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Perceived Alcohol Stigma and Treatment for Alcohol Use Disorders

by

Joseph E. Glass

A dissertation presented to the
Graduate School of Arts and Sciences
of Washington University in
partial fulfillment of the
requirements for the degree
of Doctor of Philosophy

August 2012

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Abstract

Despite the availability of effective treatments, the overwhelming majority (85%) of individuals suffering from alcohol use disorders (AUDs) never receive help for their problems. AUDs include the disorders of alcohol abuse and alcohol dependence. An objective of *Healthy People 2020* is to increase the number of individuals diagnosed with AUDs who receive alcohol treatment. The extent to which one believes that stigmatizing attitudes towards those with AUDs exist is defined as “perceived alcohol stigma” (PAS). Although it is known that persons with AUDs who have higher levels of PAS are at an even greater risk of not receiving treatment, the specific mechanisms by which PAS affects treatment utilization remain unknown. Additionally, while the comorbidity of AUDs and other psychiatric disorders is highly prevalent, scant research has explored the relationship between PAS and comorbidity. The aims of this study were: (1) to examine how PAS may influence the receipt of alcohol treatment for those who have met criteria for AUDs in their lifetime, and (2) to examine PAS in persons with AUDs alone as compared to those with co-occurring AUDs and other psychiatric disorders.

This study used data from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), which is a population-representative survey of United States adults living in noninstitutionalized settings. Respondents were included in the analyses if they completed both Wave 1 (collected during 2001-2002) and Wave 2 (collected during 2004-2005) survey interviews, and met criteria for DSM-IV AUD. Based on these criteria, data from 11,303 out of 43,093 respondents were analyzed. The primary analytic strategy was structural equation modeling.

While prior work identified an inverse relationship between PAS and alcohol treatment utilization among persons with lifetime AUDs, this study revealed that the relationship between PAS and perceived need for treatment and actual treatment utilization is complex. In each of the two aims of this study, one of three hypotheses was directly supported. Important considerations for design, measurement, and theory development were derived. However, longitudinal research and an improvement in the assessments of alcohol stigma, problem recognition, and perceived need for alcohol treatment must be accomplished in order to better quantify and describe any potential effect of PAS on treatment utilization.

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Chapter 1. Specific Aims and hypotheses

Despite the availability of effective treatments, the overwhelming majority (85%) of individuals suffering from alcohol use disorders (AUDs) never receive help for their problems (Cohen, Feinn, Arias, & Kranzler, 2007; Finney, Wilbourne, & Moos, 2007; Miller & Wilbourne, 2002). As a result, an objective of *Healthy People 2020* is to increase the number of individuals diagnosed with AUDs who receive alcohol treatment (U.S. Department of Health and Human Services, 2010). Those with AUDs who receive treatment are more likely to recover from alcohol problems (Dawson et al., 2005; Miller & Wilbourne, 2002; Moos & Moos, 2006; Moyer, Finney, Swearingen, & Vergun, 2002), thus, it is critical to increase the number of individuals who are treated.

The Surgeon General's report, which described substance-related and non-substance-related psychiatric conditions in the United States, identified stigma as the "most formidable obstacle" to receiving services (U.S. Department of Health and Human Services, 1999). *Public stigma* is defined as the general public's reactions and evaluations towards persons with stigmatized conditions (Corrigan and Watson 2002). Public stigma is particularly negative for AUDs (Link, Phelan, Bresnahan, Stueve, & Pescosolido, 1999; Schomerus, Lucht, et al., 2010). The general public has a stronger desire to keep a social distance from those with AUDs and considers persons with AUDs to be more at fault for their illness than those with non-substance-related psychiatric disorders such as depression or schizophrenia (Link, et al., 1999). *Perceived stigma* encompasses individuals' awareness of public stigma. The extent to which one believes

that stigmatizing attitudes towards those with AUDs exist is defined as “perceived alcohol stigma” (PAS).

Indeed, persons with AUDs who have higher levels of PAS have a greater risk of not receiving treatment than their counterparts with lower levels of PAS (Keyes et al., 2010). However, the specific mechanisms by which PAS affects treatment seeking remain unknown. Measures of alcohol-specific stigma are relatively new to the alcohol literature and much of the current knowledge on stigma comes from the literature on non-substance-related psychiatric disorders (Brown, 2011; Schomerus et al., 2011). Mechanisms have been discussed which explain how perceived stigma might decrease treatment seeking, including 1) stigma prevents individuals from perceiving a need for treatment, perhaps because of the preference to handle problems “on one’s own” (Mechanic, 2003), and 2) treatment is avoided to prevent the exposure of the stigmatizing condition to others (Corrigan, 2004). Thus, PAS may attenuate perceptions of treatment need, or alternatively, individuals may simply forgo treatment despite a perceived need for treatment because of fears of being stigmatized. Either or both of these mechanisms may explain the decreased use of treatment services for AUD-affected individuals with greater levels of PAS.

