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RUNNING HEAD: TREATMENT CHOICE

Drug Therapy versus Psychotherapy

Which Would You Choose?

A Cognitive Investigation of a Clinical Problem

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Abstract

Previous research has investigated the use of causal knowledge on categorization and the diagnostic process (Ahn, Kim, Lassaline, & Dennis, 2000; Ahn & Kim, 2000; Ahn, Flanagan, March, & Sanislow, 2006; Haslam & Ernst, 2002; Kim & Ahn, 2002a; Kim & Ahn, 2002b; Kim & Keil, 2003; Rehder, 2003; Rehder & Hastie, 2001; Rehder & S.Kim, 2006). The current study is interested in examining how causal information influences treatment choice. Both Study 1 and 2 found that when causal knowledge about a mental disorder is taught, rather than when it is unknown, treatment choice is based on what people believe is the root cause of the disorder. These findings suggest that with education about the causal pathways of mental disorders, more appropriate treatment options can be chosen.

Psychotherapy vs. Drug Therapy:

What would you choose?

A Cognitive Investigation of a Clinical Problem

“There are enough people out there who still equate mental illness with damaged goods that can't be fixed.” – Patty Duke

In a given year, 44 million Americans or roughly 23% of adults living in the United States will be diagnosed with a mental disorder (U.S Department of Health and Human Services, 1999). Whereas mental disorders are highly prevalent, their diagnosis and treatment have been decidedly controversial. There are many psychological disorders for which drug therapy has proven effective and others for which psychotherapy has proven effective. There has also been speculation that the most successful course of treatment is a combination of drugs and psychotherapy. Often, one treatment type is dominantly used for a disorder and the other acts as a supplement. There are many factors contributing to why one disorder is more commonly treated with a drug therapy and another with psychotherapy, but still other situations where it appears that the choice between these two treatment types is haphazard. Little is known about how patients and clinicians go about choosing their treatment and why they decide to choose one over the other. A greater understanding of the mental processes involved in this choice is essential for treating mental disorders.

Past studies have examined laypersons' attitudes towards both psychotherapy and drug therapy in the treatment of mental disorders (Argermeyer & Matschinger, 2004; 2005; Furnham & Henley, 1988; Furnham & Wardley, 1990; 1991; Furnham, Wardley, & Lillie, 1992; Riedel-Heller, Matschinger, Argermeyer, 2005). Furnham and Wardley

(1990, 1991) suggested that it is laypersons' relatively undeveloped knowledge of mental illness that perpetuates an inaccurate perception of psychotherapy and other psychological treatments. However, laypeople were found to be somewhat knowledgeable in the domain of mental illness as certain disorders with a more biological basis were viewed as less affected by psychotherapy (i.e. schizophrenia, Alzheimer's) and disorders with a more external basis were viewed as more affected by psychotherapy (i.e. agoraphobia, social anxiety disorder). When asked directly about psychotherapy, Furhnam and Wardley (1990; 1991) found that laypersons did in fact have a favorable perception of psychotherapy and the benefits it has on mentally ill clients. Additionally, Wong (1994) found that lay people still possess many misconceptions about the effects of psychotherapy, such as believing some therapies could "cure" schizophrenia. Yet overall, laypeople view psychotherapy as beneficial and an effective treatment for many mental illnesses.

In addition to psychotherapy, psychotropic medication has continued to gain patient approval. The recent rise in use of drug therapy has led to a more favorable public opinion than in past years (Angermeyer & Matschinger, 2004; Thomas, Conrad, Casler, & Goodman, 2006). Although public opinion of drug therapy was previously negative (Angermeyer & Matschinger, 2005), a 250% increase in the use of psychotropic medications in adolescents from 1994 to 2001 suggests that people have become more comfortable with using drug therapy as a treatment for mental disorders (Thomas et al., 2006). Additionally, many patients are seeking medication from their general practitioners rather than having to see a psychiatrist. Although the general public's awareness and the availability of psychotropic medication is increasing, people still

possess immature knowledge about these drugs, leading to false impressions that perpetuate negative opinions. Some patients completely avoid drug therapy due to the unwarranted side effects of many psychotropic drugs. While it is true that many psychotropic medications have side effects, they have also proven to be highly effective for several mental disorders (Angermeyer & Matschinger, 2005). Patients overall may still possess some unfavorable conceptions of drug therapy; however, the wide range of psychotropic drug use illustrates that people still turn to them for treatment.

Although patients use both psychotherapy and drug therapy as treatment for mental illness, it is likely that being naïve in the domain of mental disorders leaves them to possess less detailed concepts of disorders and treatments than expert clinicians and health professionals. However, it is clear from past research (Furhnam and Wardley, 1990; 1991; Kim & Ahn, 2002b) that laypeople do possess theories and ideas about mental disorders. For the patient, the conception of a mental illness is subjective, and therefore the perceived cause is also subjective. Patients' constructions of mental illness are represented by which factors they find to be most threatening to their personal health. In turn, that which poses a threat affects the patient's actions as well their decision to seek out treatment (Friberg, 2005). Friberg (2005) found that patients discuss their mental illness in terms of their subjective experience and the effect the illness has on their behavior, which consequently is what determines their course of treatment action.

The Effects of Causal Knowledge on Diagnosis

Research on the mental processes involved in diagnosis may also show some parallels with the mental processes involved in treatment choice. A brief review of the research conducted on diagnosis will now be discussed, as it relates to treatment choice.

For years, the diagnostic process has been a focus in psychological research. Diagnosis can range from determining why a car won't start to identifying cancer cells in a patient. Researchers have continually investigated the underlying thought processes behind how this kind of decision-making is done. For mental disorders, the *DSM-IV-TR* is implemented to help make such diagnoses (APA, 2000). The *DSM-IV-TR* is intended to be atheoretical, allowing for all schools of thought to utilize the same guide. As a result, mental disorders are diagnosed in more of a checklist fashion, where a diagnosis of major depression requires a patient to have five out of the nine available symptoms (Cooper, 2004; Helmuth, 2003). This tool has proven very problematic for a number of reasons, one major concern being the lack of causal information presented for the disorders within the *DSM-IV-TR*. Kim and Ahn (2002a) found that even while using the *DSM-IV-TR* as a guide, clinicians use causal theories to aid in their diagnoses. These theories are a result of the individual's clinical paradigm as well as clinical experience in practice, which naturally varies from one clinician to the next. So while it may only be necessary to have five of nine symptoms for a diagnosis of major depression according to the *DSM-IV-TR*, inherent variations of symptom importance are present in clinician's causal theories. The use of causal theories for mental disorders is not only found with clinicians, but lay people as well (Kim & Ahn, 2002b). Laypersons also differentiate between symptom importance within their individualized naïve theories. This effect has also been looked at in medical diseases with multi-chain causal structures; Kim and Keil (2003) found that causal information greatly influenced participants' decisions about which patient was more likely to be diagnosed with certain medical diseases. Even though the *DSM-IV-TR*

does not integrate etiologies in its framework, it is clear that causal information is an integral part of diagnosing mental disorders.

It is understood that causal information is utilized in the diagnostic process, however, there is still debate as to how exactly this process occurs. Currently, there are two models in practice that outline how this process might transpire. The *Causal Model Theory* or *CMT* (Rehder, 2003a; Rehder, 2003b; Rehder & S. Kim, 2006) focuses on the probabilistic mechanisms between features of a causal theory as well as the causal laws of a category. While this model can be explained in a computational form, for the purposes of the current study only a brief outline will be discussed. According to *CMT*, what is important about a feature in categorization is whether or not a feature has a direct cause. For example, in disorder X, A causes B, and B causes C. According to *CMT*, A should be seen as the least important feature as there is no direct cause to it. B and C should be seen as more important than A and equally important to each other, as they both have one direct causal link. Therefore, where A is not caused by anything, B is caused by A, making B important, and C is caused by B, making C important. However, empirical data has shown that A is always viewed as the most important feature in a concept (Rehder, 2003a; Rehder 2003b; Rehder & S. Kim, 2006). *CMT* previously had no direct explanation for this result but recently described this as a separate effect, the *primary root cause effect (PRCE)*. Specifically, Rehder and S. Kim (2006) and Rehder and Burnett (2005) speculated that there may be an underlying mechanism to an overall category which says that the essence of the category causes the primary root cause. The idea of an underlying mechanism or an essence is extremely hard to test empirically because without the underlying mechanism and essence the category would cease to be

that category, therefore creating an all-or-nothing concept.

The *Causal Status Hypothesis* or *CSH* (Ahn, 1998; Ahn, Kim, Lassaline & Dennis, 2000) addresses the *primary root cause effect* in its model. According to *CSH* the root cause is seen as the most central and important to the category, followed by the intermediate causes, followed by the terminal effects. Specifically, the deeper a feature is embedded in a category's causal structure, the more central it is to the category.

Therefore, the root cause is seen as causally central to the category as it is the most entrenched feature in the category (Ahn et al., 2000). Again, this model can be depicted in a computational form, but for the current research an example will be offered. In the same instance where in disorder X, A causes B, and B causes C; *CSH* predicts that each of the features decrease in importance as a result of their causal status within the category. Therefore A is the most important as it is the most causally central, B is the next most causally central and important, and C therefore is the least important and least causally central.

To review, despite other differences between the models, both *CSH* and *CMT* (with *PRCE*) predict that the root cause is the most causally important feature of a category, rather than the peripheral features. The current studies aim to investigate if causal information affects treatment choice. Based on this, the studies focus on the root cause of the disorder and the intermediate cause because although both Ahn and Rehder and their respective colleagues have shown that the root cause is deemed the most important in diagnosis, no research to date has investigated whether it is also most important with respect to treatment choice. The current studies do not tease apart the differences in predictions between *CSH* and *CMT*.

In diagnosis, the idea is to determine whether or not the overall disease or disorder category is present. If a patient presents with certain symptoms, clinicians and other health professionals will assess these symptoms within the framework of the category in order to determine the appropriate diagnosis. Both *CSH* and *CMT* (with *PRCE*) predict accurately that the root cause is the most important feature of the disorder and that a patient presenting the root cause of a disorder is more likely to have the disorder than a patient who only presents peripheral symptoms. The current study is interested in examining the reasoning process involved in treatment choice for mental disorders. If clinicians and lay people use causal information to aid in the diagnosis of a mental disorder, it is possible that a comparable process is used to determine whether psychotherapy or drug therapy should be chosen to treat a mental disorder.

