complicated past. (p. 6)

Given the ambiguous ontological status of mental disorders, the goal of this study is to examine what mental health professionals consider the bases of mental disorders to be, and what consequences or implications such causal beliefs have.

Studying whether clinicians hold biological or nonbiological beliefs about the causes of mental disorders has important clinical implications. For instance, clinicians tend to blame patients more for psychologically based symptoms than biologically based symptoms (Miresco & Kirmayer, 2006). Furthermore, past studies have found that whether laypeople

view mental disorders as biologically or psychosocially caused affects their beliefs about curability and the efficacy of various treatments (medicine vs. therapy) (e.g., Goldstein & Rosselli, 2003; Iselin & Addis, 2003; Kuppin & Carpiano, 2006; Luk & Bond, 1992), and it is possible that causal beliefs might have the same impact for clinicians who determine what treatments to administer.

Additionally, as patients' views about whether their disorders are biologically or psychologically caused can be shaped by their clinicians, it would be crucial to understand clinicians' own beliefs. This might have significant public health implications considering the current epidemic of mental disorders. According to the National Institute of Mental Health, over one quarter of Americans suffer from a clinical mental disorder in any given year (<http://www.nimh.nih.gov/health/topics/statistics/index.shtml>). Recent studies by Kessler, Chiu, Demler, and Walters (2005) found that about half of Americans will meet the criteria for a DSM-IV disorder sometime in their lives, and that one third of Americans received treatment from mental health clinicians between 2001 and 2003. Although mental health practitioners could potentially have considerable influence on American public health, few cognitive science studies have examined this domain of expertise.

In addition to practical implications, clinicians' beliefs about the causes of mental disorders present an interesting case for cognitive scientists, as several theoretically plausible and interesting possibilities of how they might reconcile biological and psychological causes exist. One aforementioned possibility is that we have two distinct modes of explanation for human behavior: folk psychology and folk biology. However, others have argued that such "dualistic thinking" goes even further such that psychological constructs are not thought to be dependent on, or embodied in, biology. Lake (2007), for instance, claims that "Western psychiatry endorses a simplified form of Cartesian dualism that posits two fundamentally irreducible ontological categories: a physical body brain and an embodied nonphysical mind" (p. 473). Indeed, the Nobel prize-winning neurobiologist Eric Kandel (1998) was so concerned about radical mind-body dualism in social scientists that he wrote a special article in the *American Journal of Psychiatry* specifically explaining how all mental events are dependent on the brain. However, there has been little, if any, empirical demonstration of the prevalence of dualism among mental health clinicians, let alone an examination of what type of dualism they may have.

Interestingly, some researchers make quite different claims about how clinicians reconcile biological and psychological causes of mental disorders. Many assert that the predominant model in American psychiatry is the biomedical model, in which all mental disorders are regarded as stemming from biological problems and psychological terms are treated as mere metaphors for biological processes (e.g., Andreasen, 1984). Kiesler (1999) termed the biomedical model as the "American way" of understanding mental disorders, propagated by pharmaceutical companies and mass media. Herbert (1997) states, "Everything from criminality to addictive disorders to sexual orientation is seen today less as a matter of choice than of genetic destiny" (p. 72).

However, others have speculated that at least some clinicians might view mental disorders as largely psychological phenomena. For instance, Goldberg and Huxley (1992) argued that while psychiatrists might prefer the biomedical view, "At the other end of the spectrum are those psychotherapists and social workers who believe that abnormal behavior can

be wholly explained in social and psychological terms” (p. 1). Again, none of these conjectures have been empirically tested.

Yet another possibility is that clinicians may treat some mental disorders (e.g., schizophrenia) as biological illnesses and others (e.g., histrionic personality disorder) as psychological illnesses (e.g., see Haslam, 2005 for similar discussion). Miresco and Kirmayer (2006) found that clinicians judged that psychological factors were important to explaining dysfunctional behavior exhibited by a person with narcissistic personality disorder, but biological factors were important to explaining that same behavior when exhibited by a person having a manic episode. This study, however, used only three mental disorders and cannot offer a complete picture of mental disorders in general. For instance, are there two distinct groups of mental disorders (biological vs. psychological) or do mental disorders exist on a continuum from biological to psychological? If disorders are regarded as being biologically or psychologically based, what proportion of mental disorders falls in each group, and where do individual disorders such as bipolar disorder fall?

So far, we have only discussed various ways in which clinicians might think of disorders as psychologically or biologically caused. However, more integrative views of mental disorders have been proposed and it is possible that clinicians might have adopted such models. A classic example of the integrative view would be Engel’s (1977) biopsychosocial framework of diseases, which postulates that disorders are caused by interactions of biological, psychological, and environmental factors. For instance, asthma may be thought of as being caused by a combination of environmental factors (e.g., pollen, dust), biological factors (e.g., genetic predisposition), and psychological factors (e.g., stress).

In a more recent paper, Kendler (2005) argues that “psychiatric disorders are ... complex multi-level phenomena ... and their full understanding will require the rigorous integration of multiple disciplines and perspectives” (p. 439; see also Engel, 1977; Kiesler, 1999). This integrated view is consistent with the increasing amount of evidence that the best treatment for most psychiatric disorders is medication in combination with some type of psychosocial intervention (e.g., Kanton, Roy-Burne, Russo, & Cowley, 2002). As a result of the recent movement toward a multifaceted conception of disorders and treatments, clinicians might also advocate that mental disorders are multiply determined.

To investigate these possibilities, clinicians in Study 1 were asked to rate the extent to which each of the 445 mental disorder categories in the DSM-IV-TR was biologically, psychologically, and environmentally based. Study 2 provides a more in-depth investigation of nine mental disorders that were judged to be highly familiar to participants in Study 1. Clinicians listed specific causes for each of these nine disorders and judged the extent to which each of the causes that he/she listed is biologically, psychologically, or environmentally based.

Finally, Study 3 examines the impact of clinicians’ causal beliefs on judgments of the efficacy of psychotherapy and medication. As mentioned, there is some preliminary evidence that laypeople believe psychological cures (e.g., therapy) are more appropriate for disorders perceived to have psychological causes and biological cures (drugs, exercise, diet) are more appropriate for disorders perceived to have biological causes (e.g., Furnham, 1995; Iselin & Addis, 2003; Mulatu, 1999). Few studies, however, have examined clinicians’ judgments about treatment plans as a function of their causal beliefs. The correspondence between clini-

cians' explanatory framework for mental disorders and their judgments of treatment efficacy would demonstrate potential effects of cognition on action in the real world.

2. Study 1

Clinicians in Study 1 were asked to rate the extent to which each of the 445 mental disorder categories in the DSM-IV-TR is biologically based (e.g., caused by any genetic or psychophysiological factors), psychologically based (e.g., caused by any behaviors, thoughts, emotions, or identity-related factors), and environmentally based (e.g., caused by current or past environmental factors). Fig. 1 presents several possible interesting outcomes. Hypothetical mental disorders (represented by each dot) are positioned along biological and psychological dimensions. (Currently, we omit the environmental dimension for simplicity but we will include it in the discussion at a later point. For now, when a mental disorder is hypothesized to be caused by neither psychological nor biological factors, it could be seen as caused by an environmental factor.)

Panel A illustrates a pattern that would result if one holds a strongly reductionist view in which psychology is equivalent to biology. In this case, ratings on psychological bases would mirror ratings on biological bases.

Panel B depicts a view where all mental disorders have strong biological components (as claimed by the biomedical model).¹ Panel C depicts the more psychosocial view in which

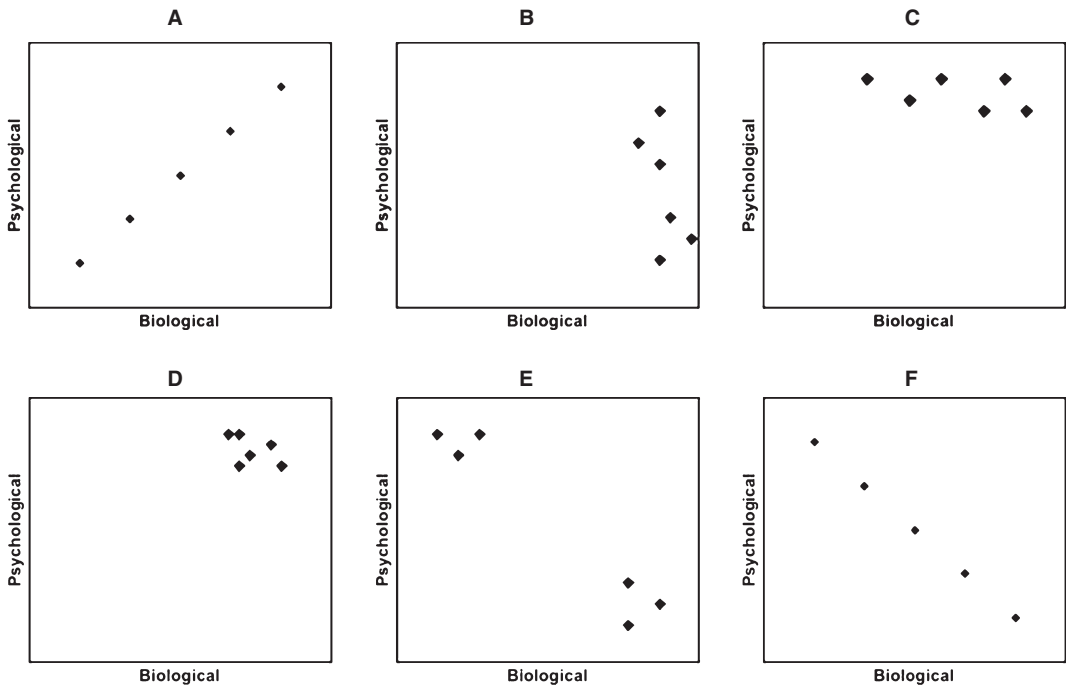


Fig. 1. Possible relationships between psychological and biological judgments about mental disorders.

all mental disorders are regarded as psychological. Panel D illustrates an integrative view where clinicians believe that both psychological and biological factors are somewhat strong determinants for mental disorders, though to varying degrees. Importantly, there is no systematic relationship between biological and psychological domains as their contributions are theoretically independent from each other.

Finally, panels E and F illustrate two cases in which biology and psychology are in competition. Panel E shows a clear dichotomy; some mental disorders are highly psychologically based while others are highly biologically based. This view would be most consistent with previous findings and claims that people have a disposition to treat psychology and biology as two ontologically separate domains (e.g., Bloom, 2004).

In reality, however, it might be difficult for a person to neatly dichotomize mental disorders into biological and nonbiological kinds. For instance, clinicians might believe that major depression is caused by some combination of genetic predisposition and psychological stress. Thus, a continuous spread of mental disorders as shown in panel F might be more likely. Still, panel F illustrates a negative relationship between biological and psychological bases: if a disorder is biologically based, it is less psychological, and vice versa. That is, clinicians might conceptualize some mental disorders as more or less problems of mind, but others as disorders of brain. Although they might not be dichotomous, such a pattern would suggest that the biological–nonbiological dimension (as opposed to other dimensions such as the person–situational attribution or internal–external causes) is basic and fundamental in conceptualizing mental disorders.