To overcome stigma as a barrier to receiving alcohol treatment services, we must first develop a knowledge base to better understand the mechanisms via which alcohol stigma affects treatment seeking. Thus, the overall objective of this dissertation was to identify how PAS may influence the receipt of alcohol treatment. AUDs frequently co-occur with other psychiatric conditions in the United States general population (Hasin, Stinson, Ogburn, & Grant, 2007), so it was also of interest to determine if PAS is

experienced to a greater extent among those with co-occurring AUDs and psychiatric disorders, and to determine if the positive relationship between the presence of co-occurring disorders and the perceived need for treatment (Grella, Karno, Warda, Moore, & Niv, 2009) or the receipt of alcohol treatment (Cohen et al., 2007) is moderated by PAS. The specific aims and corresponding hypotheses for this dissertation were as follows:

Aim 1: Examine how PAS may influence the receipt of alcohol treatment for those who have met criteria for AUDs in their lifetime.

H1. Higher PAS is associated with decreased perceptions of treatment need among those with lifetime AUDs.

H2. Higher PAS is associated with reductions in help seeking among those with lifetime AUDs who also ever perceived a need for treatment.

H3. Psychological barriers to care will mediate the relationship between PAS and the receipt of alcohol treatment among those with lifetime AUDs.

Aim 2: Examine PAS in persons with AUDs alone as compared to those with co-occurring AUDs and psychiatric disorders.

H4. PAS will be higher among individuals with past-year AUDs and co-occurring psychiatric disorders, compared to their counterparts with past-year AUD alone.

H5. PAS will moderate the relationship between the presence of co-occurring psychiatric disorders and perceived need for alcohol treatment among persons with past-year AUDs.

H6. PAS will moderate the relationship between the presence of co-occurring psychiatric disorders and the receipt of alcohol treatment among persons with lifetime AUDs who ever perceived a need for treatment.

To accomplish these aims, secondary analyses of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) (Grant, Moore, Shepard, & Kaplan, 2003) were performed. NESARC is a population-representative survey of United States adults living in noninstitutionalized settings, conducted the by National Institute of Alcohol Abuse and Alcoholism (NIAAA). NESARC is the only large general population survey that contains a validated measure of PAS. Information regarding specifically how stigma serves as a barrier to treatment seeking in the United States general population may inform the development of future interventions to combat alcohol stigma and potentially increase the rates of alcohol treatment.

Chapter 2. Background and significance

Alcohol use disorders (AUDs) are a significant public health problem, yet the majority of individuals with AUDs never receive treatment. AUDs include the disorders of alcohol abuse (AA) and alcohol dependence (AD) (American Psychiatric Association, 2000). A striking 30% of adults aged 18 or older meet criteria for AUDs in their lifetime (Cohen et al., 2007). AUDs are a significant public health problem and are associated with adverse health conditions including acute injury, neurologic impairment, other psychiatric and drug comorbidity, and certain cancers (Hasin et al., 2007; Kopelman, Thomson, Guerrini, & Marshall, 2009; Rehm et al., 2009). The costs of AUDs and excessive alcohol use in the United States exceed the costs of cancer and coronary heart disease (alcohol-related costs totaled \$184 billion in 1998 which included medical consequences, worker productivity, crime, accidents, and treatment/prevention costs) (Harwood, 2000; Harwood, Fountain, & Livermore, 1998). World Health Organization data estimated that unhealthy alcohol use cost the United States \$234 billion in 2007 (Rehm et al., 2009).

Treatments for AUDs are effective and increase one's likelihood of recovery from alcohol problems (Dawson, Grant, Stinson, & Chou, 2006; Finney et al., 2007; Moos & Moos, 2006; Moyer et al., 2002), yet estimates from NESARC show that the overwhelming majority (85%) of individuals with AUDs never receive care from professionals or other sources of help such as Alcoholics Anonymous (Cohen et al., 2007). To address this gap, an objective of Healthy People 2020 is to increase the number of individuals diagnosed with AUDs who receive alcohol treatment (U.S.

Department of Health and Human Services, 2010). Alcohol treatments have been shown to reduce health care costs and other costs to society associated with AD (Holder et al., 2000; Zarkin et al., 2010). Data also show that interventions for AA are cost-beneficial (Fleming et al., 2000, 2002). Thus, it is critical to increase the number of individuals with AUDs who receive treatment.