The Causal Origin of Mental Disorders

Mental disorders are described as having biological/organic causes or psychological/external causes. For example, with major depression, the idea that inactive or overactive neurotransmitters can alter mood and therefore create the depressed mental state is a way in which the disorder is seen to occur through a biological pathway. It is also known that a tragic event such as a parent dying at a young age can trigger major depression, and this is seen as being more of an external and environmental pathway. Whereas mental disorders may be talked about in terms of biological or psychological pathways, lay people have little understanding of the actual mechanisms behind a mental illness (Furnham & Wardley, 1990; 1991). However, it may be that both patients and clinicians, when aware of the cause of a mental disorder, use this information to choose the best treatment. With the expansion of public knowledge about mental disorders,

Angermeyer and Matschinger (2005) found that laypersons understand that some disorders can have more biological causes (i.e. schizophrenia) and therefore would be best treated by psychotropic drugs, and that some disorders can have more external causes (i.e. agoraphobia) and therefore would be best treated by psychotherapy. However, for disorders like major depression where both psychotherapy and drug therapy have proven effective, laypersons seem to lack a treatment preference.

For the current research, we are interested in examining if knowledge of this biological/physical or psychological/environmental cause can predict treatment choice. For the duration of this paper the biological/physical causes will be notated as “biological” and the psychological/environmental causes will be notated as “psychological.” However, these terms will conceptually refer to the full term. In line with *CSH* and *CMT* (with *PRCE*), we expect that in diagnosing a mental disorder, the root cause will be the most informative feature in deciding which treatment should be chosen: psychotherapy or drug therapy. Where a root cause is seen as extremely central to a category, we are interested in examining if the knowledge of causal information will alone determine treatment choice, regardless of other factors such as previous conceptions of mental illness, drugs, and psychotherapy. Although the causal structure of a mental disorder is often quite complex, when the causal knowledge is made salient the information should strongly influence which treatment is chosen, leading to a more effective treatment overall. Without causal knowledge, treatment choices for a mental disorder may be less effective, as the chosen treatment may not be eradicating the root cause of the illness but rather only eliminating terminal symptoms.

Although we predict that treatment choice will be dependent on the root cause of a mental disorder, there are several alternative possibilities that may result. Another possible outcome is that the intermediate causes of the mental disorders will be more indicative of treatment choice, rather than the root cause. Where the intermediate cause is the lowest node before the terminal symptom, it is possible that the recency effect may occur, when whatever items are presented later are remembered best (Neath, 1993). Therefore, the intermediate cause will be remembered more clearly than the root cause and consequently the treatment option will be chosen based on the intermediate cause alone. If this effect is shown, the presence of causal knowledge will lead all participants to choose the treatment option that directly affects the intermediate cause rather than the root cause.

A third possible outcome is that society may have an overwhelming bias toward one particular treatment option. It is possible that regardless of the causal knowledge provided, all participants will be biased towards one treatment option. For example, regardless of whether a participant is presented with a patient suffering from a chemical imbalance in the brain leading to depression, or a traumatic event leading to depression, the drug therapy treatment could be dominantly chosen. If an overwhelming social bias is present, and leads to this effect, participants in both the causal knowledge and no causal knowledge condition should show the same dominant preference for one treatment option. This bias would be unrelated to causal knowledge and therefore would affect both groups equally. However, it is also possible that individuals have personal biases that are not the same as the social bias. If this is the case, then participants should respond to their personal biases and again show no influence of the causal knowledge.

Lastly, it is possible that the results will alternatively show an interaction of the causal knowledge condition and treatment type. Specifically, participants in the no causal condition may show an overwhelming social (or individual) bias towards one treatment option whereas the causal knowledge condition participants may show a greater dependency on the root cause of a mental disorder. Again, for example, participants in the no causal knowledge condition might tend to choose the drug therapy overall, where participants in the causal knowledge condition may tend to choose the treatment most directly affecting the root cause.

In these studies, we will be specifically investigating how the presence of causal knowledge affects treatment choice. Recall our prediction that when causal knowledge is present, treatment choice will be based on the root cause of the mental disorder. If the root cause feature in a causal structure is weighted more heavily than the intermediate causes and terminal effects as shown in previous research (Ahn et al., 2000; Ahn & Kim 2000), then that which directly affects the root cause of a mental disorder should be seen as the most viable treatment option. Therefore, when a disorder has a biological root cause (deemed causally central in the disorder), a psychological intermediate cause, and a neutral (equally biological and psychological) terminal effect, the drug therapy should be chosen as more useful than psychotherapy in treating the patient with this disorder. Likewise, when a disorder has a psychological root cause (deemed causally central in the disorder), a biological intermediate cause, and a neutral terminal effect, the psychotherapy should be chosen as more useful than drug therapy in treating the patient with this disorder. In these disorders, there is no difference in the number of symptoms that are biologically based or psychologically based; the only difference is the causal role

of each symptom within the disorder. Therefore, the predicted results would only occur if people were adhering to the causal information.

Furthermore, when a disorder has a biological root cause, a biological intermediate cause, and a neutral terminal symptom versus a disorder with a biological root cause, a psychological intermediate cause, and a neutral terminal symptom, the drug therapy should be seen as even more useful for the first disorder than the second.

Likewise, when a disorder has a psychological root cause, a psychological intermediate cause, and a neutral terminal symptom versus a disorder with a psychological root cause, biological intermediate cause, and a neutral terminal symptom, the psychotherapy will be seen as even more useful for the first disorder than the second. In these disorders there are multiple causes from the same origin, therefore, the therapy that affects these causes should be seen as highly effective. Conversely, these effects should not arise when no causal information is provided.

Study 1

Participants. Eighty Northeastern University undergraduates participated in Study 1, 40 in the causal knowledge condition and 40 in the no causal knowledge condition. Participants were either given partial credit for an introductory psychology course or monetary compensation in the amount of \$5.

Materials & Procedure. Four artificial disorders, based on symptoms listed in the *DSM-IV-TR* (APA, 2000), were implemented. In the causal knowledge condition, participants were presented with the three major classifying symptoms for each disorder. Next, participants read a sentence identifying the causal pathway of the three symptoms for that disorder, followed by a chain diagram of the causal information. Each disorder's

three symptoms were presented in one the following four chains: (1) psychological → psychological → neutral; (2) biological → biological → neutral; (3) psychological → biological → neutral; (4) biological → psychological → neutral (See Figure 1). Each artificial disorder was created with all four chains of causal information listed above with two versions of each (all of the preceding root and intermediate causes reversed in order) to ensure appropriate symptom content control as well as counterbalancing of symptoms. There were eight patient types created from the four variations of each disorder. The order that the disorders were presented in was randomized within subject and counterbalanced between subjects.

All symptoms were pre-tested and verified as being either biological or psychological in nature (see Appendix A for a more detailed description of this pretest). Symptoms were also pre-tested for which treatment would be most helpful (prescription medication or counseling), and for how serious the symptom was in need of treatment (See Appendix B for a more detailed description of this pretest). In addition, all causal pathways were pre-tested and verified for plausibility (See Appendix C for a more detailed description of this pretest). For example, participants learning about chain 1 (psychological → psychological → neutral) read that *Mikigam Disorder* is classified by the following three symptoms (listed): suicidal thoughts, repeated nightmares, and a decreased need for sleep. Then participants read the causal theory “Clinical researchers have found that in patients diagnosed with *Mikigam Disorder*, suicidal thoughts tend to cause repeated nightmares, and repeated nightmares tend to cause a decreased need for sleep.” Following this, participants viewed the causal chain diagram of this information. After learning the causal information, participants learned of two commonly used

treatments for the disorder; an artificial psychotherapy (i.e. Yentile Therapy) and an artificial drug therapy (i.e. Zorphine Therapy), and were informed that both treatments take up to two weeks for initial improvements to show. Participants were then asked to rate the psychotherapy and the drug therapy on how effectively each would treat the disorder on a scale of 0-100 (0=not at all and 100= extremely helpful). (See Appendix D for sample stimuli). The order of the treatments (drug therapy and psychotherapy) was counterbalanced within subjects across disorders, and the ratings question for each treatment followed the order of the presented treatments and was therefore counterbalanced within subjects as well.

Participants in the no causal knowledge condition only learned of the three symptoms that classify each disorder. These participants did not learn any of the causal information, did not view the causal diagrams, and only learned of the two common forms of treatment for the disorder. Participants were then asked to rate the psychotherapy and the drug therapy on how effectively each would treat the disorder on a scale of 0-100 (0=not at all and 100= extremely helpful). (See Appendix E for sample stimuli). Again the order of the treatments (drug therapy or psychotherapy) was counterbalanced within subjects across disorders, and the ratings questions for each treatment followed the order of the presented treatments and was therefore counterbalanced within subjects as well.

The confidentiality of all information was ensured through IRB approvals prior to participant recruitment. All participants were informed at the beginning of the study that they could decline to answer any questions without penalty.

Results. The following paragraph will give an overview of the important findings of Study 1. When participants learned the biological → psychological → neutral chains, the drug therapy was rated higher (more effective) than the psychotherapy. Likewise, when participants learned the psychological → biological → neutral chain, the psychotherapy was rated higher (more effective) than the drug therapy. These results were not found when participants were presented with the same symptoms without causal information. Also, when participants learned the biological → biological → neutral chains, they rated the drug therapy higher than the psychotherapy and higher than they did for the biological → psychological → neutral chains. Equivalently, when participants learned the psychological → psychological → neutral chains, they rated the psychotherapy higher than the drug therapy and higher than they did for the psychological → biological → neutral chains. Similar results were found with the same symptom sets when no causal knowledge was learned, however, overall ratings were higher in the causal knowledge condition. A more thorough description of the results will follow, with all analyses conducted at the $\alpha = .05$ level.

We first investigated the treatment ratings for the psychological → biological → neutral chains as well as the biological → psychological → neutral chains in the causal knowledge condition. This is the critical analysis to test between hypotheses; if participants were influenced by causal knowledge they should show a treatment preference related to the root cause of the disorder when presented with this information. A 2 (item type: psychological vs. biological) X 2 (treatment type: psychotherapy vs. drug therapy) ANOVA revealed no main effect of item type or treatment type (all p 's > .22); however, the critical interaction was significant, $F(1, 39) = 16.31$, $MSE = 877.43$; $p < .01$;

$\eta^2 = .30$. A series of planned comparisons was conducted. In the psychological \rightarrow biological \rightarrow neutral chains, participants rated the psychotherapy ($M = 75.75$) as more effective than the drug therapy $M = 54.50$; $t(39) = 3.18$; $p < .01$; $\eta^2 = .21$. In the biological \rightarrow psychological \rightarrow neutral chains, participants rated the drug therapy ($M = 74.30$) as more effective than the psychotherapy $M = 57.63$; $t(39) = 2.79$; $p < .01$; $\eta^2 = .17$. Also, the psychotherapy was reliably rated as more effective for the psychological \rightarrow biological \rightarrow neutral chains than for the biological \rightarrow psychological \rightarrow neutral chains; $t(39) = 3.60$; $p < .01$; $\eta^2 = .25$; and drug therapy was rated as more effective for the biological \rightarrow psychological \rightarrow neutral chains than for the psychological \rightarrow biological \rightarrow neutral chains; $t(39) = 3.75$; $p < .01$; $\eta^2 = .26$. These results were predicted and indicate that participants were using the causal information to determine their treatment choice, such that psychotherapy was seen as the best treatment for psychological root causes and drug therapy was seen as the best treatment for biological root causes.