To summarize, the current paradigm can reveal clinicians' beliefs about the ontological status of mental disorders. It allows us to distinguish between various stances, including reductionism, biomedical models, psychological models, integrated views, and the supposition that "mind" and "body" are inversely related.

Adding the environmental factor into Fig. 1 would further yield a myriad of possibilities. One possibility, for instance, is that environmental factors are believed to operate entirely independently of psychological and biological factors. An alternative possibility is that environmental factors, in the context of evaluating mental disorders, are likely to be thought of as social context, rather than physical environments. If this were the case, environmental contributions would positively correlate with psychological contributions.

In this study, we also obtained measures of clinicians' familiarity with mental disorders in the DSM-IV. Clinicians may not be familiar with all 445 mental disorders, and it is possible that some of their psychological, environmental, and biological base judgments may be mere guesses. Familiarity data not only provide information about the scope of practicing clinicians' familiarity with the DSM-IV but also allows us to perform analyses only on familiar mental disorders.

2.1. *Methods*

2.1.1. *Participants*

Recruitment of licensed clinicians was conducted through lists of all licensed psychiatrists, psychologists, and social workers in the state of Connecticut from the Connecticut

Department of Public Health. All psychiatrists in New Haven County, all psychologists in the city of New Haven, and social workers in the cities of New Haven and Hamden were sent a letter soliciting their participation. Trainees were recruited by e-mailing all trainees in the psychiatry residency, psychology internship, clinical psychology, and social work fellowship programs at Yale University and the Yale School of Medicine through the training directors of these programs.

Participants were 20 licensed psychiatrists, 20 licensed psychologists, 19 licensed clinical social workers, 10 psychiatry residents, 10 psychology interns and clinical graduate students, and 10 social work fellows (post-MSW, prelicensure). The demographic characteristics, experiences as mental health practitioners, and theoretical orientations of participants can be found at <http://www.cogsci.rpi.edu/CSJarchive/Supplemental/index.html>. Although all participants were selected from New Haven County, participants in our sample had a wide variety of clinical experiences, theoretical orientations, and demographic characteristics, and none of the reported results interacted with theoretical orientations. Following a typical pay scale, participants were paid per hour as follows: licensed psychiatrists, \$100; licensed psychologists, \$85, licensed clinical social workers, \$70; psychiatry residents, psychology interns, and social work fellows, \$40.

2.1.2. *Stimuli*

From the DSM-IV-TR, 445 disorders were selected. All diagnoses with ICD codes as well as middle-level higher-order categories listed in bold type on pages 13–26 of the DSM-IV-TR (e.g., delirium, pervasive developmental disorders) were used except for psychological factors affecting medical conditions and medication-induced disorders. To facilitate ease of rating, all of the numbered diagnoses, except for substance-related disorders,² were grouped under middle-level higher-order categories. Keeping these groupings, four randomized orderings of the disorders were created. One of these four orderings was used in all tasks for each participant.

2.1.3. *Procedure*

Paper-and-pencil questionnaires were conducted individually either at a lab or through the mail. The study lasted from 1 to 2.5 hr. The questionnaire consisted of four sections, administered in the following order: (a) free recall of disorders; (b) familiarity ratings; (c) psychological, environmental, and biological basis ratings; and (d) history of clinical experience.

For the free recall task, participants were first asked to list “the mental disorder categories that come most easily to mind and/or are the most important to your practice as a clinician.” Afterwards, participants were asked to rate their familiarity with all 445 DSM-IV-TR disorders on a scale from 1 (“not very familiar”) to 7 (“very familiar”). To prevent fatigue, diagnoses, when appropriate, were placed within DSM-IV-TR groupings as explained earlier, and participants were told that their rating for a higher-order category would apply to all categories included in that grouping unless they indicated otherwise.

After completing the familiarity ratings, participants were asked to rate the extent to which these disorders are biologically, psychologically, or environmentally based. Participants rated all disorders on a specific basis (i.e., biological, psychological, or environmental)

before rating them on the next basis. The order in which participants were asked to rate the biological, psychological, and environmental bases was counterbalanced across participants. Participants were asked to think of biological, psychological, and environmental causes as non-mutually exclusive domains that could be overlapping and to rate each type of causal basis individually, without trying to remember the ratings they gave to the other judgments or trying to divide the causal basis equally among the three judgments.

At the beginning of each subsection of the causal basis ratings task (i.e., biological, psychological, or environmental ratings), participants received instructions corresponding to that subsection, explaining the definition of the causal basis for that subsection and how to give ratings. A biological basis was defined as "... any genetic or psychophysiological factors that contribute to or cause the disorder." Participants were also given an example using a migraine headache: "A person might believe—whether it is true or not—that a headache has a strong biological basis because genes are causal factors in developing migraine headaches." A psychological basis was defined as "... any behaviors, thoughts, emotions, or identity-related factors that contribute to or cause the disorder" with stressful emotions used as a sample cause for headaches. An environmental basis was defined as "... current or past environmental factors that contribute to or cause the disorder," with a stressful commute as a sample cause for headaches.

Participants gave ratings on a scale of 1 (caused by no or very few [biological/psychological/environmental] factors) to 5 (almost completely caused by [biological/psychological/environmental] factors) and put a "?" if they did not have a judgment. Participants were asked to make their ratings quickly in order to give their first impression about the disorders. Participants were asked to give their perception based on their personal experience with people with the particular disorders, with the understanding that this perception could be informed by research findings or didactic training. Participants were asked to give their judgments regardless of how certain they were about their ratings. These instructions were repeated at the beginning of each subsection.

Finally, participants filled out a questionnaire asking about their background as explained in the Participants section.

2.2. Results

Fig. 2 plots the mean ratings across all respondents for each of the 445 disorders on the three causal bases measured in this study.³ Particularly noteworthy is that, on all three judgments, the mean ratings of the 445 DSM-IV-TR mental disorders spanned almost the full range of the provided scale (i.e., 1–5). Few participants endorsed a strong biomedical view (panel B in Fig. 1) or a psychosocial model (panel C; see below for subject-level analyses).⁴

Another striking pattern in Fig. 2 is the strong relationships among the three variables.⁵ Participants' beliefs about biological bases were strongly negatively correlated with both psychological bases, $r(443) = -.92$, $p < .001$, as well as environmental bases, $r(443) = -.86$, $p < .001$. One might argue that these negative correlations occurred because participants thought they should pick only one causal basis for a disorder. However, this

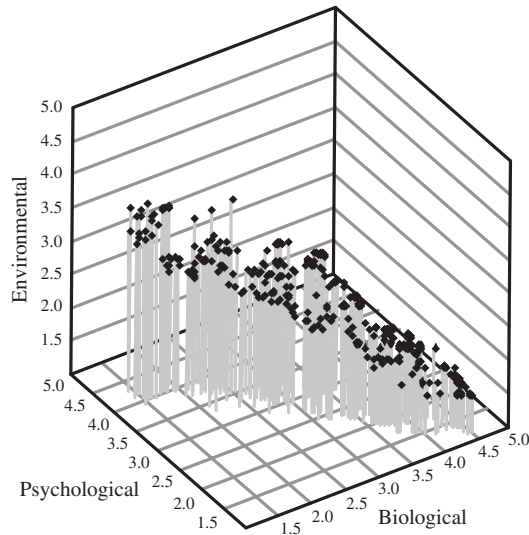


Fig. 2. Mean clinicians' ratings on environmental, psychological, and biological basis judgments on the 445 DSM-IV-TR mental disorders.

interpretation is undermined by the positive correlation between the environmental basis and psychological basis ratings, $r(443) = .84, p < .001$.

To further ensure that the negative correlations were not due to the task's implicit demand to select a single cause for each disorder, similar analyses were carried out with participants' responses from only the first block of causal judgments, which were made before they were aware of tasks on other causal bases. In other words, the average biological basis ratings were calculated only from those participants who did this task first, psychological ratings calculated only from those who did that task first, and so on. Even with this analysis, the correlations were still significant in the same direction; the biological basis ratings negatively correlated with the psychological basis ratings ($r[443] = -.91$), and with the environmental basis ratings ($r[443] = -.62$), while the psychological and environmental basis ratings positively correlated ($r[443] = .51$), all $ps < .001$.

In addition, we obtained correlations within each individual participant to ensure that the above pattern is not an artifact of averaging across all participants' ratings. Using $\alpha = .05$, 91.0% of the participants showed a statistically significant negative correlation between biological and psychological judgments, 83.1% showed a statistically significant negative correlation between biological and environmental judgments, and 88.8% showed a statistically significant positive correlation between psychological and environmental judgments. This result confirms that the same pattern remains within each individual's ratings.

2.2.1. Judgments about familiar disorders

As clinicians may not be familiar with many of the disorders, the above findings might be based on mere guesses rather than on actual beliefs. For instance, most people would guess that "sesamoid bone disease" would be biologically based, even though they have

absolutely no idea what comprises that basis. In order to investigate clinicians' causal beliefs about the disorders that are familiar to clinicians, we now examine the familiarity data.

The general pattern of the familiarity data is that clinicians did not appear to be overwhelmingly familiar with the DSM-IV-TR disorders.⁶ In the free recall task, only 22 of the 445 (4.9%) mental disorders in the DSM-IV-TR were spontaneously generated by at least 25% of the participants in the study, and almost half of the DSM-IV-TR mental disorders (i.e., 212 out of 445) were never listed by any of the participants. Clinicians' familiarity ratings also reported only a moderate amount of familiarity. Table 1 lists the 49 mental disorder categories recalled by at least 25% of one of the subgroups of participants (i.e., novices, expert psychiatrists/psychologists/social workers; see <http://www.cogsci.rpi.edu/CSJarchive/Supplemental/index.html> for subgroup percentages). Table 1 also lists the familiarity and causal basis ratings for these 49 disorders.

When only these 49 DSM-IV-TR disorders were analyzed, the pattern of correlations among the three dimensions remained the same. The mean ratings on the biological basis were strongly negatively correlated with those on the psychological basis, $r(47) = -.96$, $p < .001$, and the environmental basis, $r(47) = -.87$, $p < .001$, whereas the ratings on the environmental basis and the psychological basis were strongly positively correlated, $r(47) = .86$, $p < .001$.

2.2.2. Professional differences

We further examined the psychological, environmental, and biological judgments of the 445 mental disorders broken down by subgroups of participants. The same pattern of correlations occurred within each of the three subgroups of experts (psychiatrists, psychologists, and social workers) as well as the novice group, with the absolute strength of the relationship ranging from .73 to .96.

One notable effect of professional background was found with biological judgments. A one-way ANOVA testing the effect of professional background among experts on each participant's mean ratings across all 445 mental disorders found a significant effect, $F(2, 56) = 6.84$, $p < .01$. Bonferroni tests found that both expert psychiatrists ($M = 3.81$, $SD = .61$) and psychologists ($M = 3.53$, $SD = .47$) gave higher ratings than expert social workers did ($M = 3.11$, $SD = .68$) on biological bases. No such differences were found on ratings of psychological and environmental bases, all $ps > .50$.