Stigma may be a formidable barrier to receiving treatment for AUDs. The 1999 report of the Surgeon General, the 2003 report by the President's New Freedom Commission on Mental Health, and the 2004 Mental Health Strategic Plan of the Veterans Health Administration recognized stigma as one of the most formidable obstacles to receiving services for psychiatric disorders, which must be overcome (Department of Veterans Affairs, 2004; U.S. Department of Health and Human Services, 1999, 2003). Although the overall impact of stigma on treatment seeking would be difficult to quantify due to its influence on individual, social, and political systems (Link & Phelan, 2001; Livingston & Boyd, 2010), it is plausible that stigma is a significant barrier to receiving alcohol treatment. Individuals with AUDs are often considered by the general public to be unpredictable, irresponsible, and of bad character (Crisp, Gelder, Rix, Meltzer, & Rowlands, 2000, p. 2000; Link et al., 1999; Schomerus, Lucht, et al., 2010). Consequently, concerns about privacy, fearing the embarrassment of discussing alcohol problems, and being afraid of what others might think are commonly cited reasons for not seeking help (Fortney et al., 2004; Grant, 1997a). Fortunately, stigma appears to be malleable: the negative attitudes towards psychiatric disorders tend to decrease after education or mass media interventions (Holmes, Corrigan, Williams, Canar, & Kubiak, 1999; Livingston, Milne, Fang, & Amari, 2012; Mino, Yasuda, Tsuda,

& Shimodera, 2001; Olfson et al., 2002; Pinfold et al., 2003). Thus, information regarding how stigma serves as a barrier to treatment seeking could inform interventions to combat alcohol stigma, and potentially, increase the rates of alcohol treatment.

We need more research to understand how PAS affects treatment utilization. To overcome stigma as a barrier to receiving alcohol treatment services, we need to understand specifically how PAS affects treatment seeking. Measures of alcohol-specific stigma are relatively new to the alcohol field and much of what we know about how stigma affects treatment seeking comes from the literature on non-substance-related psychiatric disorders (Brown, 2011; Schomerus et al., 2011). In that literature, mechanisms have been proposed to explain how stigma might decrease treatment utilization, including 1) perceived stigma prevents individuals from perceiving a need for treatment (Mechanic, 2003) and 2) treatment is avoided to prevent the exposure of the stigmatizing condition to others (Corrigan, 2004). Although the rates of perceiving a need for treatment and receiving treatment are vastly lower for those with AUDs as compared to those with non-substance-related psychiatric disorders (Edlund, Unutzer, & Curran, 2006; Mojtabai, Olfson, & Mechanic, 2002), it is plausible that these stigma-related mechanisms (i.e., decreasing perceived need, and creating fear of the exposure of one's condition) operate in the context of treatment utilization for AUDs.

PAS may decrease problem recognition and perceptions of alcohol treatment need. The pathway to receiving health services begins with problem recognition, which may lead to the development of perceptions of treatment need, decisions to seek help, and finally treatment utilization (Mechanic, 1975, 2002; Rothman & Salovey, 2007). Lacking problem recognition, which is closely related to the concept of the “denial” of

one's problems, is thought to be inherent among persons with AUDs (Baekeland & Lundwall, 1977; Dare & Derigne, 2010; Grant, 1997a; Levy, 1993). Due to the fact that the label "alcoholic" is stigmatizing, people may deny or fail to admit that they have alcohol problems to avoid being associated with a stigmatized label. Hence, PAS may contribute to the lack of problem recognition among those with AUDs.

Furthermore, lacking the perception that one needs treatment is the major "rate-limiting step" to receiving alcohol treatment in the United States general population (Edlund, Booth, & Feldman, 2009; Edlund et al., 2006; Grella et al., 2009; Oleski, Mota, Cox, & Sareen, 2010). Just one in nine people with past-year AUDs perceive a need for treatment (Edlund et al., 2009). However; among those with past-year AUDs who perceive a need for treatment, the majority receives it (Edlund et al., 2009). Perceiving a need for treatment is predicated upon the belief that treatment is an appropriate solution to one's problems (Mechanic, 1975, 2002; Rothman & Salovey, 2007). Even for those who recognize that they have a problem, PAS may interfere with the development of perceptions of treatment need due to the anticipation of the stigma associated with receiving treatment if their treatment participation became public knowledge (Mojtabai et al., 2002). Therefore, even for those who recognize that they have an alcohol problem, stigma may lead people to believe that treatment is not an appropriate solution to their problems (Mechanic, 2003). Rather than formal treatment, these persons may attempt to use alternatives to treatment such as the moderation of drinking without the help of a professional, the reliance on spiritual help such as prayer, or the reliance on friends or family members for support. It can be inferred that these persons would be less likely to recover from their alcohol problems owing to the known effectiveness of various forms

of alcohol treatment, as well as observations in epidemiologic data that a positive relationship exists between the use of external sources of help and the remission of AUDs (Dawson et al., 2006; Finney et al., 2007; Moos & Moos, 2006; Moyer et al., 2002). In a study examining recovery rates among NESARC respondents with prior-to-past-year AUDs, 45.7% of those who received treatment achieved recovery, as compared to just 32.5% of those who did not receive treatment (Dawson et al., 2006).