We next looked at the treatment ratings for the psychological, biological, neutral symptom sets as well as the biological, psychological, neutral symptom sets in the no causal knowledge condition. These results again were critical for supporting the hypotheses in showing no treatment preference in the absence of causal knowledge. A 2 (item type: psychological vs. biological) X 2 (treatment type: psychotherapy vs. drug therapy) ANOVA revealed no main effects or interactions (all $p > .46$). These results demonstrate that there was no treatment preference without the presence of causal knowledge (See Figures 2 and 3).

Next, we examined the treatment ratings for the psychological \rightarrow psychological \rightarrow neutral chains as well as the biological \rightarrow biological \rightarrow neutral chains within the causal

knowledge condition. These analyses were to ensure that participants were in fact matching treatment type to symptom type. A 2 (item type: psychological vs. biological) X 2 (treatment type: psychotherapy vs. drug therapy) ANOVA revealed no main effect of item type or treatment type (all p 's > .28); however, the interaction was significant, $F(1, 39) = 37.88$; $MSE = 825.67$; $p < .01$; $\eta^2 = .49$. To determine which contrasts were significant, we conducted several planned comparisons. In the psychological → psychological → neutral chains, participants rated the psychotherapy ($M = 74.80$) as more effective than the drug therapy, $M = 52.73$; $t(39) = 3.07$; $p < .01$; $\eta^2 = .19$. In the biological → biological → neutral chains, participants rated the drug therapy ($M = 77.58$) as more effective than the psychotherapy, $M = 43.73$; $t(39) = 4.93$; $p < .01$; $\eta^2 = .38$. Also, participants reliably rated the psychotherapy as more effective for the psychological → psychological → neutral chains than for the biological → biological → neutral chains; $t(39) = 5.62$, $p < .01$; $\eta^2 = .45$; and rated the drug therapy more effective for the biological → biological → neutral chains than for the psychological → psychological → neutral chains; $t(39) = 5.15$, $p < .01$; $\eta^2 = .41$. Again, these results were as predicted and signify that participants were in fact matching symptom type with treatment type.

To determine that causal knowledge was the influence for treatment choice, we next conducted the same analyses within the no causal knowledge condition. We examined the treatment ratings for the psychological, psychological, neutral symptom sets as well as the biological, biological, neutral symptom sets. A 2 (item type: psychological vs. biological) X 2 (treatment type: psychotherapy vs. drug therapy) ANOVA revealed no main effect of item type or treatment type (all p 's > .82), however, the interaction was significant, $F(1, 39) = 0.011$; $MSE = 683.56$; $p < .01$; $\eta^2 = .35$. Our

planned comparisons showed that in the psychological, psychological, neutral symptom sets, participants rated the psychotherapy ($M = 74.00$) as more effective than the drug therapy $M = 54.03$; $t(39) = 3.37$; $p < .01$; $\eta^2 = .23$. In the biological, biological, neutral symptom sets, participants rated the drug therapy ($M = 73.00$) as more effective than the psychotherapy $M = 55.38$; $t(39) = 2.45$; $p < .02$; $\eta^2 = .13$. Participants also reliably rated the psychotherapy as more effective for the psychological, psychological, neutral symptom sets than for the biological, biological, neutral symptom sets; $t(39) = 4.50$; $p < .01$; $\eta^2 = .34$; and rated the drug therapy as more effective for the biological, biological, neutral symptom sets than for the psychological, psychological, neutral symptom sets; $t(39) = 4.00$; $p < .01$; $\eta^2 = .29$ (See Figure 4 and 5). While these results were similar to those in the causal condition, the ratings were overall higher in the causal condition than in the no causal condition, showing that with the presence of causal knowledge treatment effects are stronger.

Discussion. Overall, Study 1 found that causal information affected treatment choice. When provided with causal information about a mental disorder, participants reliably based their treatment choice on the root cause of the disorder. This effect was even stronger when the disorder symptom sets were cohesive rather than mixed. In the no causal knowledge condition participants based their treatment choice on the content of the symptoms alone. That is, when a disorder had a biological, biological, neutral symptom set participants reliably chose the drug therapy, as the disorder had more biologically based symptoms. Similarly, when a disorder had a psychological, psychological, neutral symptom set, participants reliably chose the psychotherapy as the disorder had more psychologically based symptoms.

When the symptom sets within a disorder were mixed, in the causal knowledge condition, the effect of causal information was clearest. When causal information was provided, participants reliably based their treatment choice on the root cause of the disorder, even though it was the only symptom present with its origin (i.e., biological or psychological). However, when no causal information was provided in the mixed symptom sets, participants did not prefer one symptom to another, as there was no reason to choose one symptom origin over another. As previously mentioned, Study 1 utilized fictitious disorders and treatments, but actual symptoms from disorders within the *DSM-IV-TR* (APA, 2000). The findings of Study 1 therefore, could possibly be due to previous knowledge about specific symptom importance within other mental disorders, though this is unlikely given the results of the control condition. Study 2 was designed to eliminate any previous knowledge about symptoms to determine the underlying effect of causal knowledge when choosing treatment.

Study 2

Participants. Ninety-six Northeastern University undergraduates participated in Study 2, 48 in the causal knowledge condition and 48 in the no causal knowledge condition. Participants were either given partial credit for an introductory psychology course or monetary compensation in the amount of \$5.

Materials & Procedure. The materials and procedure in Study 2 were identical to those in Study 1, except that the symptoms were blank properties rather than actual symptoms from the *DSM-IV-TR* (APA, 2000). Study 2 explicitly dictated whether the symptom was biological or psychological in nature. For example: Symptom Q (biological in nature), Symptom R (psychological in nature), Symptom S (equally biological in

nature and psychological in nature). (See Appendices F and G for sample stimuli.) The materials were randomized and counterbalanced in the same way as in Study 1.

Results. The results from Study 2 replicated the essential findings of Study 1; below is a general overview of those results. Participants again rated the drug therapy higher (more effective) than the psychotherapy when they learned the biological → psychological → neutral chains. Likewise, the psychotherapy was rated higher (more effective) than the drug therapy when participants learned the psychological → biological → neutral chains. When participants learned the biological → biological → neutral chains, they again rated the drug therapy higher than the psychotherapy and higher than they did for the biological → psychological → neutral chains. Additionally, when participants learned the psychological → psychological → neutral chains, they rated the psychotherapy higher than the drug therapy and higher than they did for the psychological → biological → neutral chains. Once again, similar results were found with the same symptom sets when no causal knowledge was learned. However, overall ratings were higher in the causal knowledge condition. A more thorough description of the results will follow, with all analyses conducted at the $\alpha = .05$ level.

Again, we first examined the critical analyses of treatment ratings in the causal knowledge condition. A 2 (item type: psychological vs. biological) X 2 (treatment type: psychotherapy vs. drug therapy) ANOVA revealed no main effect of item type or treatment type (all p 's $< .33$); however, again the critical interaction was significant, $F(1, 47) = 16.86$; $MSE = 679.31$; $p < .01$; $\eta^2 = .26$. A series of planned comparisons was conducted. In the psychological → biological → neutral chains, participants rated the psychotherapy ($M = 73.15$) as more effective than the drug therapy $M = 56.27$; $t(47) =$

4.18, $p < .01$; $\eta^2 = .27$. In the biological \rightarrow psychological \rightarrow neutral chains, participants rated the drug therapy ($M = 72.69$) as more effective than the psychotherapy $M = 58.67$; $t(47) = 2.66$; $p < .01$; $\eta^2 = .13$. Also, the psychotherapy was reliably rated as more effective for the psychological \rightarrow biological \rightarrow neutral chains than for the biological \rightarrow psychological \rightarrow neutral chains; $t(47) = 3.32$; $p < .01$; $\eta^2 = .19$. Drug therapy was rated as more effective for the biological \rightarrow psychological \rightarrow neutral chains than for the psychological \rightarrow biological \rightarrow neutral chains; $t(47) = 4.89$; $p < .01$; $\eta^2 = .34$. Again, these results were as predicted and imply that participants were sensitive to the causal knowledge in treatment preference, choosing drug therapy for the biological root causes and psychotherapy for the psychological root causes.

Secondly, we investigated the treatment ratings in the no causal knowledge condition to ensure that similar results were not found in the absence of causal knowledge. A 2 (item type: psychological vs. biological) X 2 (treatment type: psychotherapy vs. drug therapy) ANOVA revealed no significant main effect of item type ($p > .17$). There was, however, a marginally significant main effect of treatment type; $F(1,47) = 1.98$; $p < .06$; $\eta^2 = .07$; such that ratings for psychotherapies were higher than ratings for drug therapies (drug therapy: $M = 54.55$, $SD = 2.39$; psychotherapy: $M = 59.66$, $SD = 2.14$). There was also a marginally significant interaction; $F(1, 47) = 3.87$; $p < .06$; $\eta^2 = .08$. Contrasts in the psychological, biological, neutral symptom sets showed a preference for psychotherapy ($M = 60.35$) over drug therapy $M = 51.65$; $t(47) = 3.44$; $p < .01$; $\eta^2 = .20$. Contrasts also showed no preference in the biological, psychological, neutral symptom sets for drug therapy ($M = 57.46$) or for psychotherapy $M = 58.96$; $t(47) = 0.40$; $p > .01$; $\eta^2 < .01$. Also, psychotherapy was not reliably rated as more effective for

the psychological, biological, neutral symptom sets or for the biological, psychological, neutral symptom sets; $t(47) = 0.60$; $p > .01$; $\eta^2 = .01$. Unexpectedly, the drug therapy was rated as more effective for the biological, psychological, neutral symptom sets than for the psychological, biological, neutral symptom sets; $t(47) = 2.33$; $p < .03$; $\eta^2 = .10$ (See Figures 6 and 7). This last finding in the no causal knowledge condition shows a treatment preference that was not present in Study 1. We therefore ran a comparison of treatment ratings in the causal knowledge condition and the no causal knowledge condition for the mixed symptom sets. This was to see the difference in the drug therapy ratings for the psychological, biological, neutral symptom sets versus the biological, psychological, neutral symptom sets in both the causal knowledge and no causal knowledge condition. As expected, the difference between the drug therapy ratings in the causal knowledge condition for the biological, psychological, neutral symptom sets and the psychological, biological, neutral symptom sets ($M = 16.42$) was much larger than the difference between the drug therapy ratings in the no causal knowledge condition for the biological, psychological, neutral symptom sets and the psychological, biological, neutral symptom sets; $M = 5.81$; $t(48) = -2.73$; $p < .01$. This comparison showed that although there was a significant result in the no causal knowledge condition, the effect of causal knowledge was much stronger than in the no causal knowledge condition.