2.3. Discussion

Let us revisit Fig. 1 to discuss the implications of the results from this study. The pattern of results decidedly differs from those shown on panel A, suggesting that clinicians endorsed that psychological constructs are not equivalent to biological constructs. This study also failed to find evidence that a single domain was believed to be fundamental to all mental disorders. Even when considering only the sample of psychiatrists, who might be thought of as holding a biomedical view of mental disorders (e.g., panel B), the mean rating on biological judgments was only 3.81 on a five-point scale. Similarly, neither psychologists nor clinical social workers thought of mental disorders as mostly psychological (e.g., panel C).

Table 1
 Mean biological, psychological, environmental, and familiarity judgments of 49 familiar disorders

Disorder	Biological	Psychological	Environmental	Familiarity
Autistic disorder	4.54	1.46	1.39	3.8
Asperger disorder	4.51	1.49	1.42	3.7
Pervasive developmental disorders	4.49	1.48	1.39	3.6
Mental retardation	4.48	1.19	1.58	4.5
Dementia of the Alzheimer's type	4.44	1.37	1.71	4.2
Dementia	4.42	1.39	1.76	3.9
Schizophrenia	4.33	2.07	1.83	5.3
Bipolar I disorder	4.3	2.27	1.86	5.6
Bipolar II disorder	4.02	2.29	1.87	5
Delirium	3.94	1.55	2.06	3.8
Schizoaffective disorder	3.91	2.51	1.89	5.2
Attention-deficit/hyperactivity disorder	3.64	2.42	2.52	5.1
Cyclothymic disorder	3.62	2.63	2.19	4.7
Major depressive disorder	3.5	3.02	2.65	6.4
Obsessive-compulsive disorder	3.48	2.91	2.27	5.7
Alcohol dependence	3.44	2.93	3.02	5.6
Substance dependence	3.42	2.95	3.07	5.3
Opioid dependence	3.42	2.93	3.08	5.1
Cocaine dependence	3.38	2.93	3.08	5.2
Cannabis dependence	3.36	3	3.06	5.4
Conduct disorder	3.34	2.67	2.75	4.9
Schizotypal personality disorder	3.21	2.93	2.28	4.5
Dysthymic disorder	3.17	3.16	2.76	6
Panic disorder with agoraphobia	3.13	3.34	2.78	5.3
Alcohol abuse	3.11	3.22	3.2	5.6
Generalized anxiety disorder	3.03	3.42	2.8	5.9
Schizoid personality disorder	3.01	2.96	2.31	4.6
Substance abuse	2.99	3.24	3.23	5.2
Opioid abuse	2.96	3.24	3.22	5
Cannabis abuse	2.95	3.26	3.23	5.5
Cocaine abuse	2.95	3.25	3.23	5.3
Hallucinogen abuse	2.95	3.26	3.22	4.8
Obsessive-compulsive personality disorder	2.93	3.31	2.45	5.3
Paranoid personality disorder	2.84	3.38	2.59	4.6
Oppositional defiant disorder	2.77	3.21	3.22	4.8
Antisocial personality disorder	2.62	3.64	3.03	5.3
Borderline personality disorder	2.57	3.77	2.94	5.8
Anorexia nervosa	2.55	3.8	3.07	5.2
Posttraumatic stress disorder	2.52	3.62	3.85	5.9
Social phobia	2.51	3.7	3.03	5.7
Bulimia nervosa	2.48	3.74	3.02	5
Avoidant personality disorder	2.33	3.82	2.87	4.4
Histrionic personality disorder	2.25	3.81	2.89	4.7
Dependent personality disorder	2.23	3.81	2.93	4.7
Narcissistic personality disorder	2.18	3.97	2.81	5.1

Table 1
(Continued)

Disorder	Biological	Psychological	Environmental	Familiarity
Adjustment disorders/with mixed anxiety and depressed mood	1.83	4.03	3.76	5.9
Adjustment disorders/with depressed mood	1.82	4.03	3.76	5.9
Adjustment disorders	1.79	4.04	3.76	5.9
Bereavement	1.57	4.02	3.73	5.4

Furthermore, the pattern of correlations of clinicians' judgments did not reflect an integrative view where the three bases independently contribute (e.g., panel D).

Instead, we found an inverse relationship between biological and psychological judgments and between biological and environmental judgments. A disorder that was thought to be strongly biological was thought to be only weakly psychological and environmental, and vice versa. When a disorder was thought of as somewhat biological, it was also thought of as somewhat psychological and environmental (e.g., major depression). This pattern reflects a tendency to array mental disorders on a continuum ranging from disorders of body to disorders of mind.

3. Study 2

Study 1 was designed to provide a comprehensive picture of clinicians' psycho-environmental beliefs across the entirety of mental disorders listed in the DSM-IV. Yet the methodology is somewhat limited in that clinicians had to evaluate a given mental disorder as a whole. In contrast, in Study 2, we examined clinicians' beliefs about *specific causes* of a smaller set of mental disorders.

In Study 2, we used nine mental disorders that were judged to be highly familiar to clinicians in Study 1. Clinician participants first listed causes of these nine mental disorders. They were then re-presented with the causes they listed and asked to rate each on how biological, psychological, or environmental in nature they were. This methodology allows us to examine a number of issues.

First, it is possible that the negative correlation between causal bases in Study 1 may have been a result of clinicians fixating on one particularly salient biological, psychological, or environmental factor (e.g., genetics for schizophrenia) that overshadowed their understanding that a set of multiple, moderate factors of another kind (e.g., stressful life events) also plays a role. In this study, we had clinicians list all the contributory causes to a disorder. Under these circumstances, we can examine whether clinicians do list multiple kinds of causes for the same mental disorder, and yet still demonstrate the negative correlation between biological and psychosocial dimensions.

Second, Study 2 provides an opportunity to examine what the content of these causes is, and how that might account for the positive correlation between environmental and psychological bases. We speculate that this positive correlation may have occurred

because the environmental factors in the context of evaluating mental disorders are more likely to be thought of as social context (e.g., family problems), rather than physical environments (e.g., radon exposure). Clinicians may regard social context as inseparable from the psychological domain—as witnessed by the frequent use of the term “psycho-social” in the literature (e.g., Lynch & Medin, 2006).

3.1. Methods

3.1.1. Participants

A national sample of clinicians was recruited. Psychologists who self-identified as practitioners rather than researchers and had a PhD in clinical psychology or a PsyD in their membership information for the American Psychological Association were contacted. Psychiatrists who listed themselves as psychotherapists in their membership information for the American Psychiatric Association were contacted. Social workers with at least a Master’s level state social work license or an active membership in the Academy of Certified Social Workers (which identifies social workers qualified for autonomous practice) were identified through the *2005 Register of Clinical Social Workers* and contacted. Sixty-three clinicians (25 psychologists, 16 psychiatrists, 22 social workers; 33 men, 29 women, and 1 unknown gender) agreed to participate in exchange for a \$70 gift certificate. Participants’ mean age was 52.4 (range: 32–72). Participants had on average 24.0 years of clinical experience (range: 7–41 years) and over their careers had seen on average 21.8 clients per week (range: 0–70 clients), in an average 28.5 weekly clinical hours (range: 10–50 hr).

3.1.2. Materials

Nine mental disorders that were judged to be highly familiar in Study 1 were selected such that they would be a representative of the biological–psychosocial continuum found in Study 1. Thus, we selected three mental disorders from the most biological cluster (schizophrenia, bipolar, mental retardation), three from the moderate biological cluster (major depression, generalized anxiety disorder, substance abuse), and three from the least biological cluster (narcissistic personality disorder, bulimia, adjustment disorder).

3.1.3. Procedure

Participants were contacted by mail and sent a link to a survey website. Once the survey began, clinicians were presented with the nine mental disorders in one of two random reverse orders.⁷ For each disorder, participants completed the *cause-listing task* and then the three *cause-rating tasks* before moving on to the next disorder.

In the *cause-listing task*, participants were asked to list as many causes and contributing factors as they could think of for the given disorder. As an example, participants were given the medical disorder asthma and a list of nine sample causes, including allergens, pollutants, stress, physical exertion, exposure to cigarette smoking when young, and genetic predisposition. Participants were instructed that, as in the asthma example, listed causes or contributing factors of disorders needed not to be present in every case of the disorder. It was highlighted to participants that pollen was listed as a cause of asthma, even though only

some cases of asthma are triggered by it. Participants were also told that their causes of mental disorders could vary in how closely they precipitate the disorder and that they should include both immediate causes (e.g., pollen) and more distant causes (e.g., genetic factors) in their lists. This instruction was included in an attempt to capture root causes of the illnesses as well as immediate causes affecting behavior. Finally, participants were also instructed that as they listed causes they should rate how important or powerful each one was on a 1 (very weak cause) to 10 (very strong cause) scale. Using the asthma example, participants were told that if “exposure to cigarette smoking when young” was thought to be a weak contributing factor, it might be rated only a 2 in importance, while if “stress” was thought to play a more powerful role in bringing about asthma, it might be rated a 9. Participants were also told that we were not testing their knowledge of the DSM and they should include only what they as clinicians personally thought were the causes of mental disorders. Such instructions were meant to discourage participants from referring to the DSM-IV; however, because the study was conducted online, this possibility cannot be eliminated.

After completing the cause listings and cause importance ratings for a given disorder, participants were re-presented with the causes that they generated, and performed the three *cause-rating tasks*. They were told that they would now complete three separate tasks asking them to rate how biological, psychological, and environmental each cause was. Participants were asked to try and complete each task separately, without trying to remember the ratings given in previous tasks and were reminded that a particular cause could be both psychological, biological, and environmental in nature, as these are not mutually exclusive realms. The scales and instructions for the *cause-rating tasks* were the same as in Study 1. The order of the three cause-rating tasks was counterbalanced using a Latin square design such that across the nine disorders, each task appeared equally in each order position (first, second, or third).

At the end of the study, clinicians filled out the requested demographic information. The experiment was programmed using Survey Monkey.

3.2. Results and discussion

3.2.1. Correlations between psychological, environmental, and biological cause ratings

Study 2 replicated Study 1. In particular, the more biological a cause was regarded to be the less psychological and vice versa. Almost all participants (92.1%) showed a significant negative correlation between biological and psychological ratings of causes. The Fisher’s *Z*-corrected average correlation was $r_{\text{avg}} = -.74$. Also as found in Study 1, psychological and environmental ratings of causes were positively correlated in 77.8% of participants, $r_{\text{avg}} = .55$, while biological and environmental ratings of causes were negatively related in 93.6% of participants, $r_{\text{avg}} = -.66$. There were no noticeable differences among social workers, psychologists, and psychiatrists with respect to these patterns.