It is noted that barriers to alcohol treatment other than lacking a perceived need for treatment are critically important, such as lacking insurance (Ilgen et al., 2010). Although, insurance is thought to have a much smaller impact on treatment utilization than perceived need (Edlund et al., 2009) perhaps due to the availability of low cost or free sources of help such as Alcoholics Anonymous. It is also important to consider that not all individuals who receive alcohol treatment have attended voluntarily (Pescosolido, Gardner, & Lubell, 1998), and problem recognition may have less of an impact on treatment utilization for those who are court-ordered to treatment. Therefore, it is important to consider that PAS and the lack of problem recognition and perceived need may have an influence on treatment utilization for some persons who are in need of treatment, but not others.

PAS may be a barrier to accessing treatment among those who perceive a need for treatment. It is also possible that individuals who perceive a need for treatment may forgo treatment because of the fear that treatment would expose their condition to others (Corrigan, 2004). That is, people may want to seek treatment but do not do so to avoid the consequences of stigma. In this way, stigma might be conceptualized as a barrier to the final decision to seek help or as a barrier to implementing a plan to take action to seek

help. Consistent with this notion, studies that query barriers to treatment among people who perceived a need for treatment but did not go find that stigma-related concerns are frequently reported (Fortney et al., 2004; Grant, 1997a; Oleski et al., 2010; Perron et al., 2009).

Alcohol stigma may be higher among those with co-occurring AUDs and psychiatric disorders as compared to those with AUDs alone. While the stigma of AUDs is a newer area of study, much research has investigated the stigma of other psychiatric conditions including depression, schizophrenia, and anxiety disorders. A recent meta-analysis of that literature showed a robust positive relationship between perceived or internalized stigma and psychiatric symptom severity (Livingston & Boyd, 2010). It has been hypothesized that persons with co-occurring substance use and other psychiatric disorders experience more stigma than those with either condition alone (Rasinski, Woll, & Cooke, 2005), but scant empirical research exists on this topic. Studies of alcohol and other substance use disorder treatment samples have found a positive relationship between substance use or alcohol stigma and anxiety and depression severity scores (Luoma, O’Hair, Kohlenberg, Hayes, & Fletcher, 2010; Schomerus et al., 2011).

It is important to consider the potential interplay between alcohol stigma and the co-occurrence of AUDs and other psychiatric disorders. AUDs frequently co-occur with other psychiatric conditions in the United States general population (Hasin, Goodwin, Stinson, & Grant, 2005; Hasin et al., 2007; Helzer & Pryzbeck, 1988; Kessler et al., 1996; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). The course of each illness is often worse for individuals with co-occurring disorders as compared to those with single disorders, particularly for those with AUDs and depression. Negative outcomes include

the experience of more severe psychiatric symptoms and alcohol-related problems, a less favorable response to treatment including more relapses, a higher likelihood of drug use, and an increased risk of suicide attempts (Cornelius et al., 1995; Cornelius, Salloum, Day, Thase, & Mann, 1996; Curran, Flynn, Kirchner, & Booth, 2000; Grant, 1996; Kushner, Abrams, & Borchardt, 2000; Salloum & Thase, 2000; Tomasson & Vaglum, 1996).

In one study of alcohol stigma in a detoxification treatment sample, depression and anxiety scores were positively associated with the belief that stereotypes of *alcoholics* had self-relevance (Schomerus et al., 2011). In that study, depression and anxiety scores were also positively associated with alcohol-related self-esteem decrement. Therefore, it is possible that psychiatric comorbidity intensifies the consequences of alcohol stigma. Alternatively, it may be that alcohol stigma increases the risk of the onset of other psychiatric disorders or exacerbates other psychiatric disorders that are already present. Modified labeling theory (see Chapter 3) posits that certain coping orientations, which are employed by stigmatized persons to avoid stigma, may actually lead negative outcomes including the onset and relapse of psychiatric disorders (Link, Cullen, Struening, Shrout, & Dohrenwend, 1989). Social withdrawal is one stigma coping orientation which has been linked to various negative outcomes, including the diminishment of self esteem, self efficacy, general well-being, social support, job market participation, and earnings, and is also linked to increased psychiatric distress (Link, Cullen, Frank, & Wozniak, 1987; Link et al., 1989; Link, Struening, Rahav, Phelan, & Nuttbrock, 1997). A recent study found a significant inverse association between PAS and social network involvement and perceived interpersonal

social support (Glass, Kristjansson, & Bucholz, In press). In summary, comorbid psychiatric problems may lead to increases in PAS among those affected by AUDs, or alternatively, the effects of alcohol stigma could increase the risk of comorbidity.