We next examined the treatment ratings for the psychological → psychological → neutral chains as well as the biological → biological → neutral chains within the causal knowledge condition. This was to once again establish that participants were matching treatment type to symptom type. A 2 (item type: psychological vs. biological) X 2 (treatment type: psychotherapy vs. drug therapy) ANOVA revealed no main effect of

item type or treatment type (all p 's > .31); however, the interaction was significant, $F(1, 47) = 67.45$; $MSE = 1095.69$; $p < .01$; $\eta^2 = .59$. We then conducted several planned comparisons. In the psychological \rightarrow psychological \rightarrow neutral chains, participants rated the psychotherapy ($M = 81.56$) as more effective than the drug therapy, $M = 45.06$; $t(47) = 5.99$; $p < .01$; $\eta^2 = .43$. In the biological \rightarrow biological \rightarrow neutral chains, participants rated the drug therapy ($M = 83.15$) as more effective than the psychotherapy $M = 41.17$; $t(47) = 8.21$; $p < .01$; $\eta^2 = .59$. Also, participants reliably rated the psychotherapy as more effective for the psychological \rightarrow psychological \rightarrow neutral chains than for the biological \rightarrow biological \rightarrow neutral chains; $t(47) = 8.06$, $p < .01$; $\eta^2 = .58$; and rated the drug therapy more effective for the biological \rightarrow biological \rightarrow neutral chains than for the psychological \rightarrow psychological \rightarrow neutral chains; $t(47) = 7.92$, $p < .01$; $\eta^2 = .57$. These findings parallel Study 1 and once again show that participants were mapping the drug therapy onto the biological symptoms and the psychotherapy onto the psychological symptoms.

Lastly, we investigated these same symptom sets within the no causal knowledge condition. We examined the treatment ratings for the psychological, psychological, neutral symptom sets as well as the biological, biological, neutral symptom sets. A 2 (item type: psychological vs. biological) X 2 (treatment type: psychotherapy vs. drug therapy) ANOVA revealed no main effect of item type or treatment type (all p 's > .14); however, the interaction was significant; $F(1, 47) = 44.92$; $MSE = 898.11$; $p < .01$; $\eta^2 = .49$. Our planned comparisons showed that in the psychological, psychological, neutral symptom sets, participants rated the psychotherapy ($M = 73.77$) as more effective than the drug therapy $M = 40.6$; $t(47) = 7.04$; $p < .01$; $\eta^2 = .51$. In the biological, biological,

neutral symptom sets, participants rated the drug therapy ($M = 69.71$) as more effective than the psychotherapy $M = 44.9$; $t(47) = 4.50$; $p < .01$; $\eta^2 = .30$. Participants also reliably rated the psychotherapy as more effective for the psychological, psychological, neutral symptom sets than for the biological, biological, neutral symptom sets; $t(47) = 6.51$; $p < .01$; $\eta^2 = 0.47$; and rated the drug therapy as more effective for the biological, biological, neutral symptom sets than for the psychological, psychological, neutral symptom sets; $t(47) = 6.31$; $p < .01$; $\eta^2 = 0.46$ (See Figures 8 and 9). Once again however, overall ratings were higher in the causal condition than in the no causal condition.

In sum, Study 2 found similar results to Study 1 in the causal knowledge condition where the presence of causal information guided treatment ratings. Once again, participants chose the treatment that was related to the origin of the root cause symptom. In the no causal knowledge condition of Study 2, results varied somewhat from the no causal knowledge condition in Study 1. Specifically, participants learning no causal information in Study 2 viewed psychotherapy as more useful overall than the drug therapy. Also, participants in the no causal knowledge condition of Study 2 showed a preference for drug therapy in the biological \rightarrow psychological \rightarrow neutral chains much like that in the causal knowledge conditions of both Study 1 and 2. However, this effect was significantly stronger in the causal knowledge condition than in the no causal knowledge condition. With this slight difference in results from Study 1 to Study 2, one possible reason for this is that Study 1 used actual symptoms. When the overall disorder did not seem to be biologically based or psychologically based, participant's treatment ratings were somewhere in-between the two treatments options. In Study 2, when the properties were blank and each disorder explicitly had one biological symptom, one psychological

symptom and one symptom that was equally biological and psychological, it is likely that participants chose treatment based on the first symptom alone since the disorders were so obscure.

Discussion. The results of Study 2, like those of Study 1, support the idea that causal information is essential in determining treatment choice. Both Study 1 and Study 2 used artificial mental disorders and treatments to minimize effects of any previous knowledge. Study 2 also removed any preceding familiarity with symptoms by using blank properties. Participants were told that both treatments take equal amounts of time to begin being effective, which created balance between the treatments that may not have been there otherwise. With no prior knowledge interfering with participants' choices, we can reasonably surmise that causal information was the reason for the difference in treatment choice. There was no overwhelming bias towards either psychotherapy or drug therapy that would have negated any effect of causal knowledge. Although in disorders with the biological, biological, neutral symptom sets and psychological, psychological, neutral symptom sets, participants who did not learn causal information mirrored the treatment choice of the participants who did learn casual knowledge, we can still conclude that causal knowledge did have a significant impact because of the treatment ratings in the mixed symptom sets. While it could have been possible that those participants who did not learn causal information either inferred causal structure or rated the treatments based on their prior knowledge in Study 1, results in the mixed symptom sets showed no treatment preference based on these same symptoms. This was unlike the participants in the causal knowledge condition, who did show a preference for treatment based on the root cause of the disorder. The findings of both Study 1 and 2 for the

biological, biological, neutral symptom sets and psychological, psychological, neutral symptom sets in the no causal knowledge condition could be due to the cohesiveness of the disorder category when there are two symptoms of the same origin. Although causal information was not present, the collection of symptoms itself helped cue a specific treatment preference. However, in the causal knowledge condition the treatment preference was more pronounced, indicating that causal information creates a stronger certainty that a specific treatment will be effective.

One other interesting finding was that whereas participants based their treatment ratings on the root cause of the disorder after learning the causal information, the biological, biological, neutral symptom sets were rated highest of all for their preferred treatment (drug therapy) and the biological, psychological, neutral symptom sets were rated lowest for their preferred treatment (drug therapy) in both the causal knowledge condition and no causal knowledge condition of Studies 1 and 2. Haslam and Ernst (2002) suggested that lay people perceive the essence of mental disorders to be more natural/biological regardless of the disorder, similarly to the concept of medical diseases. Although Ahn, Flanagan, Marsh, and Sanislow (2006) suggest that this essentialist thinking is only found with medical diseases rather than mental disorders, this still may be the underlying reason for this finding. Participants in the current study may have rated the drug therapy higher for the biological, biological, neutral symptom sets than for the psychological, psychological, neutral symptom sets, because the first disorder is seen as more medical than mental in nature. Also, Haslam and Ernst (2002) suggested that people might think of disorders as cohesively biological in nature, therefore when presented with the biological, psychological, neutral symptom sets, this knowledge conflicted with what

they may naturally assume to be true of mental disorders. Specifically, if participants believed drugs to be highly effective in treating a disorder that was fully biological in nature, when one symptom in that same disorder is no longer biological this may drastically change how they view the overall origin of the disorder, potentially creating much lower drug therapy ratings. If this is the reason behind the variation in treatment ratings, then perhaps treatment of mental disorders is seen as affecting the essential properties of a mental disorder. Further investigation would be needed to determine if this is the case.

General Discussion

The current research approached theory-based categorization in a novel way, using artificial mental disorders to examine treatment choice. Previous research has examined the importance of causal theories in classifying objects into categories (Rehder, 2003a; Rehder, 2003b; Rehder & S. Kim, 2006) as well as medical and mental diagnosis (Ahn, 2000; Ahn, Kim, Lassaline & Dennis, 2000; Keil, 2006). The past findings suggest that people are sensitive to causal information in theory-based categorization and that this influences classification significantly. The current studies went a step further and examined if causal information not only helped to classify the mental disorder but also helped determine which treatments are likely to be seen as the most useful. This research implies that people use causal information to aid in their treatment choice, and also that treatment choice is affected by the information known about the whole category. Ross (1997) suggested that category use affects classification during the learning phase in that when classification is learned by using a category, the specific features will be classified in a unique way. With the presence of causal knowledge, an even more specific effect

was shown in the current studies. Participants learned about a disorder category, learned of the classifying symptoms, and used those symptoms to aid in their treatment choice. Without this causal information, the classified symptoms were of less importance to the category, which caused treatment choice to be more arbitrary.

Currently, we are working on a follow-up study that will more closely examine how people use causal information in treatment choice for mental disorders. Specifically, where *CSH* and *CMT* agree that the root cause is viewed as the more important feature of a category, these models do not agree about the importance of intermediate and terminal symptoms. As noted previously, *CSH* predicts feature importance based on the status of the feature within the category, the more conceptually central the feature, the more important it is to the category. *CMT* however, predicts that feature importance is dependant on the amount of direct causal links from one feature to the next. Therefore, in a three-step chain where A causes B and B causes C, *CSH* predicts that B will be viewed as more important than C (B has a higher causal status than C) where *CMT* predicts that B and C are equally important (both have one direct cause). We are in the process of executing a study where participant's drug and psychotherapy ratings will indicate which model more accurately predicts how people utilize causal information in respect to treatment choice.

Additionally, we are hoping to bring a similar study to clinicians. We have examined how laypeople use causal information in treatment choice, but we also know that laypeople are less informed about mental disorders and therefore may choose treatment differently than clinicians. As clinicians are most often suggesting treatment for

mental disorders, it will be highly informative to learn how clinicians decide on treatment and how causal information influences this choice.

Whereas the current studies examined the effect of causal knowledge with artificial disorders and treatments, in the future we would also like to investigate how causal information is conceptualized in actual disorders with actual treatments. We now know that causal information does have an effect on treatment choice when the causal information is made salient and available. As Furnham and Wardley (1990, 1991) discussed, laypeople possess only partial concepts of mental disorders and therefore do not fully understand the causes of these disorders. However, laypeople still have some understanding of disorders that seem more biological and others that seem more psychological in nature. Whereas these concepts may be incomplete, people still seek out treatment based on what they believe to be true of the disorder. Today, people can find information on the internet, billboards, and television advertisements all explaining information about certain mental disorders. Although this information may be factual, it is not complete. If people are influenced by these sources alone, their treatment choice may not be ideal for their disorder. As the current studies examined the effects of cohesive, salient causal pathways for mental disorders on treatment choice, it is unmistakable that the availability of this knowledge would be of significant value for the public as well as health professionals. With clear information about causal pathways for mental disorders, people would understand full concepts and be able to make more informed, accurate choices for treatment based on this knowledge.