We also carried out analyses using the mean biological, environmental, and psychological ratings for each disorder. Mean biological ratings of the causes of a disorder were negatively correlated with mean psychological, $r(7) = -.96, p < .05$, and environmental ratings, $r(7) = -.83, p < .05$. Mean psychological and environmental ratings were positively

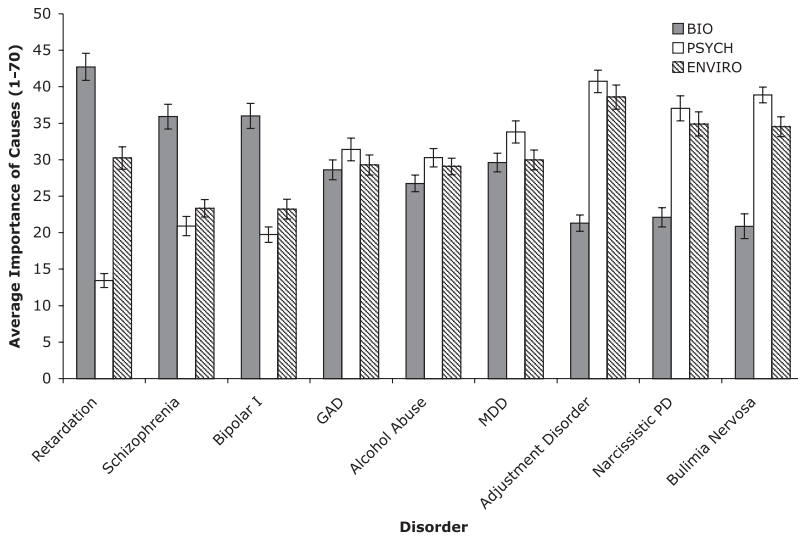


Fig. 3. Average importance index of biological, psychological, and environmental causes for disorders in Study 2.

correlated, $r(7) = .66, p < .05$. The same patterns were obtained when examined within psychologists, social workers, and psychiatrists.

In addition, we carried out similar analyses weighted by importance ratings that participants provided for each cause. That is, we multiplied the importance rating of each cause by the degree to which it is regarded as biological, psychological, and environmental and then averaged this across all the causes a clinician listed for a disorder (see Fig. 3 for the mean weighted ratings for each disorder). Then, we averaged these scores across the 63 clinicians for each of the nine disorders. Correlations across these weighted item means also replicated Study 1. Across disorders, the weighted biological cause ratings were negatively correlated with the weighted psychological cause ratings, $r(7) = -.97, p < .05$, and the weighted environmental cause ratings, $r(7) = -.72, p < .05$, with the latter two being positively correlated, $r(7) = .75, p < .05$. Again, the same patterns were obtained when examined within psychologists, social workers, and psychiatrists. The current findings thus suggest that, although clinicians believe multiple domains contribute to a disorder, the negative correlation seen in Study 1 may be a result of these domains varying systematically in their importance across disorders.⁸

3.2.2. Analyses of content of causes

To examine how these patterns of correlations emerged, we examined the content of causes clinicians regard as biological, psychological, and environmental. In total clinicians listed 3082 causes, with an average of 5.43 causes per disorder. To get an idea of the distribution of the types of causes, we classified causes as being “biological” if they were rated above a 4 on the seven-point biological basis rating scale, “psychological” if rated above the midpoint on the psychological scale, and similarly for environmental causes. Causes

could thus be classified as being only biological, only psychological, only environmental, or any combination of the three. We were able to classify 2879 (96%) causes according to this scheme (47 causes had missing B, P, or E ratings, 156 causes were not rated highly on any causal dimensions). More than a third (36.2%) of the mental disorder causes were regarded as both psychological and environmental in nature. Purely biological causes were the next most popular at 26.7%, followed by purely psychological causes at 12.2%, and purely environmental causes at 8.7%.

For illustrative purposes, we coded clinicians' causes into 18 categories summarized in Appendix A, along with their biological, psychological, or environmental classifications designated using the above scheme. The most frequently mentioned cause categories were "stressful life events" and "social factors," constituting almost one third of causes listed for the nine mental disorders. These prominent causes were regarded as psychological and environmental causes, and not biological. Furthermore, physical environments that would have large impacts on biological traumas (e.g., prenatal trauma, deficiency of food or oxygen, medication side effects, prenatal viruses, environmental toxins) were infrequently mentioned. That is, the positive correlation between psychological and environmental ratings appears to have been obtained because the most prominent environmental causes for the domain of mental disorders are social environmental factors, which have a closer affinity to psychological mechanisms.

Causes that were rated as biological tended to be those involving genetics, biological make-up, and biological trauma or illness. These causes make up another one third of causes for the nine mental disorders, and they tended to be rated as biological, and not psychological or environmental. Although some participants do regard causes such as emotional/mood problems, social factors, and stressful life events as being both biological and psychological (or all three), these causes are relatively infrequent.

Fig. 4 also plots these 18 categories of causes by their average biological, environmental, and/or psychological ratings. The size of bubbles in Fig. 4 reflects the number of times this type of cause was mentioned. As clearly demonstrated in Fig. 4, the inverse relationship between biological and environmental or psychological judgments and the positive relationship between environmental and psychological judgments shows up at the specific cause level as well.⁹ That is, what happens at the level of disorder (Study 1) also happens at the level of cause; causes believed to be biological were regarded as less psychological and vice versa. In fact, the distribution of specific causes along the biological and psychological dimension, as shown in Fig. 4A, appears more dichotomous than the distribution of mental disorders in Study 1. This suggests that clinicians may treat specific causes categorically (e.g., a cause is either biological or psychological), but as they believe that any given disorder is caused by a combination of multiple factors, mental disorders end up being distributed more continuously along the biological–psychological dimension.

Appendix A also shows the prevalence of each coding category broken down by disorders. One noticeable result is that a variety of causes was listed for each of the mental disorders—as opposed to just one dominant type. For instance, even for bulimia, which was judged to be one of the most psychosocially based mental disorders, heredity/genetic causes were listed as frequently as stressful life events. These results suggest that the inverse

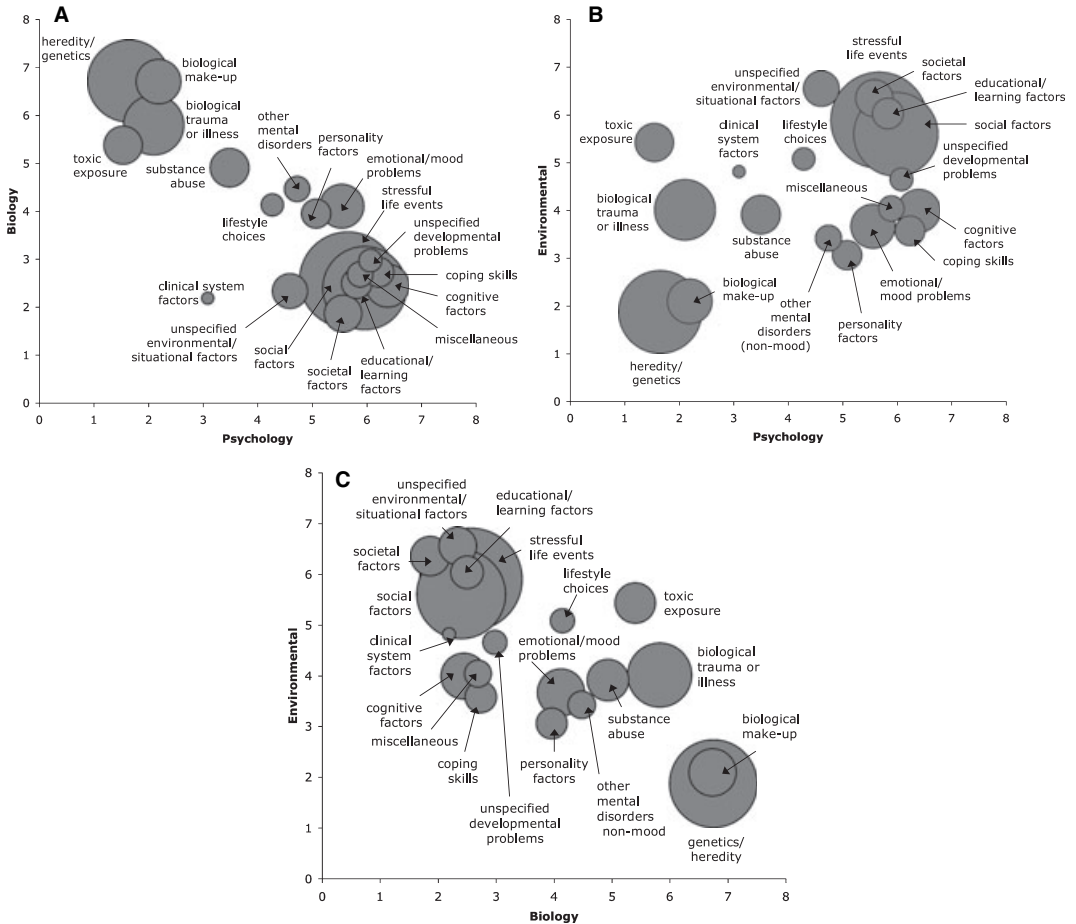


Fig. 4. The 18 coding categories of causes graphed by their average biological and psychological ratings (A), average environmental and psychological ratings (B), and average environmental and biological ratings (C). The size of each point gives a rough indication of how prevalent each coding category is. Thus, “stressful life events” were mentioned as causes of disorders 646 times in the study, whereas “clinical system factors” were only mentioned 11 times.

relationship between biological and psychosocial dimensions is unlikely to be due to the fact that clinicians could only think of one dominant specific cause of a single domain.

To summarize, Study 2 replicated the inverse relationships between biological and psychological/environmental bases in mental disorders by using a different methodology. Even when clinician participants made domain judgments at the level of specific causes, we found the same pattern of results (Fig. 3). The inverse relationships were also obtained when looking at causes regardless of disorders (Fig. 4). Furthermore, these results suggest that it is highly unlikely that the findings from Study 1 were due to clinicians thinking of only one dominant cause for each mental disorder. Finally, the content analyses of specific causes listed for the nine mental disorders suggest that social environments, rather than physical environments,

are the most prevalent environmental causes in the domain of mental disorders, which explains the positive correlation between psychological and environmental judgments.

4. Study 3

Previous researchers have argued that we have framework theories that guide inferences and reasoning about an entire domain (e.g., Godfrey-Smith, 2003; Wellman & Gelman, 1992). The relationship we found between biological influences and psycho-environmental influences could be part of the framework theory for mental disorders: to the extent a disorder is regarded as biologically caused, it is regarded as less psychologically caused and vice versa. But what are the consequences of this framework theory? How might clinicians' beliefs about the inverse relationship influence other inferences or reasoning?

There are a number of possibilities. For instance, new discoveries of genetic influences of a mental disorder could inspire possibly inaccurate inferences that the disorder is no longer psychologically or environmentally influenced. Also, this framework theory may affect judgments of blame and responsibility (e.g., Miresco & Kirmayer, 2006). Of many possible implications, Study 3 examines how clinicians' causal beliefs could affect treatment decisions, as they may have arguably the most immediate practical implications.

One possibility is that clinicians might think of medication and therapy as, respectively, biological and psychological interventions that are most effective in their respective domains. Thus, they might think it difficult for medication to cure or control a mental disorder caused by psychological/environmental factors, and conversely, they might think it difficult for psychotherapy to ameliorate a mental disorder caused by biological factors.

Previous studies provide preliminary evidence showing such pattern in laypeople. For example, Iselin and Addis (2003) gave participants vignettes describing depression and manipulated whether the character's problems were caused by physical (low levels of serotonin) or psychological causes (e.g., got a bad job evaluation), or whether no mention of etiology was made. They found that medical treatments were believed to be more helpful in the physical cause condition, and psychological treatments in the psychological cause condition. Similarly, Mulatu (1999) found prayer and family care were rated more important for treating mental rather than physical illnesses. Also, Luk and Bond (1992) found that medical interventions, such as seeing a medical doctor and improving bodily health, were regarded as more important to overcoming "psychiatric" problems (e.g., schizophrenia) than "emotional" problems (e.g., anorexia, agoraphobia) (see also Furnham, 1995; Furnham & Buck, 2003; Narikiyo & Kameoka, 1992; Proctor, 2008). It is possible that expert clinicians may show the same pattern as laypeople.