The effects of PAS on treatment seeking might be stronger for those with AUDs and co-occurring psychiatric disorders versus those with AUDs alone. It remains unknown whether the inverse relationship between alcohol stigma and treatment seeking for AUDs is stronger for persons with psychiatric comorbidity as compared to those without psychiatric comorbidity. That is, the possibility that PAS moderates the relationship between the presence of a co-occurring psychiatric disorder and the receipt of alcohol treatment remains unexplored.

Very few individuals with co-occurring substance use and other psychiatric disorders receive care for both conditions despite recommendations to treat them concurrently (Center for Mental Health Services, 1998; Institute of Medicine, 2006; Nunes & Levin, 2004; Watkins, Burnam, Kung, & Paddock, 2001). For persons with AUDs and comorbid non-substance-related psychiatric disorders, most often one's alcohol problems remain untreated and treatment is sought for another psychiatric condition (Grant, Hasin, & Dawson, 1996; Hatzenbuehler, Keyes, Narrow, Grant, & Hasin, 2008; Kessler et al., 1996; Narrow, Regier, Rae, Manderscheid, & Locke, 1993; Wu, Ringwalt, & Williams, 2003). There are likely multiple reasons why persons with co-occurring disorders seek help for their non-substance-related psychiatric conditions as compared to their substance-related psychiatric conditions. For example, addictive disorders often involve a component of not wanting to quit using substances. However, the notion that treatment is sought far more often for non-substance-related problems than

treatment for alcohol problems is also consistent with the fact that AUDs are more stigmatized than other psychiatric conditions such as depression or anxiety (Link et al., 1999; Schomerus, Lucht, et al., 2010). Although psychiatric comorbidity is generally associated with an increased likelihood of receiving alcohol treatment, alcohol treatment rates are still far lower than rates of other psychiatric treatment in the general population (Cohen et al., 2007; Grella et al., 2009; Helzer & Przybeck, 1988; Kessler et al., 1996; Robins, Helzer, Przybeck, & Regier, 1988).

Present gaps in knowledge must be overcome to inform future interventions that aim to increase the number of persons who perceive a need for and subsequently receive alcohol treatment. While epidemiologic studies show that those with AUDs who perceive more public stigma towards alcoholism have an increased risk of not receiving treatment (Keyes et al., 2010), the mechanisms by which alcohol stigma affect treatment utilization remain unknown. First, perceptions of treatment need may be substantially decreased by PAS, but studies have yet to determine if these constructs are associated. Second, it is also unknown whether those who perceive a need for treatment are less likely to seek help when they have higher levels of PAS. Third, while it is hypothesized that an internalization of perceived stigma or PAS leads to psychological barriers that result in decreases in help seeking (Corrigan, 2004; Schomerus et al., 2011), empirical studies have not tested this hypothesis. Fourth, scant empirical evidence exists regarding differences in levels of PAS among those with co-occurring disorders versus those with AUDs only. One study found that individuals affected by both drug use disorders and non-substance-related disorders perceived more stigma related to their drug use than their non-substance-related psychiatric problems (Link, et al., 1997), and others have found

higher depression and anxiety scores among persons in alcohol and substance use disorder treatment samples who report higher levels of perceived or internalized stigma (Luoma et al., 2010; Schomerus, Lucht, et al., 2010). However, these studies did not attempt to compare levels of substance use stigma when a non-substance-related psychiatric disorder was present versus not. Finally, no work was identified that examined if high levels of PAS help explain why those with co-occurring disorders exhibit only a slight increase in rates of alcohol treatment, yet exhibit a large increase in rates of mental health treatment (Kessler, et al., 1996). In order to inform interventions that aim to boost help seeking, it is important to understand the specific mechanisms by which PAS affects perceived need and the receipt of alcohol treatment.

Chapter 3. Conceptual framework

Three conceptual frameworks informed this dissertation research. Modified labeling theory posits that perceived stigma develops as a social process for all persons, but has personal relevance and negative consequences for those who are affected by a stigmatizing condition (Link et al., 1989). Rothman and Salovey's (2007) stage-based model of health behavior change describes the development of health problem recognition, decisions to use health services, and the initiation and maintenance of behavioral actions to use services. The Aday and Andersen model of health services use posits that a combination of predisposing, enabling, and need factors explain the use of health services (Aday & Andersen, 1974; Andersen, 1995). This dissertation research blends the conceptual frameworks of modified labeling theory, the stage-based model of health behavior change, and the Aday & Andersen model of health services use, into a unified, parsimonious, exploratory conceptual framework.

Modified labeling theory

Early labeling theorists described that societal conceptions of deviant behavior and emotional expression were essentially the cause of psychiatric illness (Scheff, 1966). Modified labeling theory posits that negative social conceptions do not necessarily cause psychiatric illness, rather, negative social conceptions and labeling significantly worsens the life experiences of individuals who have one (Link, 1987). According to modified labeling theory, public stigma reflects the social conceptions of "what it means" to have a stigmatized illness (Link et al., 1989). People become aware of the stigmatizing attitudes held by the general public during socialization, regardless of whether they later develop a

mental illness. However, for persons who develop a mental illness and are labeled as having a stigmatized condition, these expectations may become personally relevant to the self. Link (1989) posits that through the process of *labeling*, where a person is confronted by the fact that they have a mental illness, stigma cascades into a multitude of negative outcomes including the internalization of stereotypes. This process becomes reinforced when one experiences acts of rejection or discrimination due to having a label (Link, 1987; Link et al., 1987).