As previously mentioned, a patient must receive a diagnosis to begin treatment, but first they have to seek out a health professional. This person is usually someone who

is available, whom the patient feels comfortable with, and whom the patient believes is knowledgeable about their disorder. Riedel-Heller, Matschinger, and Angermeyer (2004) found that patients clearly seek out help from professionals they feel have the most knowledge and ability to heal their mental disorders. This choice is also highly influenced by the perceived cause of the mental illness, such that a psychiatrist is seen as better treatment source for disorders with a more biological cause like brain disease and schizophrenia and a psychologist is seen as being much less helpful. Also, for disorders influenced by psychological or external stressors such as depression, a psychotherapist is seen as the better source for treatment than a psychiatrist (Reidel-Heller et al., 2004).

For patients, the current studies suggest that it may be the perceived cause that holds significant importance. A patient may seek out a psychiatrist if they are experiencing biological symptoms and therefore begin taking psychotropic medication. However, after learning more about their specific disorder or beginning to experience additional symptoms, the patient may believe the cause of their disorder is more psychological in nature and therefore cease taking their medication. Likewise, if a patient enters therapy because of psychologically based symptoms and they continually feel biological or physical symptoms as well, they may believe that psychotherapy is not the best treatment for them and enter a medication regimen instead or in addition to the therapy. It is vastly important that patients grasp a full understanding of their disorder and the importance of the effect their treatment has on the disorder so that they know they are receiving the most appropriate treatment.

There has been some speculation about how people conceptualize the origin of a mental disorder, based on the essence of the disorder. Where Haslam and Ernst (2002)

suggested that people view mental disorders as having some underlying biological or organic cause, recent research by Ahn et al. (2006) suggests otherwise. Although lay people believe that there is an underlying biological cause for most medical diseases, they are less willing to admit this for mental disorders. Clinicians are also unwilling to believe that there is a single essence of a mental disorder that must be eradicated in order to treat the disorder. Therefore, it is important to fully understand the patient's illness before treating, as there are many reasons why a patient may be suffering from a mental disorder and often only one reason for a patient suffering from a medical disease. Overall, Ahn et al. (2006) found that people hold much stronger essentialist beliefs about medical disorders than they do about mental diseases, showing that there are often many contributors to a mental disorder and not only one.

There are also multiple factors influencing treatment seeking for mental disorders in addition to the causal information pertaining to the disorder. One of the more serious influences is the societal view of mental disorders. There is a serious social stigma towards mental illness that leads people to strongly avoid a diagnosis. Four types of stereotypes about mental disorders have been recognized that not only affect the individual with the disorder, but also their treatment seeking. First, people with mental disorders are seen as dangerous and should be avoided. Second, people with mental disorders are to blame for their problems because it is a weakness in their character. Third, those with illnesses are incompetent and require authority figures to make decisions for them. And lastly, they are viewed as childlike and in need of parental figures to care for them. Unfortunately, due to these socially acknowledged stereotypes, patients will avoid a mental disorder diagnosis at all costs, as the label "mentally ill" is

often more psychologically damaging than the disorder itself (Corrigan, 2002). The stigma these stereotypes create also results in a predicament for people in search of treatment. Not only are patients often unsure of which treatment is right for them, but they are forced to weigh the benefits of treatment versus the disadvantages of having a mental illness in today's society. Patients may ultimately attempt to evade a mentally ill diagnosis, which means they are not always receiving the most appropriate treatment, if any.

With such a severe social stigma against a mentally ill diagnosis, if treatment is chosen it can often be based on the most discreet method. This ultimately means that people might choose drug therapies over psychotherapies. Most people have a general practitioner, who, like a psychiatrist, can administer psychotropic medications for most mental disorders. The idea of going to see your 'doctor' carries a lot less of the stigma surrounding mental illness than if someone mentioned they were going to their therapist or to a therapy session (Corrigan, 1996). Therefore, in an attempt to evade the stigma and find treatment easily, people may turn to drug therapies for disorders even when this may not be the best treatment option. Aside from the stigma, there is also the issue of time. People want to feel better, but they also want this to happen as quickly as possible. While in actuality many drug therapies and psychotherapies begin effectiveness around the same time, the actual time away from other activities can be viewed as much higher for psychotherapy than drug therapy (DeRubeis, Gelfand, Tang, & Simons, 1999; DeRubeis, Hollon, Amsterdam, Shelton, Young, Salomon, O'Reardon, Lovett, Gladis, Brown, & Gallop, 2005; Elkin, Shea, Watkins, & Imber, 1989; Holden, 2003; Corrigan, 1996). This may artificially imply that drug therapies could be the best option, as it appears to be

the quickest method of treatment. However, even though drugs are often seen as the more appealing option, 40% of people taking anti-psychotic medications did not comply with their prescribed amount, most often due to side effects (Craven & Rosenbech, 1998). Patients will cease treatment for unwanted side effects when they believe that these effects are worse than their original disorder (Holden, 2003). This line of thought may lead people to only seek out psychotherapy, as there are no common adverse effects.

In having to deal with the social stigma against mental disorders as well as attempting to receive treatment in an inconspicuous manner, in the quickest amount of time, and with the fewest side effects possible, people are faced with an incredibly complex decision. This is often why a health professional is contacted in the first place. It has been suggested that the best treatment comes from good communication between doctor and patient (Friberg & Hansson-Scherman, 2005; Cameron, 1996). If a patient believes they have a problem they will talk about it in whatever terms they understand, therefore, it is the doctor's responsibility to discuss the illness in terms the patient will comprehend and teach those terms that are unfamiliar. This has been shown to greatly increase treatment compliance (Friberg & Hansson-Scherman, 2005; Cameron, 1996), once a patient can understand their mental illness they are more willing to adhere to their treatment regimen. Specifically, clinicians use the *DSM-IV-TR* to aid in their diagnosis and help decide on treatment for their patients (APA, 2000). However, as previously mentioned, the *DSM-IV-TR* is less than ideal in explaining the concept and origin of mental disorders for both clinicians and patients. Given the current findings, if the *DSM-IV-TR* discusses no etiologies, how is treatment supposedly chosen by clinicians? And if treatment is chosen based on individual clinician's theories, does this mean that the

organization of the *DSM-IV-TR* is not in practical use (Cooper, 2004; Helmuth, 2003)? Currently the *DSM-IV-TR* is in the process of being edited for its newest version, with a predicted publishing date sometime near 2010. This new version will begin to incorporate etiologies of disorders, allowing for different disorders to come about through different causes (Helmuth, 2003). Fortunately, this addition should greatly increase patient understanding of mental disorders as clinicians will be able to more clearly explain how a treatment will affect the cause of a particular mental disorder. With greater understanding of the causal pathways for mental disorders, perhaps these other aforementioned extraneous factors will have less of an influence over treatment choice.

Although it is apparent that the cause of a mental disorder is important to clinicians and other medical professionals as well as patients, all of the previously discussed aspects also contribute to how causal information may be utilized in reasoning about actual mental disorders. While we currently know some causal information for the pathway of certain mental disorders, we are lacking the full picture. And while we know that certain drugs can alleviate symptoms of mental disorders, we don't fully understand all the internal mechanisms these drugs work on. Psychotherapy is constantly evolving and changing with new techniques for better patient experience and recovery. Therefore, the real story of treatment choice is unfortunately much more complicated in the world than in the current study. We hope that with small steps we can gain more information about how treatment is chosen and how the presence of even slices of causal information would aid in treatment choice and effectiveness for mental disorders in the future.

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Appendix A

Pilot 1: Nature of symptoms

The purpose of this pilot was to ensure that the symptoms chosen from the *DSM-IV-TR* were seen as being biological/physical in nature (henceforth “biological”), psychology/environmental in nature (henceforth “psychological”), or equally both. By choosing symptoms on this basis, we could plausibly create disorders that were seen as having psychological causes (the root cause being psychological in nature) and disorders having biological causes (the root cause being biological in nature). Eighty symptoms from various disorders in the *DSM-IV-TR* were chosen to be rated in this pilot. Fifteen participants were asked to rate how psychological in nature and how biological in nature each symptom was on a scale of 1 to 9 (1=not at all, 9=very). Participants also had the option of checking the ‘don’t know’ box if they were unfamiliar with the symptom and did not wish to rate it. The features rated highest as being psychologically caused were to be used as the psychological root and intermediate causes and the features rated highest as being biologically caused were to be used as the biological root and intermediate causes. This was to ensure the plausibility of the causal pathways as well as to equate the strength of all psychological causes and all biological causes. Of all eighty symptoms rated, the 62 highest rated symptoms (psychological: $M=6.18$, $SD=1.34$, range: 3.67-12.33; biological: $M=5.05$, $SD=1.28$, range: 3-7.8) were taken and used for further pre-testing in a second pilot.

Appendix B

Pilot 2: Matching Treatment Type with Symptom Type

Following Pilot 1, this second pilot was testing each of the chosen sixty-two symptoms on their inherent treatment matching as well as their severity. Out of the sixty-two symptoms rated for being psychological in nature or biological in nature, we wanted to make sure that the symptoms were seen as being best treated by counseling/psychotherapy (henceforth “counseling”) for the psychological symptoms or prescription medications for the biological symptoms. In addition to testing for treatment type, we also wanted to determine the severity of each symptom. Sixteen participants were asked to rate how helpful counseling and prescription medications would be in treating each of the 62 symptoms from Pilot 1. Participants were then also asked to rate each symptom on how serious the problem (the symptom) was (i.e. to what degree professional help would be necessary). Participants also had the option of checking the ‘don’t know’ box if they were unfamiliar with the symptom and did not wish to rate it. The two ratings types (treatment and severity) were counterbalanced and randomized between subjects. Symptoms were chosen based on the highest ratings for treatment type (counseling and prescription medications) followed by the nature of the symptom (psychological and biological). In the rare cases in which the ratings from Pilots 1 and 2 did not run in the same direction for a particular symptom, it was our strategy to choose the symptoms based on highest rated treatment type rather than the nature of the symptom because both Study 1 and 2 were concerned with how the causal information about a particular disorder affects the choice of treatment type.

Of the sixty-two symptoms, a total of 20 were to be used in Study 1. Each of the four disorders were to be comprised of two psychologically based symptoms, two biologically based symptoms, and one symptom that was viewed as being equally psychological and biological. Of the sixty-two rated symptoms in this pilot, 8 symptoms rated highest for counseling (and psychological), and 8 symptoms rated highest for prescription medication (and biological) were chosen. An additional four symptoms were chosen with ratings that fell in the middle of the spectrum for counseling and prescription medication as well as their psychological and biological nature. Of these three groups of symptoms (counseling and psychological, prescription medication and biological, and neutral terminal symptoms) four artificial disorders were created. Each artificial disorder was created based on rating equality (the items to be used for the psychological root and intermediate causes rated equally high for counseling and psychological nature as the biological root and intermediate causes were rated for prescription medications and biological nature), severity equality (the severity of all symptoms rated as equal as possible within a disorder), and for which symptoms could logically belong to a single concept (See Table 1 for all disorder data).