However, one study on clinicians' beliefs about disorders suggests that beliefs about causes may not be related to beliefs about treatment. Ahn, Flanagan, Marsh, and Sanislow (2006) found that clinicians are unwilling to endorse the idea that mental disorders are real and natural categories with necessary and sufficient features that cause symptoms. Importantly, even those who did endorse such causal essences for mental disorders did not believe that these causes needed to be removed in order to get rid of the disorder, suggesting that

perhaps clinicians would not take causes into account when selecting treatments. Yet what Ahn et al. (2006) examined was the need to remove the *specific* causes (e.g., traumatic memory) of a given disorder, rather than effectiveness of a treatment in the same *general* domain (e.g., biology vs. psychology).

To further examine the possibility that causal beliefs might affect treatments beliefs, a subset of participants from Study 2 was presented with cases of mental disorders caused by different factors they had listed in Study 2. For each case, they were asked to judge to what degree psychotherapy and medication would each be helpful in treating the disorder. We then examined whether clinicians would judge medication to be more effective for cases caused by factors that were judged to be biological in Study 2, and psychotherapy to be more effective for causes caused by factors that were judged to be psychological or environmental. That is, this study was designed to see whether clinicians' beliefs about biological, psychological, and/or environmental causes impact their decisions about the effectiveness of treatments. This design allows us to examine how committed clinicians are to their separation of biological and psychological phenomena. If clinicians really do understand that social and environmental causes have a biological impact, and biological causes have a psychological impact, they would not necessarily favor within-domain treatments.

4.1. Methods

4.1.1. Participants

Fifty-five of the participants in Study 2 indicated they would be willing to participate in a follow-up study and were sent materials via mail. Forty-four clinicians (16 psychologists, 20 social workers, and 8 psychiatrists) completed and returned the materials and received a \$40 gift certificate for their time. Demographics were almost identical to the previous study: there were 22 men and 22 women and the average age was 54.0. Participants had on average 25.6 years of clinical experience, and over their careers had seen on average 21.0 clients per week, in an average 28.4 weekly clinical hours.

4.1.2. Materials

For each participant, we developed individually tailored materials. Each booklet contained a number of patient cases, each with a mental disorder, caused by a certain factor (e.g., major depressive disorder caused by genetics). Throughout the study, the nine mental disorders used in Study 2 were used. The causal factors were the same ones generated by each participant him/herself and rated as being important (receiving an importance ratings of 5 or more) in Study 2. Thus, one clinician saw only 12 cases, and another clinician saw 88 (the average number of cases was 41.3). Cases were presented in a quasi-random order such that no two cases involving the same disorder appeared twice in a row, nor did two cases caused by the same factor.

4.1.3. Procedure

Study 3 was conducted 30–90 days after the participants completed Study 2. At the beginning of Study 3, participants were instructed that they would see a number of cases,

each representing a hypothetical person and that all they knew about him/her was that they had the mental disorder listed, and that it was primarily caused by the listed factor (e.g., case 1 describes a person who has “generalized anxiety disorder” primarily caused by “family problems”). We specified that by “primarily caused” we meant the listed causes was the strongest and most dominant cause of the disorder.

In two separate tasks participants rated to what extent psychotherapy or medication could “improve, control, or manage” the person’s disorder (1 = could not at all/5 = moderately/9 = very effectively). In the preceding instructions, medication was defined as “psychiatric/psychoactive/psychotropic drugs” and psychotherapy was defined as “treatment by psychological means, involving repeated verbal interactions between a clinician and a client.” For each judgment, participants also indicated their confidence in their ratings on a 1 (not at all confident) to 5 (very confident scale).

The order of psychotherapy versus medication tasks was counterbalanced across participants. Before starting the second task, participants were instructed that they would be rating the same cases they had seen previously. They were reminded that responses on the second task could be totally independent from those of the previous one, and they should try not to remember or consider the ratings they gave previously.

4.2. Results and discussion

4.2.1. Confidence ratings

Despite the limited information provided by each case, overall clinicians were very confident about their ratings. Of all treatment judgments 92.4% were rated a 3 or more on the confidence scale, and 32 out of 43 participants were certain about at least 90% of their treatment judgments.

4.2.2. Overall beliefs about treatment by disorder

Fig. 5 shows the mean overall perceived effectiveness of medication and therapy at treating the nine disorders, presented with the means from Study 2 about how overall biological, psychological, and environmental causes of the disorder were regarded to be. As seen in the figure, all disorders were regarded as somewhat treatable by at least one method, with the exception of mental retardation. Given the floor effects for this item, subsequent analyses do not include it.

4.2.3. Relationship between beliefs about causal basis and treatment

When considering mean ratings for each disorder, there were correlations between beliefs about the effectiveness of therapy and medication and the beliefs about biological/psychological/environmental bases of the *causes of disorders*. Fig. 6 (left panel) shows the correlations. Medication was judged to be more effective the more biologically based the causes of a disorder were, whereas psychotherapy was judged to be more effective the more psychologically or environmentally based causes of a disorder were. The same pattern of results was obtained when examined separately for psychiatrists, social workers, and psychologists. If we compare the average ratings of the

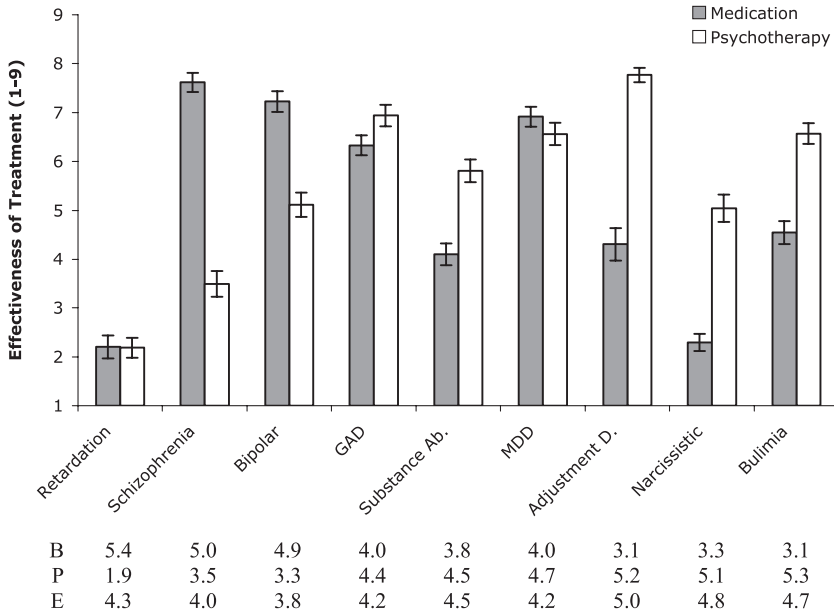


Fig. 5. Clinicians' overall beliefs about the effectiveness of medication and therapy for treating nine mental disorders.

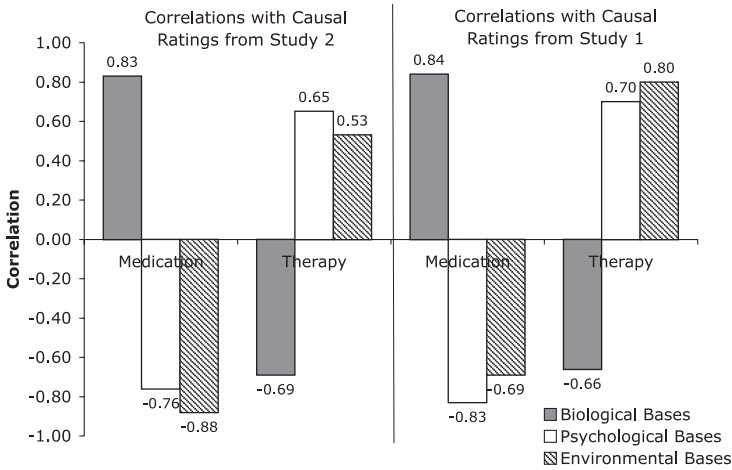


Fig. 6. Correlations between beliefs about mean treatment effectiveness in Study 3 and beliefs about the mean biological, psychological, and environmental cause ratings for disorders in Study 2 (left panel), and disorder ratings in Study 1 (right panel), respectively.

biological, psychological, and environmental basis of the disorders from Study 1, we find similar correlations with beliefs about the effectiveness of therapy and medication in the current study (see the right panel of Fig. 6).

Analyses by subjects also found similar patterns. For each subject, we calculated correlations between biological, psychological, and environmental ratings of causes and their subsequent beliefs about treatments for a mental disorder case caused by that factor. The correlations were in the same direction as the group correlations in a majority of participants (81.8–97.7% of participants; see Proctor, 2008, for details).

The correspondence between the inverse biological–psychosocial relationship and the treatment plans is highly unlikely to be due to some kind of task demand characteristics. Recall that Study 3 was conducted more than a month after Study 2 in which clinicians rated how biological, psychological, or environmental a cause was. Thus, when clinicians were rating the effectiveness of treatments in Study 3, the biological and psychosocial ratings they provided in Study 2 were unlikely to have been producing demand to respond accordingly.

4.2.4. Detailed analyses of three mental disorders in the middle range

We further examined the three mental disorders that were judged in Study 2 to be moderately psychological, biological, and environmental (generalized anxiety disorder, substance abuse, and major depression). As the majority of participants in Study 3 were given specific cases in which each of these disorders was caused by a biological or psychological/environmental factor, we could examine whether the specific cause type would push the efficacy of psychotherapy or medication in the predicted direction.¹⁰

First, based on each participant’s ratings from Study 2, each case was categorized as biologically caused (receiving a biological rating of 4 or greater but psychological and environmental ratings of <4) or psychologically/environmentally caused (receiving a psychological or environmental rating of 4 or greater, but a biological rating of <4). Then, for each participant, we obtained the mean medication effectiveness rating and mean psychotherapy effectiveness rating for each of the three mental disorders for each cause type. These ratings were used to perform separate two (cause type: biological vs. psychological/environmental) × 2 (treatment type: medication vs. psychotherapy) repeated measures ANOVAs for each of the three disorders. As seen in Fig. 7, in all three cases, the predicted significant interaction was

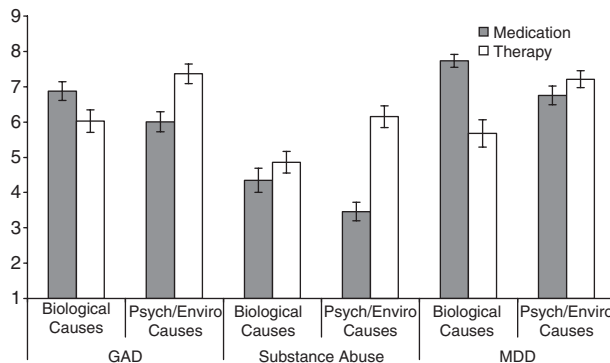


Fig. 7. Mean beliefs about treatments for cases of generalized anxiety disorder, major depressive disorder, and substance abuse caused by biological and psychological/environmental causes.

obtained; generalized anxiety disorder: $F(1, 31) = 28.58, p < .0001, \eta^2_p = .48$; substance abuse: $F(1,36) = 31.04, p < .0001, \eta^2_p = .46$; major depressive disorder: $F(1,33) = 52.71, p < .0001, \eta^2_p = .62$. These interaction effects were also significant when examined separately for psychiatrists, social workers, and psychologists.