Modified labeling theory also suggests that persons affected by stigmatized conditions may employ coping strategies that actually intensify the effects of stigma (Link, Mirotznic, & Cullen, 1991). Particular coping strategies such as the concealment of stigmatized conditions or the avoidance of individuals who are aware of them may appear beneficial at face value. However, these coping strategies have been linked to social withdrawal and isolation, resulting in the diminishment of self-esteem, self-efficacy, general well-being, social support, job market participation and earnings, and attempts to seek help (Link, 1987; Link et al., 1989, 1997; Wahl, 1999; Wright, Gronfein, & Owens, 2000) . Importantly, such negative consequences are also risk factors for psychiatric disorder. Thus, through the labeling process, stigma is hypothesized to ultimately contribute to increased relapses of existing psychiatric conditions, as well as the development of new psychiatric conditions (Link, et al., 1989).

While modified labeling theory focuses broadly on stigma, Corrigan's (2004) conceptual model relates these ideas to explain how the internalization of stigma, or *self-stigma*, interferes with receiving mental health care. While perceived stigma is the belief that others have negative attitudes towards persons with a particular stigmatized identity,

self-stigma is when an individual with that identity believes these negative attitudes are true and apply to him or herself (Corrigan, 2004). It is important to note that the term “self-stigma” should not imply that individuals with stigmatized labels are responsible for the stigma and its consequences. Others prefer using the term “internalized stigma” to ensure that the responsibility of stigma is attributed to society and particularly to those who stigmatize others (Link & Phelan, 2001; Link, Struening, Neese-Todd, Asmussen, & Phelan, 2001).

Corrigan’s (2004) conceptual model involves two hypotheses: 1) as a result of the awareness of public stigma, individuals may forgo treatment to avoid being labeled as mentally ill, and/or 2) individuals may forgo treatment to avoid suffering from self-stigma. Corrigan (2004) noted, “the potential of self-stigma can yield label avoidance and decreased treatment participation” (p. 618). Thus, while modified labeling theory describes the internalization of stigma as a dependent variable caused by the independent variable of labeling, Corrigan (2004) identifies the anticipation of internalized stigma as independent and label avoidance and decreased treatment participation as dependent variables.

Although the theories may appear to conflict in this regard, it is important to consider that others have discussed that labeling exists on a continuum which does not necessarily require that individuals participate in psychiatric treatment to be considered labeled (Moses, 2009; Thoits, 1985). A continuum of labeling would include “self-labeling” (such as the admittance of having a problem to oneself or others) (Thoits, 1985), “social labeling” through one’s friends and others becoming aware of one’s stigmatized condition and/or having the need for involvement with mental health

professionals (Corrigan, 2004), and finally “formal labeling” which is thought to occur through the assignment of a diagnosis by a mental health professional (Link, 1987). Therefore, if labeling occurred by means other than treatment participation, treatment utilization would be a candidate dependent variable in studies that aim to formally test the propositions of modified labeling theory.

When comparing Link (1987) and Corrigan’s (2004) theories, they have notable overlap. Corrigan’s (2004) first hypothesis regarding label avoidance overlaps with the concealment coping strategy outlined by Link (1987). Treatment avoidance may be one method to conceal a stigmatized condition. Corrigan’s (2004) second hypothesis regarding self-stigma avoidance overlaps with the concealment and social withdrawal mechanisms described by modified labeling theory. Labeled persons may use concealment or social withdrawal to avoid the internalization of stigma.

These theories are not without limitations. Critiques of modified labeling theory conclude that it could be improved by incorporating evidence regarding the heterogeneity in perceived stigma that exists across persons who possess a stigmatized characteristic (Freidl et al. 2003). It has also been argued that the responses to societal labels and perceived stigma vary across individuals, for example some may cope with stigma by recognizing its illegitimacy (Camp et al. 2002). In addition, some have argued that discrimination should be operationalized as a completely separate construct from stigma, with stigma only encompassing negative evaluations (Deacon 2006; Sayce 1998). However, a recent study provided evidence that, at least in the case of PAS, the removal of the construct of perceived discrimination from perceived stigma would offer little

benefit due to its very high correlation with perceived devaluation ($r=0.9$) (Glass et al., In press).