This data was gathered to equate the psychological root and intermediate causes and the biological root and intermediate causes for likelihood of treatment choice. Once all the root and intermediate causes were equated for treatment preference (counseling chosen for all psychological causes and prescription medication chosen for all biological causes), the items could be utilized in the causal knowledge condition without any differentiation in preference choice for both psychological causes and both biological causes. This allows for the treatment choice to be attributed to the influence of causal

knowledge. Using these four artificial disorders, each with five symptoms, we further pre-tested for the plausibility of all possible causal theories within a disorder.

Appendix C

Pilot 3: Plausibility of Causal Theories

The third pilot was to test the plausibility of the causal theories created from the artificial mental disorders. Four artificial disorders, each with 5 symptoms, were broken down into causal chains that consisted of one root cause (psychological or biological), one intermediate cause (psychological or biological), and one neutral terminal symptom. As each disorder had two psychological symptoms, two biological symptoms, and one neutral symptom, a total of 12 potential causal theories per disorder could possibly be created. Of these twelve possible theories, only 8 were needed to ensure appropriate counterbalancing between subjects (a psychological → psychological → neutral chain, a biological → biological → neutral chain, a psychological → biological → neutral chain, a biological → psychological → neutral chain; and all of the preceding root and intermediate causes reversed in order).

Sixteen participants read a total of 48 causal theories (12 per each of the four disorders) and were asked to rate how plausible the description was on a scale of 1 to 9 (1=not at all plausible, 9=completely plausible). The causal theories were randomized and counterbalanced between subjects.

The psychological → psychological → neutral causal chains and the biological → biological → neutral causal chains were rated for plausibility as a check to ensure that they were in fact plausible, as all four of these chains were utilized between subjects. The remaining eight chains were made up of the four symptoms used in the psychological → psychological → neutral chains and the biological → biological → neutral chains that were counterbalanced. Of those eight chains, two pairs (a psychological root cause and a

biological intermediate cause with its reverse) were chosen based on the highest plausibility ratings overall, as well as equal plausibility ratings across the pair (see Table 2 for a list of the causal theories and plausibility ratings for each disorder).

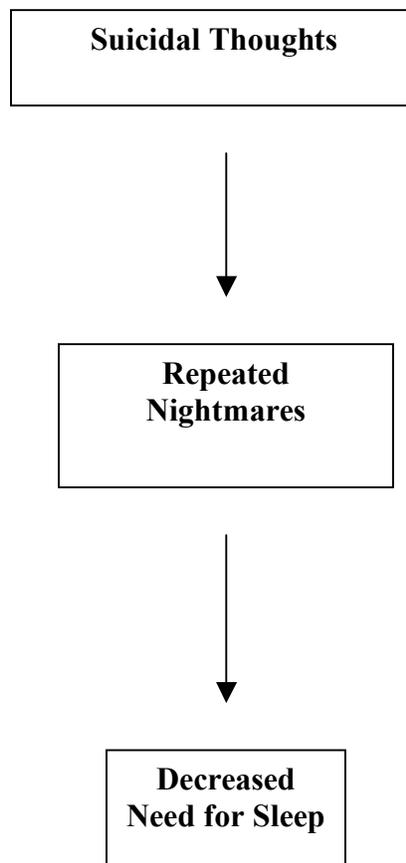
Appendix D

Mikigam Disorder

There is a mental disorder known as *Mikigam Disorder*. This disorder is classified by the following symptoms:

Suicidal Thoughts
Repeated Nightmares
Decreased Need for Sleep

Clinical researchers have found in patients diagnosed with *Mikigam Disorder*, **suicidal thoughts** tend to cause **repeated nightmares**, and **repeated nightmares** tend to cause a **decreased need for sleep**.



When you understand this information please turn onto the following page. You may turn back to this page at any time. Please feel free to ask the experimenter any questions.

Appendix D Continued

There are two commonly used treatment options for *Mikigam Disorder*.

Both treatments are equally available and cost efficient.

- One treatment is the psychotherapy known as **Yentile Therapy**.
- Another treatment is the drug therapy known as **Zoraphine Therapy**.

Initial signs of improvements may take up to two weeks to appear for either treatment option.

Below, please rate each treatment option on how effectively it would treat *Mikigam Disorder* on a scale of 0-100 (0=not at all effective, 100=extremely effective).

Yentile Therapy (0-100) _____

Zoraphine Therapy (0-100) _____

Appendix E

Mikigam Disorder

There is a mental disorder known as *Mikigam Disorder*. This disorder is classified by the following symptoms:

- Suicidal Thoughts**
- Repeated Nightmares**
- Decreased Need for Sleep**

There are two commonly used treatment options for *Mikigam Disorder*.

Both treatments are equally available and cost efficient.

- One treatment is the *psychotherapy* known as **Yentile Therapy**.
- Another treatment is the *drug therapy* known as **Zoraphine Therapy**.

Initial signs of improvements may take up to two weeks to appear for either treatment option.

Below, please rate each treatment option on how effectively it would treat *Mikigam Disorder* on a scale of 0-100 (0=not at all effective, 100=extremely effective).

Yentile Therapy (0-100) _____

Zoraphine Therapy (0-100) _____

Appendix F

Mikigam Disorder

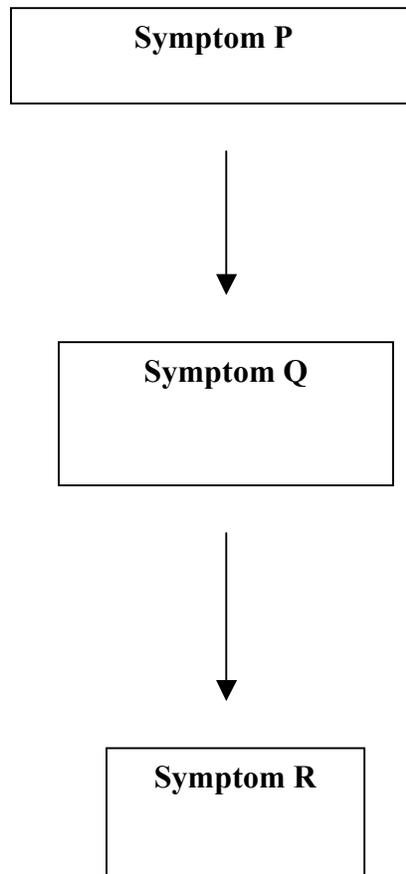
There is a mental disorder known as *Mikigam Disorder*. This disorder is classified by the following symptoms:

Symptom P, which is psychological/environmental in nature

Symptom Q, which is psychological/environmental in nature

Symptom R, which is equally psychological/environmental & biological/physical in nature

Clinical researchers have found in patients diagnosed with *Mikigam Disorder*, **Symptom P** tends to cause **Symptom Q**, and **Symptom Q** tends to cause a **Symptom R**.



When you understand this information please turn onto the following page. You may turn back to this page at any time. Please feel free to ask the experimenter any questions.

Appendix F Continued

There are two commonly used treatment options for *Mikigam Disorder*.

Both treatments are equally available and cost efficient.

- One treatment is the psychotherapy known as **Yentile Therapy**.
- Another treatment is the drug therapy known as **Zorphine Therapy**.

Initial signs of improvements may take up to two weeks to appear for either treatment option.

Below, please rate each treatment option on how effectively it would treat *Mikigam Disorder* on a scale of 0-100 (0=not at all effective, 100=extremely effective).

Yentile Therapy (0-100) _____

Zorphine Therapy (0-100) _____

Appendix G

Mikigam Disorder

There is a mental disorder known as ***Mikigam Disorder***. This disorder is classified by the following symptoms:

Symptom P, which is psychological/environmental in nature

Symptom Q, which is psychological/environmental in nature

Symptom R, which is equally psychological/environmental & biological/physical in nature

There are two commonly used treatment options for ***Mikigam Disorder***.

Both treatments are equally available and cost efficient.

- One treatment is the psychotherapy known as **Yentile Therapy**.
- Another treatment is the drug therapy known as **Zoraphine Therapy**.

Initial signs of improvements may take up to two weeks to appear for either treatment option.

Below, please rate each treatment option on how effectively it would treat ***Mikigam Disorder*** on a scale of 0-100 (0=not at all effective, 100=extremely effective).

Yentile Therapy (0-100) _____

Zoraphine Therapy (0-100) _____

Table 1

Symptom Origin and Treatment Ratings for Mikigam Disorder

Item	Type	Biological	Psychological	Prescription Meds	Counseling	Severity
Repeated nightmares	Psych	3.733 (2.120)	6.733 (1.792)	4.000 (2.503)	7.313 (1.922)	5.688 (1.702)
Suicidal Thoughts	Psych	3.333 (2.127)	7.533 (1.407)	4.625 (2.500)	7.813 (2.287)	7.813 (2.287)
Hallucinations	Bio	5.800 (2.783)	5.600 (2.823)	6.125 (2.187)	5.938 (2.265)	7.813 (1.109)
Insomnia	Bio	6.133 (2.615)	5.600 (2.354)	6.625 (1.708)	6.063 (2.112)	5.625 (1.893)
Decreased need for sleep	Neut	6.266 (1.907)	5.333 (1.759)	5.375 (2.985)	5.563 (2.159)	4.688 (2.182)

Symptom Origin and Treatment Ratings for Onyellis Disorder

Item	Type	Biological	Psychological	Prescription Meds	Counseling	Severity
Deliberate fire starting	Psych	3.666 (2.895)	6.733 (2.840)	3.250 (2.380)	7.750 (1.483)	7.563 (1.788)
Recurrent recollections of a distressing event	Psych	4.066 (3.305)	6.933 (2.685)	3.875 (2.527)	7.750 (1.238)	6.563 (1.711)
Motor agitation	Bio	5.000 (3.566)	3.866 (3.292)	5.438 (2.756)	4.438 (2.159)	5.313 (2.651)
Nausea or vomiting	Bio	7.800 (1.521)	3.933 (2.815)	7.125 (2.029)	2.688 (2.213)	5.125 (2.579)
Amnesia	Neut	6.066 (2.434)	4.866 (2.386)	4.250 (3.256)	4.375 (3.074)	7.375 (1.408)

Symptom Origin and Treatment Ratings for Nairbick Disorder

Item	Type	Biological	Psychological	Prescription Meds	Counseling	Severity
Excessive or unreasonable fear	Psych	4.466 (2.532)	7.200 (1.656)	3.125 (1.893)	7.563 (1.315)	5.813 (1.601)
Recurrent thoughts that produce anxiety	Psych	4.933 (2.549)	6.600 (1.724)	5.313 (2.626)	7.313 (1.302)	4.688 (2.213)
Muscle tension	Bio	7.000 (2.619)	3.666 (2.469)	6.250 (2.793)	3.125 (2.391)	3.625 (1.821)
Trembling or shaking	Bio	6.333 (2.320)	4.066 (2.434)	6.000 (2.556)	3.688 (2.575)	5.250 (1.949)
Forgetful in daily activities	Neut	6.400 (1.502)	5.800 (2.305)	4.750 (2.745)	4.438 (2.632)	4.875 (1.928)