Follow-up planned comparisons indicate that, in each disorder, there was a trend or significant finding that therapy was regarded as a more effective treatment for cases caused by psychological causes ($ps < .01$ for generalized anxiety disorder and substance abuse; $p = .064$ for major depressive disorder). The opposite trend was found in major depressive disorder and generalized anxiety disorder for biological causes ($ps < .01$), while for substance abuse the difference between treatments became nonsignificant ($p = .12$).

To summarize, the results from Study 3 suggest that clinicians believe that cross-domain cures are less effective. We found that clinicians believe therapy is more effective for the cases caused by psychological/environmental causes, and that medication is regarded as more effective for the cases caused by biological causes. This was true even though both cases may be of the same disorder. For instance, a clinician thought that a case of major depression caused by genetics or a chemical imbalance should be treated by medication, while a case of major depression caused by a stressful life event should be treated by therapy.

5. General discussion

5.1. Summary of results

The series of three studies reported in this paper present the first empirical investigations of mental health professionals' ontological assumptions about mental disorders. One main finding is that mental health professionals do not treat mental disorders as a homogeneous kind. Instead, they spread mental disorders widely along a continuum ranging from psychosocially to biologically caused.

We also found that our results were highly consistent across multiple subgroups of participants (e.g., psychiatrists, social workers, and psychologists) and samples (New Haven county subjects in Study 1 and a national sample in Study 2). The same negative correlations were observed in Study 1 in both within- and between-subjects analyses. Such consistent findings across Studies 1 and 2 undermine the possibility that the inverse relationship was obtained because participants felt demand to vary their judgments across disorders. Furthermore, this consistency across different groups of participants suggests that clinicians appear to agree to a great extent on the causal bases of at least the nine mental disorders tested throughout the two studies.

Furthermore, Study 3 found that this spread along a biological–psychological continuum corresponds to clinicians' assumptions about the efficacy of different treatments; medication was thought to be more effective for biologically based mental disorders and psychotherapy was thought to be more effective for psychosocially based mental disorders. Thus, Study 3 suggests that the causal beliefs found in Studies 1 and 2 have real-life implications.

5.2. *Why is there a negative correlation?*

Why would clinicians believe that if biological causes are important to a mental disorder, psychologically or environmentally causes are less so, and vice versa? There are many ways to approach this important question, including longitudinal studies on how clinicians' beliefs come about and to what degree this negative correlation might reflect general causal discounting phenomena. At this point, the current study provides some potential, but not definite answers to this question.

One possible answer is the following. Clinicians may experience that some mental disorders (e.g., schizophrenia) are better treated by medication, while others (e.g., adjustment disorder) are better treated by psychotherapy. These beliefs about treatment efficacy might then result in beliefs about causal bases of mental disorders; the disorders that are responsive to medication are thought to be more biologically based and the disorders that are responsive to psychotherapy are thought to be more psychosocially based (see, for instance, Markman & Ross, 2003, for a review of how category use affects category learning). Of course, the causal direction could be the opposite; clinicians' beliefs about causal bases of mental disorders may result in their beliefs about the effectiveness of treatment options. Yet another possibility is that the two sets of beliefs may be mutually reinforcing. Future studies can further investigate this issue through longitudinal observations or using fictitious disorders.

A different but equally valuable way of explaining the negative correlation is to examine the specific causes of mental disorders from which the negative correlation emerges. As reported in Study 2, the top four causes of the nine familiar mental disorders listed by clinicians were stressful life events, social factors, heredity, and biological trauma. These causes constituted almost two thirds of causes listed by the clinicians, so they must have largely contributed to the inverse correlations. Stressful life events and social factors were judged to be psychological and environmental, but not biological, whereas heredity and biological trauma were judged to be biological, but not psychological or environmental. It is quite unlikely that our clinician participants, who are all well educated, would deny that stressful life events do not produce any changes in the brain, or that biological trauma has no psychological consequences. Instead, our speculation is that clinicians *refer to* stressful life events as psychosocial factors because they believe their biological components are merely a mechanism rather than the root cause. Similarly, they *refer to* heredity as a biological factor because they regard it as a root cause that merely produces psychological consequences.

5.3. *Validity issues*

An additional important question raised by these results is whether clinicians' beliefs about causes and treatment of mental disorders are valid. First, do clinicians' beliefs about causes have any relation to the actual bases of mental disorders? For instance, even though the DSM-IV-TR states that etiologic factors of mental retardation "may be primarily biological or primarily psychosocial, or some combination of both" (p. 45),

our clinicians believed that mental retardation has primarily biological but not psychological causes. As our understanding of the etiology of mental disorders increases, the validity of clinicians' beliefs found in this study can be further evaluated and understood.

Second, are clinicians' beliefs about the effectiveness of treatment plans found in Study 3 valid? If the only thing you know about a client is that their disorder is caused by a chemical imbalance, it may make sense to target that imbalance with an appropriate medication. Similarly, if you know that a client's problems with anxiety are caused by childhood experiences, it does seem that therapy would be an effective treatment. The pattern of results found in our study may reflect clinicians' understanding that some disorders do respond better to existing biomedical treatments than other treatments, and some respond best to psychosocial or behavioral ones. Indeed, Zachar (2000) states that even for the same disorder "effective treatment sometimes requires adopting different targets of intervention" (p. 223).

However, the leap to assuming that therapy would be less effective in addressing a chemical imbalance or that medication would be less helpful for someone whose anxieties are rooted in their childhood is perhaps less warranted. After all, therapy is ultimately an intervention that affects the brain (e.g., Kandel, 1998). Similarly, medication is an intervention that clearly has large psychological effects. For example, antidepressants not only affect chemical levels in the brain but can also influence one's social relationships, personality, and even the sense of self (Kramer, 1993).

Indeed, the best treatment for most psychiatric disorders is considered to be medication plus some type of psychosocial intervention, with a diverse team of professionals (e.g., psychiatrists, primary care physicians, nurse practitioners, psychologists, social workers, case managers) and a multifaceted treatment plan (e.g., American Psychiatric Association, 2002; Kanton et al., 2002). Yet, the current findings indicate that clinicians regard therapy as far more effective for disorders such as adjustment disorder, bulimia, and narcissistic personality disorder, while medication is thought to be far more effective for bipolar disorder and schizophrenia. A strong focus on the perceived cause of these disorders might blind clinicians to the benefits of medication and therapy respectively.

5.4. Compatibility with laypeople's beliefs

This study is the first extensive empirical investigation of clinicians' beliefs about the causal bases of mental disorders. These new data open up future opportunities to examine whether clinicians' beliefs are compatible with laypeople's beliefs. Such investigations would be vital in improving public health because studies suggest similarities between clients' and therapists' values are associated with therapeutic improvement (e.g., Beutler & Clarkin, 1990; Propst, 1980).

Furthermore, studies suggest that causal beliefs about disorders affect compliance with treatments. For example, in the medical domain, Heurtin-Roberts and Reisin (1992) found that black women with hypertension were more likely to take their blood pressure medication when they believed their condition was caused by physical, when compared

to psychosocial, causes (see also Meyer, Leventhal, & Gutmann, 1985). Extending these ideas to mental disorders, mental health patients may be more receptive to treatments if they are perceived to be targeting what they believe to be the causes of their symptoms.

However, existing studies of lay beliefs may be too limited to allow for systematic comparisons to the current data on clinicians. For instance, although there are many population studies on the beliefs about mental disorders, many of these were conducted outside North America (e.g., Angermeyer & Matschinger, 1999; Jorm et al., 2005), and thus any incompatibility between clinicians and laypeople could be due to cultural differences (see Angermeyer & Dietrich, 2006, for a recent review). Also, most of the studies on laypeople's causal beliefs about mental disorders examine only a limited number of mental disorders (mostly major depression and schizophrenia only; Nakane et al., 2005; Link, Phelan, Bresnahan, Stueve & Pescosolido, 1999).

Yet several interesting contrasts are noticeable. In general, laypeople appear to believe that the causes of mental disorders are more psychosocial than biological. Angermeyer and Dietrich's (2006) review compiled the top four causes of mental disorders listed by laypeople across multiple studies. While these causes are quite similar to those listed by our clinicians in Study 2, psychosocial factors were listed much more frequently as causes for schizophrenia. Thus, "stressful life events" and "social relationships" were listed as causes of schizophrenia by 72.5–87% and 59–64% of the laypeople participants, respectively. Furthermore, a study conducted in Italy found that 70% of the relatives of people with schizophrenia believed that schizophrenia was caused exclusively by psychosocial factors (Magliano et al., 2001).

In addition, laypeople tend to hold strongly negative views about pharmacologic treatments (Angermeyer & Matschinger, 1996; Angermeyer, Matschinger, & Riedel-Heller, 1999). For instance, one study found that 23% of people believe antidepressants are helpful (Jorm et al., 1997), whereas our clinicians in Study 3 strongly endorsed medication as an effective treatment for major depressive disorders. Further clinically important discrepancies between clinicians' and patients' beliefs about the causes and treatments of disorders may be found in future research utilizing the present data.

Nonetheless, our clinicians' responses do corresponded to laypeople's beliefs in other significant ways. Haslam and Giosan (2002), for instance, examined what factors or dimensions underlie the lay concept of mental disorders. The first factor identified in their factor analysis was a bipolar dimension with biological causation (e.g., bacterial or viral infection, brain abnormality, genetic defect) on one end and environmental causation (e.g., family life, traumatic events, social influences) and psychological causation (e.g., due to conflicts they have with society, flawed character, personal control) on the other end.¹¹ This pattern is strikingly similar to the inverse relation found between the biological and psychosocial dimensions from our clinicians. In addition, as discussed earlier, correspondence between causal and treatment beliefs found in Study 3 also mirrors the patterns found in laypeople studies (e.g., Iselin & Addis, 2003). These similarities between expert clinicians and laypeople could reflect deep-seated inclinations to separate biology from psychology.

5.5. Dualism

However, one should be cautious about concluding mind–brain dualism based on our data. As discussed earlier, Miresco and Kirmayer (2006) found that clinicians tend to judge a person more responsible for their behavior when they attribute it to psychological causes (narcissistic personality disorder) than when they attribute it to biological causes (a manic episode). As their title stated, they treated these findings as evidence for “the persistence of mind-brain dualism in psychiatric reasoning.” Mind–brain dualism, as defined by Miresco and Kirmayer, is “the idea that the mind is somehow distinct from the brain and that its essence cannot be reduced to purely material and deterministic neurological mechanisms” (p. 913). However, none of their results directly demonstrated that clinicians actually believed that not all operations of the mind could be eventually reduced to neurologic mechanisms.