With regard to the limitations of Corrigan's (2004) hypotheses, Schomerus and Angermeyer (2008) showed mixed support for Corrigan's (2004) framework in their narrative review of research on how stigma affects help seeking for non-substance-related psychiatric problems. While Corrigan's (2004) hypotheses have not yet been validated in the context of AUDs, NESARC data show that PAS is inversely associated with lifetime treatment participation (Keyes et al., 2010). Indirectly, some evidence also generally supports that internalized alcohol stigma could decrease treatment participation. Higher levels of internalized alcohol stigma are inversely associated with one manifestation of self-efficacy known as *drinking-refusal self-efficacy*, or the belief that one could refuse a drink or forgo alcohol consumption when it is offered or present in the environment (Schomerus et al., 2011). More broadly, self-efficacy is an important component in various cognitive and stage-based models of health behavior change that may facilitate help seeking (Glanz, Rimer, & Viswanath, 2008; Rothman & Salovey, 2007).

A stage-based model of health behavior change

Rothman and Salovey (2007) propose that three major phases exist with regard to the psychology of changing health behavior: 1) gathering and interpreting health information and determining if there should be concern about a health problem, 2) deciding whether to take action, and 3) initiating and maintaining behavioral decisions. Phases 1 and 2 of the stage-based model are used in this dissertation to inform the conceptualization of perceptions of treatment need.

As described in Chapter 2, lacking the perception that one needs treatment is the major “rate-limiting step” (Edlund et al., 2009) to receiving alcohol treatment in the United States general population. For those who seek help on their own volition, it can be inferred that having perceptions of treatment need are predicated on the belief that one actually has a problem. Some believe that denial, or lacking the recognition of having an alcohol problem, is a hallmark of AUDs (Baekeland & Lundwall, 1977; Dare & Derigne, 2010; Grant, 1997a; Levy, 1993). For example, the transtheoretical model of human behavior change (TTM), which has been applied to understanding the recovery from AUDs, describes that a “precontemplation” stage exists which may be characterized as denying or lacking knowledge of one’s problems (DiClemente & Prochaska, 1998; DiClemente & Velasquez, 2002). Additionally, the first of the twelve steps of the Alcoholics Anonymous approach involves admitting powerlessness over alcohol and the inability to manage one’s problems (Alcoholics Anonymous, 2005). Yet, some evidence suggests that most of those with an AUD have at least some recognition of their drinking problem (Williams et al., 2006).

Even for persons who transition past Stage 1 of the Rothman and Salovey (2007) model by recognizing that they have an alcohol problem, they may not believe that they need treatment per se. Stage 2, deciding what to do about the problem, is useful to inform perceptions of treatment need among individuals who recognize that they have a problem. Perceptions of treatment need may involve a complex process that includes psychological (e.g. problem recognition, beliefs that treatment will help), social (e.g. stigma, pressures from social networks), and legal causes (e.g. pressures from the court system) (Pescosolido et al., 1998). Perceptions of need for alcohol treatment may be

predicated upon the belief that alcohol treatment is acceptable, appropriate, efficacious, and that the benefits of attending treatment would be worth the costs (e.g. stigma). This raises the issue that perceptions of treatment need may vary based on the specific types of alcohol treatment that are known and available to individuals, and that perceived need may be present without resulting in help seeking. For example, individuals may perceive a need for a type of help that is not available (e.g. a “magic pill”). Or, they may perceive a specific type of help but not others. Individuals could even perceive a need for a specific treatment, but still believe that certain aspects of the treatment are unpalatable. Such factors have rarely been studied in the context of perceived need for alcohol treatment. What we do know about perceptions of treatment need is reviewed in the following section.

What do we know about perceptions of alcohol treatment need?

The potential influence of psychological and social constructs on perceptions of treatment need remain understudied in the empirical literature, and they are often studied separately (Mojtabai et al., 2002; Pescosolido et al., 1998). Recent investigations have found a strong relationship between alcohol and psychiatric problem severity and perceived need for alcohol treatment (Edlund et al., 2009; Grella et al., 2009; Hedden & Gfroerer, 2011; Oleski et al., 2010). Importantly, these studies also suggest that factors known to facilitate health services use (e.g. insurance) and the factors known to predispose people to use services (e.g. sociodemographic characteristics) offer little explanatory power when investigating perceived need for alcohol treatment (Edlund et al., 2009; Grella et al., 2009; Hedden & Gfroerer, 2011; Oleski et al., 2010). This is consistent with Rothman and Salovey’s (2007) conceptual model, which describes that

enabling characteristics would have little effect on health problem recognition despite their significant role in initiating and maintaining health decisions. Therefore, stage-based models of health behavior change are well suited to understand perceived need because they seek to understand why people develop health problem recognition and decisions of whether and how to address the problem, and further recognize that the initiation and maintenance of behavioral decisions to seek help is a separate process with unique causes (Rothman & Salovey, 2007).