Symptom Origin and Treatment Ratings for Yopiercey Disorder

Item	Type	Biological	Psychological	Prescription Meds	Counseling	Severity
Failure to develop peer relationships	Psych	4.733 (2.712)	7.066 (1.907)	2.688 (1.852)	7.688 (1.352)	5.688 (1.887)
Social anxiety	Psych	4.933 (2.631)	6.933 (1.624)	4.938 (2.720)	7.313 (1.401)	5.063 (1.526)
Abnormal sleep patterns	Bio	6.400 (1.805)	5.933 (1.580)	5.500 (1.862)	5.375 (2.187)	5.000 (1.862)
Difficulty concentrating	Bio	6.000 (2.171)	6.733 (1.981)	6.188 (2.536)	4.813 (2.536)	5.063 (1.879)
Fatigue	Neut	7.333 (2.127)	5.133 (2.386)	5.313 (2.414)	4.438 (2.581)	4.063 (1.982)

Note: The standard deviations are presented in parentheses with each mean

Table 2

Causal Theories and Plausibility Means for Mikigam Disorder

Causal Theory	Root Cause	Intermediate Cause	Neutral Terminal Symptom	Plausibility Mean Ratings
Causal Theory 1	Suicidal Thoughts	Repeated Nightmares	Decreased Need for Sleep	5.125 (2.363)
Causal Theory 2	Repeated Nightmares	Suicidal Thoughts	Decreased Need for Sleep	4.375 (2.217)
Causal Theory 3	Hallucinations	Insomnia	Decreased Need for Sleep	5.6875 (2.213)
Causal Theory 4	Insomnia	Hallucinations	Decreased Need for Sleep	4.0625 (2.265)
Causal Theory 5	Repeated Nightmares	Hallucinations	Decreased Need for Sleep	4.5 (2.503)
Causal Theory 6	Hallucinations	Repeated Nightmares	Decreased Need for Sleep	5.0625 (2.323)
Causal Theory 7	Suicidal Thoughts	Hallucinations	Decreased Need for Sleep	4.5625 (2.190)
Causal Theory 8	Hallucinations	Suicidal Thoughts	Decreased Need for Sleep	5.0625 (2.016)

Note: This is a sample of the causal theories counterbalanced for one disorder (Mikigam), the standard deviations are in parentheses after the mean ratings

Figure Captions

Figure 1. Four types of causal chains used in the experimental conditions

Figure 2. Drug and psychotherapy ratings for the psychological → biological → neutral symptom sets of both the causal knowledge and no causal knowledge conditions in Study 1

Figure 3. Drug and psychotherapy ratings for the biological → psychological → neutral symptom sets of both the causal knowledge and no causal knowledge conditions in Study 1

Figure 4. Drug and psychotherapy ratings for the psychological → psychological → neutral symptom sets of both the causal knowledge and no causal knowledge conditions in Study 1

Figure 5. Drug and psychotherapy ratings for biological → biological → neutral symptom sets of both the causal knowledge and no causal knowledge conditions in Study 1

Figure 6. Drug and psychotherapy ratings for the psychological → biological → neutral symptom sets of both the causal knowledge and no causal knowledge conditions in Study 2

Figure 7. Drug and psychotherapy ratings for the biological → psychological → neutral symptom sets of both the causal knowledge and no causal knowledge conditions in Study 2

Figure 8. . Drug and psychotherapy ratings for the psychological → psychological → neutral symptom sets of both the causal knowledge and no causal knowledge conditions in Study 2

Figure 9. Drug and psychotherapy ratings for biological → biological → neutral symptom sets of both the causal knowledge and no causal knowledge conditions in Study 2