Indeed, the fact that clinicians in the Study 1, for instance, regarded less than 10% of the causes of adjustment disorder as being biological need not mean they regard this disorder as solely a product of a metaphysically independent mind. Rather, they likely regard the brain as a necessary and sufficient part of the disorder, but not worthy of particular mention, as it may be seen as an *enabling condition* as opposed to a cause.

Psychologists and philosophers have long noted that, although two factors may be both necessary and jointly sufficient for producing an effect (e.g., the presence of a spark and oxygen would result in your house burning down), people will often make a psychologically meaningful distinction between what factors are regarded as causes (e.g., the spark) and what are regarded as mere enabling conditions (e.g., the oxygen) (e.g., Cheng & Novick, 1991; Einhorn & Hogarth, 1986; Goldvarg & Johnson-Laird, 2001; Hart & Honore, 1985). Thus, in a case of adjustment disorder, clinicians might regard the brain as being relatively normal and constant across those who do not have the disorder, thus an enabling condition. In such disorders, it would be the abnormal intrusive psychological and environmental events (such as social factors or traumatic life events) that act against the person’s natural tendency to be in a healthy state; hence, only these would be listed as causes.

Another possible explanation for why clinicians may not acknowledge that all psychological phenomena are at basis biological is that reducing all psychological phenomena to biological ones is a reductionist explanation that has limited clinical utility. For instance, in trying to understand the way social skills deficits (e.g., of schizophrenia) inhibit a person’s ability to be employed, focusing on the fact that social skills deficits are at root a biological phenomenon does not offer much help in trying to understand the relationship between social skill deficits and employment or what to do about it.

The above discussion suggests that the inverse relationship found in Miresco and Kirmayer’s (2006) study as well as in our study could be due to pragmatics of what we tend to refer to as psychological and biological factors. That is, the type of dualism that clinicians may be exhibiting is a milder form of “explanatory dualism,” in which certain constructs are pragmatically easier to call psychological phenomena, even though they are realized in biological system of the brain—and both levels of analysis are regarded as important to

explaining behavior (see also Kendler, 2001 for an excellent review of different versions of mind–body dualism in the context of psychopathology).

Future research can further clarify what it is that clinicians do or do not believe. For instance, our study found that clinicians judged that a nonnegligible portion of mental disorders in the DSM-IV (i.e., the ones in the middle range in Fig. 2) are both biological and psychosocial, albeit moderately so. Our Study 2 also found that for these middle-range disorders, clinicians could readily verbalize both types of specific causes. For instance, a clinician listed both “genetics” (biological and not psychological) and “coping mechanisms” (psychological and not biological) as causes for major depressive disorder. That is, they were willing to endorse multiple causes of different kinds for the same mental disorder, rather than treating a mental disorder strictly as either a biological or a psychological kind.

Another direction for other potential future research that would overcome the limitations of the current study would be to examine whether the compatibility between causal beliefs and treatment effectiveness ratings would generalize to more enriched situations. In Study 3, we only examined simplified cases, but in real-life cases with a live person, a clinician would be confronted with a much larger amount of information about their client. As more information is discovered about a patient, the within-domain treatment preferences found in this study may become even more pronounced. Or it could be also diluted if information about cross-domain causes of a disorder comes to light.

6. Conclusions

Mental disorders create an interesting tension for lay theories of causation, as they appear to be a mixture of biological (e.g., genes, brain trauma) and psychological (e.g., beliefs, intentions) phenomena. This study presents the first detailed empirical investigation of mental health clinicians’ ontological beliefs about mental disorders. This study ruled out the possibility that clinicians treat all mental disorders in the same way (either as entirely biological or psychological). Instead, they tend to array mental disorders on a continuum ranging from biological to psychosocial kinds. We also found that such ontological beliefs have implications for their beliefs about the effectiveness of psychotherapy or medication, providing the first demonstration of how clinicians’ causal beliefs may influence their choice of treatment options.

Notes

1. Here we illustrate only one possible outcome from each representative view, but they are not the only possible outcomes. For instance, a biomedical model can result in a pattern where all disorders are clustered in the lower right-hand corner of the graph.
2. The substance-related disorders were grouped by the type of disorder, with the various substances that could cause the disorder listed as subcategories because it is likely that

clinicians would be familiar with individual substance-related disorders regardless of the kind of substance that was causing it.

3. Mean familiarity ratings, as well as each category's biological, psychological, and environmental ratings for each of the 445 mental disorders in the DSM-IV-TR, can be found at <http://www.cogsci.rpi.edu/CSJarchive/Supplemental/index.html>.
4. Interestingly, mean clinicians' ratings showed that biological ratings ($M = 3.41$, $SD = .77$) were significantly higher than psychological ratings ($M = 2.55$, $SD = .81$), $p < .001$, suggesting a slight leaning toward the biomedical model. In addition, psychological ratings were significantly higher than environmental ratings ($M = 2.45$, $SD = .54$), $p < .001$.
5. The average interrater correlations across the 445 mental disorders were .48, .53, and .32 for judgments of biological, psychological, and environmental bases, respectively. When considering only experts' judgments on 49 familiar disorders (see the main text for the operational definition of familiar disorders), these correlations were somewhat higher: .62, .57, and .48. As a general overview of the results, we first report analyses based on ratings averaged across all participants, but to address a potential concern for using average data when the consensus is not robust, we also follow up with analyses within each individual and within each subgroup.
6. A more conclusive description of clinicians' familiarity with the DSM-IV-TR disorders awaits a further study using nationwide samples.
7. Due to experimenter error, nine participants saw the disorders in order of most biological to least, or least biological to most, but in all of the analyses there were no significant differences between these nine participants and the rest of the subjects, so only overall results are discussed.
8. Admittedly, this task cannot capture some of the nuances of clinician's theories, such as the possibility that certain causes may only be important in the presence or absence of other causes.
9. Malle (1999) notes that people make a clear intentional–unintentional distinction in explaining behavior in general. Although this distinction may appear similar to the biological and psychological/environmental distinction, there seem to be important differences. Malle proposed that while unintentional behavior is explained with reference to causes (“Anne was driving above the speed limit because the speedometer didn't work”), intentional behavior is explained either in terms of reasons (“Anne was driving above the speed limit because she wanted to get to the store before 6:00”) or the causal history that brought those reasons about (“Anne was speeding because she was raised to be punctual”). Use of the causal history explanations is associated with slightly lower judgments of intentionality. In our study, we rarely found reasons in clinicians' cause listings, indicating that clinicians do not generally regard even psychosocial mental disorders as being fully intentional. Instead the mapping between our findings and those of Malle's seems to be that while biological factors are regarded as mere causes (e.g., Eve is depressed because of a neurotransmitter imbalance), psychosocial factors are recruited as causal history of reason explanations (e.g., Eve is depressed because of a series of stressful life events).

10. The subsequent analyses were not feasible with the six other mental disorders because the cause types listed were heavily skewed to be biological or psychological/environmental.
11. Haslam's (2005) folk psychiatry theory has "psychologizing" as a separate and independent dimension, but this dimension appears to refer more to psychological conflicts they are currently experiencing rather than psychological causation.

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References

- Ahn, W., Flanagan, E. H., Marsh, J. K., & Sanislow, C. A. (2006). Beliefs about essences and the reality of mental disorders. *Psychological Science*, *17* (9), 759–766.
- American Psychiatric Association. (2000). *Diagnostic and Statistical Manual of Mental Disorders, 4th edition, text revision*. Washington, DC: American Psychiatric Association.
- American Psychiatric Association. (2002). *Practice guideline for treatment of patients with bipolar disorder* (2nd ed.). Washington, DC: American Psychiatric Association.
- Andreasen, N. C. (1984). *The broken brain: The biological revolution in psychiatry*. New York: Harper & Row.
- Angermeyer, M. C., & Dietrich, S. (2006). Public beliefs about and attitudes towards people with mental illness: A review of population studies. *Acta Psychiatrica Scandinavica*, *113*, 163–179.
- Angermeyer, M. C., & Matschinger, H. (1996). The effect of personal experience with mental illness on the attitude towards individual suffering from mental disorders. *Social Psychiatry and Psychiatric Epidemiology*, *31*, 321–326.
- Angermeyer, M. C., & Matschinger, H. (1999). Lay beliefs about mental disorders: A comparison between the western and the eastern parts of Germany. *Social Psychiatry and Psychiatric Epidemiology*, *34*, 275–281.
- Angermeyer, M. C., Matschinger, H., & Riedel-Heller, S. G. (1999). Whom to ask for help in case of a mental disorder? Preferences of the lay public. *Social Psychiatry and Psychiatric Epidemiology*, *34*, 202–210.
- Beutler, L. E., & Clarkin, J. (1990). *Systematic treatment selection: Toward targeted therapeutic interventions*. New York: Brunner, Mazel.
- Bloom, P. (2004). *Descartes' baby: How the science of child development explains what makes us human*. New York: Basic Books.
- Carey, S. (1985). *Conceptual change in childhood*. Cambridge, MA: Bradford Books, MIT Press.
- Cheng, P. W., & Novick, L. R. (1991). Causes versus enabling conditions. *Cognition*, *40*, 83–120.
- Einhorn, H. J., & Hogarth, R. M. (1986). Judging probable cause. *Psychological Bulletin*, *99*, 3–19.
- Engel, G. L. (1977). The need for a new medical model: A challenge for biomedicine. *Science*, *196*, 129–136.
- Furnham, A. (1995). Lay beliefs about phobia. *Journal of Clinical Psychology*, *51* (4), 518–525.
- Furnham, A., & Buck, C. (2003). A comparison of lay-beliefs about autism and obsessive compulsive disorder. *International Journal of Social Psychiatry*, *49* (4), 287–307.