Figure 1

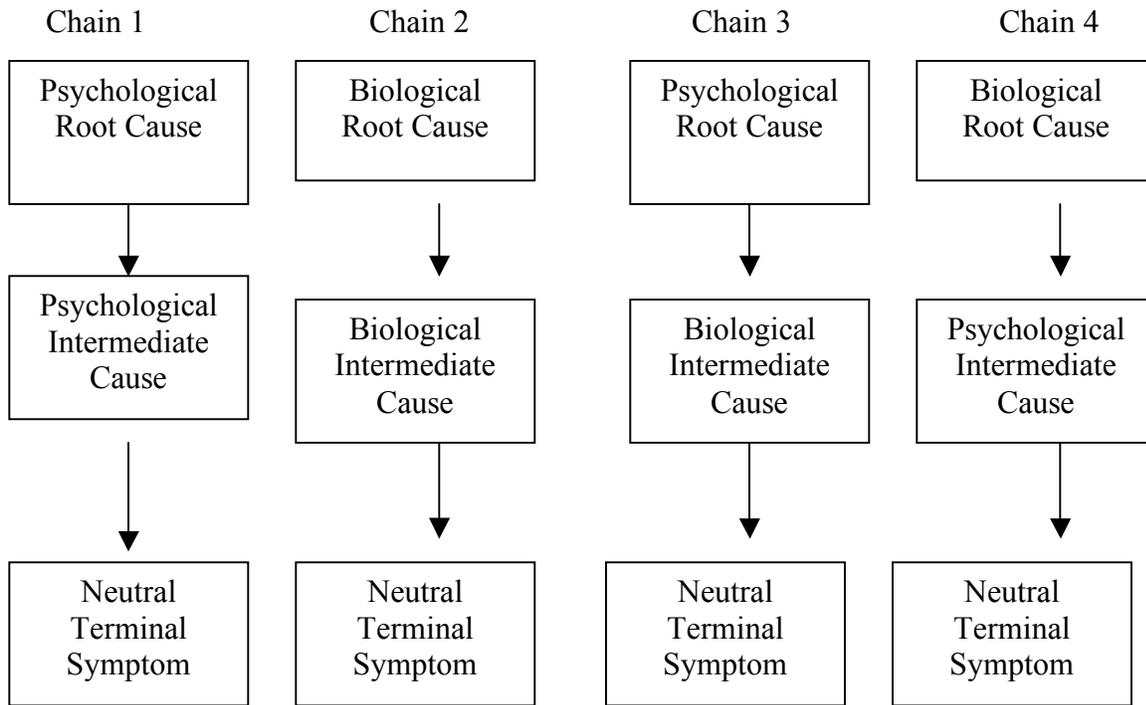


Figure 2

Chain: psychological → biological → neutral; Study 1

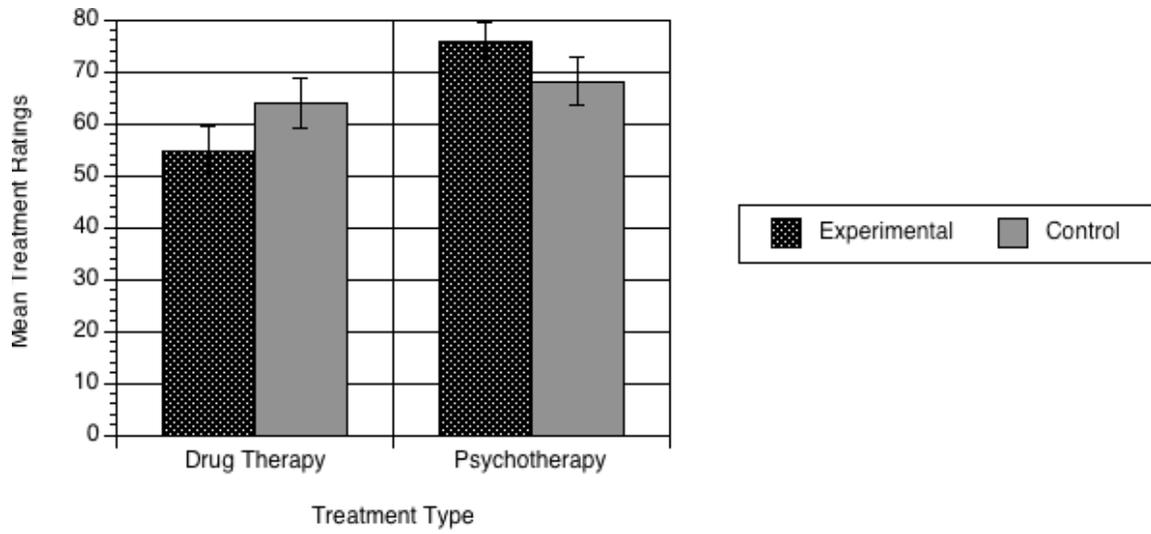


Figure 3

Chain: biological → psychological → neutral; Study 1

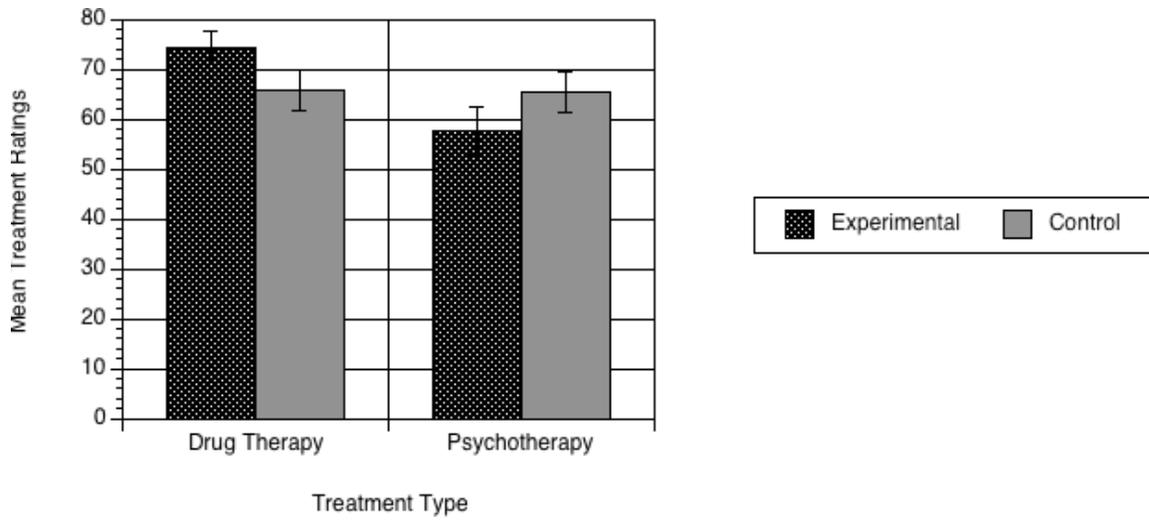


Figure 4

Chain: psychological → psychological → neutral; Study 1

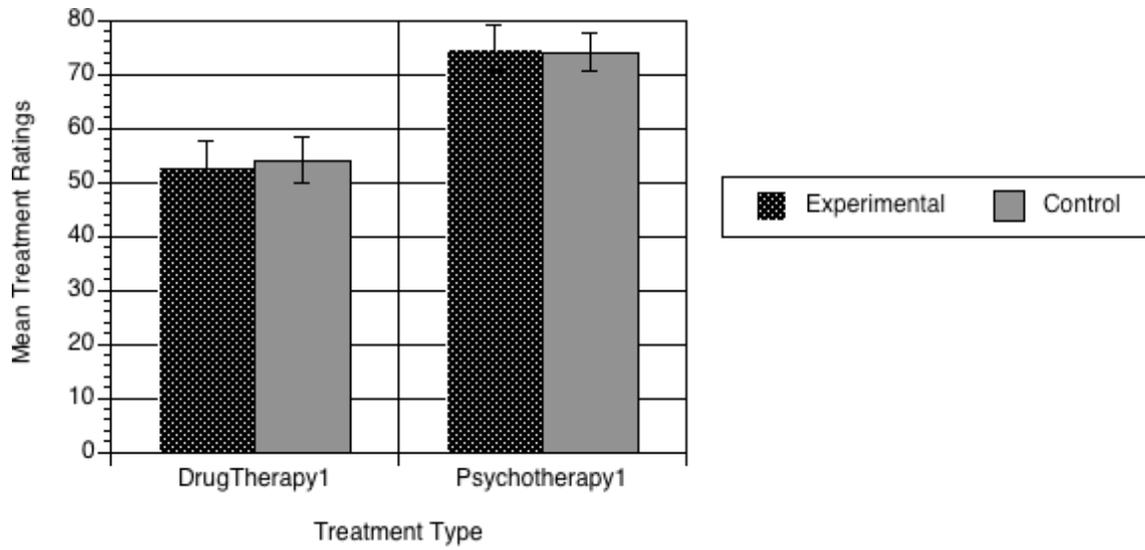


Figure 5

Chain: biological → biological → neutral; Study 1

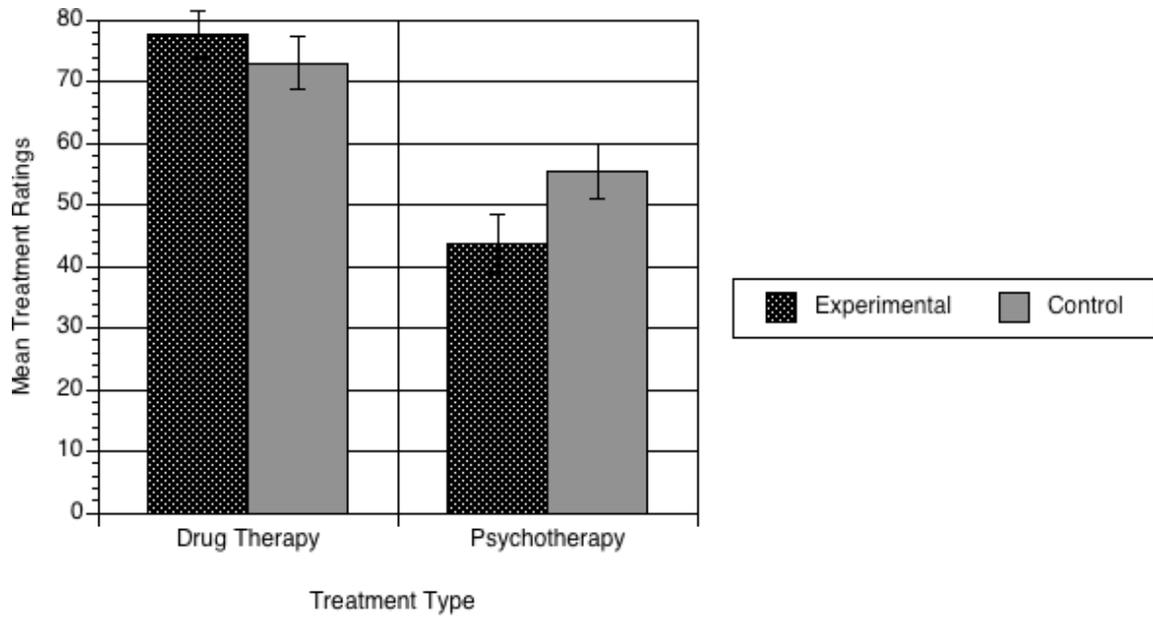


Figure 6

Chain: psychological → biological → neutral; Study 2

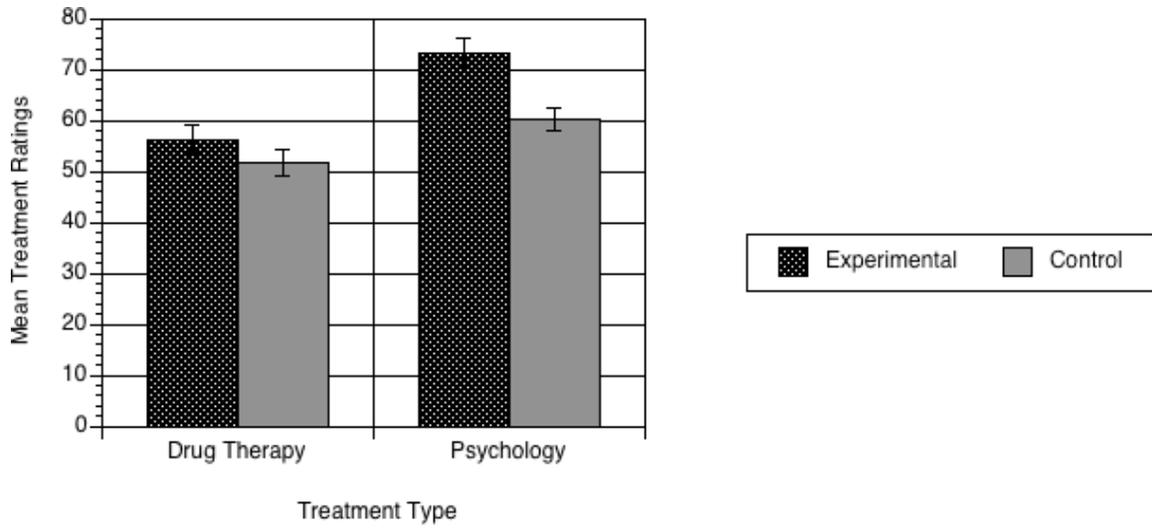


Figure 7

Chain: biological → psychological → neutral; Study 2

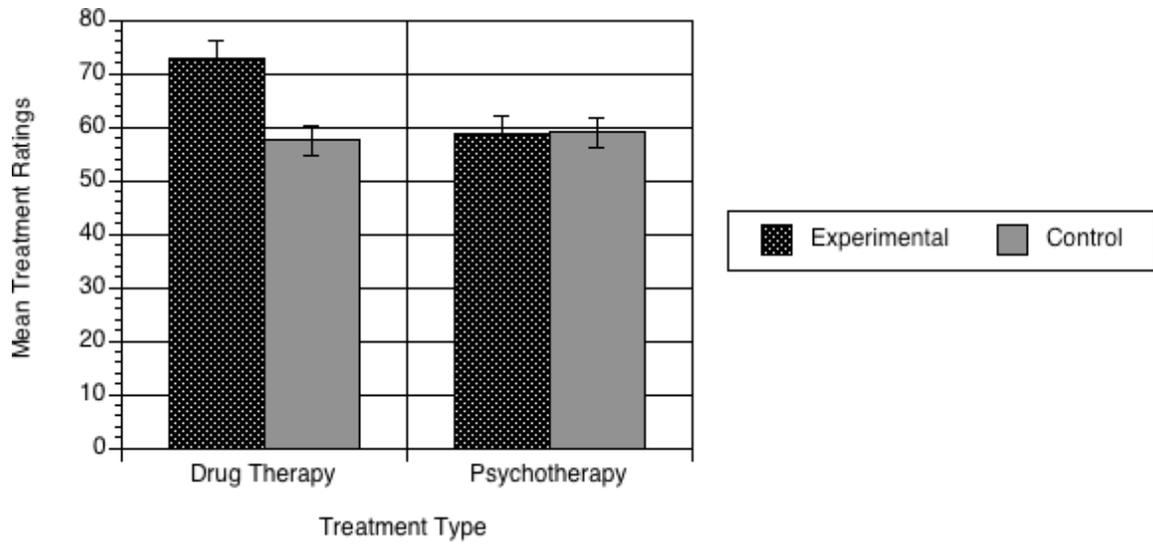


Figure 8

Chain: psychological → psychological → neutral; Study 2

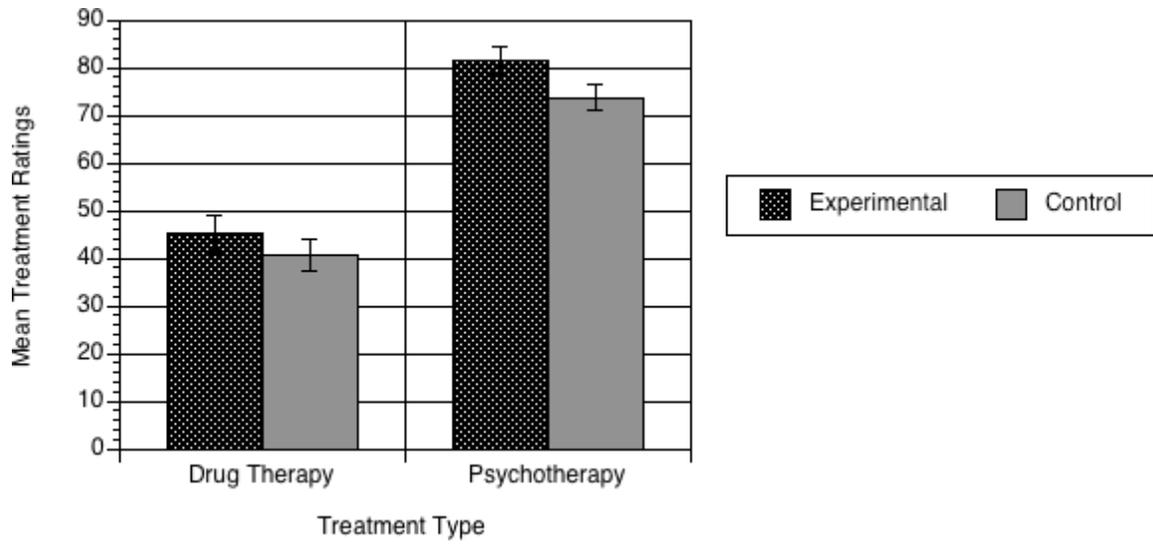


Figure 9

Chain: biological → biological → neutral; Study 2