- Godfrey-Smith, P. (2003). *Theory and reality*. Chicago: University of Chicago Press.
- Goldberg, D. P., & Huxley, P. (1992). *Common mental disorders: A bio-social model*. London: Tavistock, Routledge.
- Goldstein, B., & Rosselli, F. (2003). Etiological paradigms of depression: The relationship between perceived causes, empowerment, treatment preferences, and stigma. *Journal of Mental Health, 12*, 551–563.
- Goldvarg, E., & Johnson-Laird, P. (2001). Naive causality: A mental model theory of causal meaning and reasoning. *Cognitive Science, 25*, 565–610.
- Hart, H. L. A., & Honore, A. M. (1985). *Causation in the law* (2nd ed.). Oxford: Clarendon Press.
- Haslam, N. (2005). Dimensions of folk psychiatry. *Review of General Psychology, 9*, 35–47.
- Haslam, N., & Giosan, C. (2002). The lay concept of “mental disorder” among American undergraduates. *Journal of Clinical Psychology, 58*, 479–485.
- Herbert, W. (1997, April 21). Politics of biology. *U.S. News & World Report, 122*, 72–80.
- Heurtin-Roberts, S., & Reisin, E. (1992). The relation of culturally influenced lay models of hypertension to compliance with treatment. *American Journal of Hypertension, 5*, 787–792.
- Inagaki, K., & Hatano, G. (1993). Young children’s understanding of the mind, body distinction. *Child Development, 64*, 1534–1549.
- Iselin, M., & Addis, M. E. (2003). Effects of etiology on perceived helpfulness of treatments for depression. *Journal Cognitive Therapy and Research, 27* (2), 205–222.
- Jorm, A. F., Korten, A. E., Jacomb, P. A., Christensen, H., Rodgers, B., & Pollitt, P. (1997). “Mental health literacy”: A survey of the public’s ability to recognise mental disorders and their beliefs about the effectiveness of treatment. *The Medical Journal of Australia, 166*, 182–186.
- Jorm, A. F., Nakane, Y., Christensen, H., Yoshioka, K., Griffiths, K., & Wata, Y. (2005). Public beliefs about treatment and outcome of mental disorders: A comparison of Australia and Japan. *BMC Medicine, 3*, 1–14.
- Kalish, C. (1996). Causes and symptoms in preschoolers’ conceptions of illness. *Child Development, 67*, 1647–1670.
- Kandel, E. R. (1998). A new intellectual framework for psychiatry. *American Journal of Psychiatry, 155*, 457–469.
- Kanton, W., Roy-Burne, P., Russo, J., & Cowley, D. (2002). Cost-effectiveness and cost offset of a collaborative care intervention for primary care patients with panic disorder. *Archives of General Psychiatry, 59*, 1098–1104.
- Keil, F. C. (1992). The origins of an autonomous biology. In M. R. Gunnar & M. Maratsos (Eds.). *Modularity and constraints in language and cognition: The Minnesota symposia on child psychology* (Vol. 25, pp. 103–137). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Kendler, K. S. (2001). Psychiatric dialogue on the mind-body. *American Journal of Psychiatry, 158*, 989–1000.
- Kendler, K. S. (2005). Toward a philosophical structure for psychiatry. *American Journal of Psychiatry, 162*, 433–440.
- Kessler, R. C., Chiu, W. T., Demler, O., & Walters, E. E. (2005). Prevalence, severity, and comorbidity of twelve-month DSM-IV disorders in the National Comorbidity Survey Replication (NCS-R). *Archives of General Psychiatry, 62*, 617–627.
- Kiesler, D. J. (1999). *Beyond the disease model of mental disorders*. Westport, CT: Praeger Publishers.
- Kramer, P. D. (1993). *Listening to Prozac*. New York: Viking.
- Kuppin, S. A., & Carpiano, R. M. (2006). Public conceptions of serious mental illness and substance abuse, their causes and treatments: Findings from the 1996 General Social Survey. *American Journal of Public Health, 96*(10), 1766–1771.
- Lake, J. L. (2007). Emerging paradigms in medicine: implications for the future of psychiatry. *Explore, 3*, 467–477.
- Link, B. G., Phelan, J. C., Bresnahan, M., Stueve, A., & Pescosolido, B. A. (1999). Public conceptions of mental illness: Labels, causes, dangerousness, and social distance. *American Journal of Public Health, 89*, 1328–1333.

- Luhrmann, T. M.. (2000) *Of two minds: The growing disorder in American psychiatry*. New York, NY: Alfred A. Knopf.
- Luk, C., & Bond, M. H. (1992). Chinese lay beliefs about the causes and cures of psychological problems. *Journal of Social and Clinical Psychology, 11*, 140–157.
- Lynch, E., & Medin, D. (2006). Explanatory models of illness: A study of within-culture variation. *Cognitive Psychology, 53* (4), 285–309.
- Magliano, L., Guarneri, M., Fiorillo, A., Marasco, C., Malangone, C., & Maj, M. (2001). A multicenter Italian study of patients' relatives' beliefs about schizophrenia. *Psychiatric Service, 52*, 1528–1530.
- Malle, B. F. (1999). How people explain behavior: A new theoretical framework. *Personality and Social Psychology Review, 3*, 23–48.
- Markman, A. B., & Ross, B. H. (2003). Category use and category learning. *Psychological Bulletin, 129*, 592–613.
- Meyer, D., Leventhal, H., & Gutmann, M. (1985). Common-sense models of illness: The example of hypertension. *Health Psychology, 4*, 115–135.
- Miresco, M. J., & Kirmayer, L. J. (2006). The persistence of mind-brain dualism in psychiatric reasoning about clinical scenarios. *American Journal of Psychiatry, 163*, 913–918.
- Mulatu, M. S. (1999). Perceptions of mental and physical illnesses in north-western Ethiopia: Causes, treatments, and attitudes. *Journal of Health Psychology, 4* (4), 531–549.
- Murdock, G. P. (1980). *Theories of illness: A world survey*. Pittsburgh, PA: University of Pittsburgh Press.
- Narikiyo, T. A., & Kameoka, V. A. (1992). Attributions of mental illness and judgments about help-seeking among Japanese-American and White American students. *Journal of Counseling Psychology, 39* (3), 363–369.
- Notaro, P. C., Gelman, S. A., & Zimmerman, M. A. (2001). Children's understanding of psychogenic bodily reactions. *Child Development, 72*, 444–459.
- Proctor, C. (2008). *Clinicians' and laypeoples' beliefs about the causal basis and treatment of mental disorders*. Dissertation, Yale University, New Haven, CT.
- Propst, L. R. (1980). The comparative efficacy of religious and nonreligious imagery for the treatment of mild depression in religious individuals. *Cognitive Therapy and Research, 4*, 167–178.
- Rubel, A. J., O'Neill, C. W., & Collado-Ardon, R. (1985). *Susto, a folk illness*. Berkeley: University of California Press.
- Wellman, H. M., & Gelman, S. A. (1992). Cognitive development: Foundational theories of core domains. *Annual Review of Psychology, 43*, 337–375.
- Woodward, A. L. (1998). Infants selectively encode the goal object of an actor's reach. *Cognition, 69*, 1–34.
- Zachar, P. (2000). *Psychological concepts and biological psychiatry*. Philadelphia: John Benjamin Publishing Company.

Appendix A

The total frequency with which different coding categories of causes were mentioned in Study 2, and a breakdown of the frequency with which these categories were rated as belonging to different biological (B), psychological (P), and environmental (E) domains

General Cause Categories	Examples	Total	P and E (34%)	B Only (25%)	P Only (12%)	E Only (8%)	B and E (7%)	All Three (5%)	None (5%)	B and P (4%)
Stressful life events	Stress, trauma, abuse, neglect, poverty, grief, life changes (move, marriage, new job)	646	409	5	46	97	8	50	20	11
Social factors	Family dynamics, peer and romantic relationships, attachment issues, isolation, social support	489	328	3	70	32	1	23	28	4
Heredity/genetics	Genetics, genetic predispositions, chromosomal abnormality	477	1	416	0	0	26	10	9	15
Biological trauma or illness	Brain injury, prenatal trauma, deficiency of food or oxygen, virus, stroke, infection	255	5	119	2	21	74	6	18	10
Biological makeup	Brain biology, structure, biochemical or neurotransmitter imbalances	139	0	121	0	0	5	4	1	8
Emotional/mood problems	Depression, anxiety, affect regulation difficulties	138	18	15	42	1	3	10	16	33
Cognitive factors	Distorted beliefs or thought processes, low self-esteem, negative thinking	131	42	2	75	1	2	4	1	4

Appendix A

(Continued)

General Cause Categories	Examples	Total	P and E (34%)	B Only (25%)	P Only (12%)	E Only (8%)	B and E (7%)	All Three (5%)	None (5%)	B and P (4%)
Substance abuse	Drug abuse, alcohol abuse, chemical dependency	107	13	39	5	4	11	9	20	6
Toxic exposure	Medication side effects, prenatal viruses, environmental toxins	103	0	18	1	20	56	0	6	2
Societal factors	Cultural influence, societal pressure, media exposure	97	68	0	3	20	0	3	3	0
Unspecified environmental/situational factors	Environmental factors, situation, life circumstances	88	44	0	3	32	3	5	1	0
Educational/learning factors	Early learning or conditioning, family modeling, lack of stimulation or education	66	46	0	6	5	3	5	1	0
Coping skills	Maladaptive, inadequate coping skills or style	62	16	1	38	0	0	2	1	4
Personality factors	Temperament, personality, perfectionism, pessimism, moral character	60	6	8	19	1	2	2	11	11

Appendix A

(Continued)

General Cause Categories	Examples	Total	P and E (34%)	B Only (25%)	P Only (12%)	E Only (8%)	B and E (7%)	All Three (5%)	None (5%)	B and P (4%)
Other mental disorders (non-mood)	Autism, attention-deficit/hyperactivity disorder, mental illness, major depressive disorder, schizophrenia, comorbid disorder, posttraumatic stress disorder	47	7	13	9	0	0	1	11	6
Miscellaneous	No known reason, impoverished object relations, lack of spiritual dimension	46	14	1	19	4	0	1	5	2
Unspecified developmental problems	Developmental arrest, unresolved childhood issues, dysfunctional childhood	37	14	2	12	3	1	3	0	2
Lifestyle choices	Nutrition, eating habits, involvement in sports	36	12	7	0	4	7	2	2	2
Clinical system factors	Poor early intervention, misdiagnosis, treatment noncompliance	11	0	0	2	5	1	0	2	1

Percentage of causes of each type listed by disorder

	Mental		Generalized			Major			Narcissistic	Bulimia
	Retardation	Schizophrenia	Bipolar	Anxiety Disorder	Substance Abuse	Depressive Disorder	Adjustment Disorder			
Biological trauma or illness	35.3	9.9	9.6	4.6	2.7	7.1	4.5	1.1	2.8	
Heredity/genetics	20.8	22.3	23.3	15.8	16.5	14.5	6.8	14.7	10.5	
Toxic exposure	15.7	7.1	4.8	1.4	1.0	1.6	.3	.0	.0	
Stressful life events	8.9	19.9	23.0	22.4	13.8	31.0	45.2	13.6	10.2	
Biological make-up	4.5	6.7	7.4	5.2	3.2	5.7	2.3	3.3	3.3	
Social factors	4.2	11.7	9.6	16.4	20.2	12.0	15.3	34.9	22.9	
Unspecified environmental/situational factors	2.1	3.5	3.0	3.3	5.2	3.0	2.8	2.6	1.7	
Educational/learning factors	2.1	.4	1.1	4.4	3.9	1.1	1.1	2.9	2.2	
Substance abuse	1.5	8.2	8.9	4.4	1.7	5.5	1.4	.4	.8	
Other mental disorders (non-mood)	1.2	1.1	.7	1.6	3.7	1.1	1.4	.4	1.7	
Miscellaneous	.9	1.1	.7	1.9	1.7	1.1	1.1	3.3	2.2	
Cognitive factors	.6	1.4	1.1	6.3	1.7	3.9	4.0	7.0	11.9	
Societal factors	.6	1.4	.0	1.6	5.4	1.4	1.1	4.4	11.9	
Lifestyle choices	.6	.4	1.9	.5	1.0	1.8	.3	.4	3.6	
Clinical system factors	.6	.7	1.1	.5	.0	.2	.3	.0	.0	
Personality factors	.3	.7	1.1	3.3	1.5	2.1	4.3	1.5	2.5	
Coping skills	.3	1.1	.0	1.9	4.2	2.3	4.0	1.8	1.4	
Emotional/mood problems	.0	.7	1.9	3.6	12.3	3.0	3.4	2.6	9.7	
Unspecified developmental problems	.0	1.8	.7	.8	.2	1.4	.3	5.1	.8	