The results of prior studies on perceived need can inform hypotheses about psychological processes that contribute to problem recognition or perceived need for treatment. Having a greater severity of alcohol dependence, having a co-occurring psychiatric disorder, and lower mental health-related quality of life are positively associated with perceived need (Edlund et al., 2009, 2006; Grella et al., 2009; Oleski et al., 2010). Perhaps, individuals may believe that professional help is only warranted when psychiatric and/or substance use problems become nearly unbearable or cause significant tangible problems. A qualitative study found that persons who chose to seek professional help, as compared to those who were coerced to enter treatment or those who inadvertently arrived at treatment due to service system referrals, more often reported psychiatric problems as a major contributing factor in choosing to receive treatment (Pescosolido et al., 1998).

Age is a consistent sociodemographic predictor of perceived need across NESARC and NSDUH, in which younger age groups were half as likely as older age groups to perceive a need for alcohol treatment in both surveys (Edlund et al., 2009). These findings are concerning considering that AUDs are most prevalent in younger age

groups (Grant, 1997b). Separate retrospective analyses of (1) alcohol dependent participants in the Collaborative Study on the Genetics of Alcoholism (COGA), a high-risk family study of alcoholism in six U.S. sites (Schuckit, Anthenelli, Bucholz, Hesselbrock, & Tipp, 1995), and (2) alcohol dependent patients from medical, psychiatric, and alcohol units (Bucholz, Homan, & Helzer, 1992), found that the first occurrence of alcohol problems typically appeared at age 20, yet efforts to seek help typically did not occur until age 31 and only after significant psychological, medical, and social harm had occurred. Perhaps, younger persons do not perceive a need for treatment because they have not drunk for long enough to experience many of the major life difficulties associated with problematic alcohol use. It is also possible that younger persons believe they will “age out” of alcohol problems, or they may be less apt to notice that their drinking is problematic because binge drinking tends to be normative among young adults. In the 2007 NSDUH data, approximately 41.8% of young adults aged 18-25 reported past-month binge drinking (Substance Abuse and Mental Health Services Administration, 2007).

Scant research has investigated the psychological determinants of perceptions of treatment need. Qualitative research is underway to examine the social and psychological factors that contribute to perceptions of treatment need (Curran, Booth, & Borders, 2011). More modifiable factors must be identified that can be leveraged by psychosocial treatments or public health interventions to increase perceptions of treatment need for alcohol problems. To date, most individuals with AUDs do not perceive a need for treatment, and we have yet to understand why or how to intervene.

Research on alcohol stigma has the potential to fill a research gap that could inform future interventions to boost help seeking.

The potential influence of alcohol stigma on perceptions of treatment need

By using the Rothman and Salovey (2007) model, at least two specific mechanisms can be proposed with regard to how alcohol stigma affects perceptions of treatment need: 1) alcohol stigma may have effects on problem recognition, and 2) alcohol stigma may affect beliefs about treatment.

Alcohol stigma may decrease problem recognition, which is a necessary prerequisite to help seeking (Rothman & Salovey, 2007). Lay stereotypes related to the label *alcoholic* are so negative that it may be difficult to relate to the prototypical alcoholic. Perceptions of personal risk play a key role in developing problem recognition (Rothman & Salovey, 2007). For example, people who associate stigmatized health problems with vulnerable populations such as racial/ethnic or sexual minorities, yet are not members of these populations, believe they are less susceptible to the health problem (Rothman and Salovey, 2007). HIV and AIDS are highly stigmatized conditions (Steward et al., 2008), and the prejudicial attitudes of racial/ethnic and sexual majority groups include the association of these conditions with African Americans and LGBT populations (Deacon, Stephney, & Prosalendis, 2005). Social psychology experiments show that heterosexual persons believe they are less susceptible to HIV and AIDS when they are presented information by homosexual persons as compared to when they are presented the same information by heterosexual persons (Evers, Bishop, Gerhan, & Weisse, 1997). In the case of alcohol stigma, social comparisons with the prototypical *alcoholic* may decrease perceived susceptibility (e.g., in the case of social class

downward comparisons, “*I have a full-time job and support my family, therefore I couldn’t be an alcoholic.*”) Last, one common stereotype is that persons with AUDs are dangerous (Link et al., 1999; Schomerus, Lucht, et al., 2010). In fact, there is a kernel of truth to this stereotype owing to the deaths and injuries linked to high-risk alcohol-related behaviors, such as drinking as driving (Schomerus, Holzinger, Matschinger, Lucht, & Angermeyer, M. C., 2010). Some individuals with AUDs may compare themselves to others with AUDs who match a more negative profile of the prototypical *alcoholic*, and believe their own problems are not severe. Hence, the lack of problem recognition for some persons with AUDs may be at least partially attributed to alcohol stigma.

Problem recognition is a necessary component of developing perceptions of treatment need, but perceived need would also be predicated upon the belief that attending alcohol treatment would be worth the costs of participating. PAS may increase the perceived costs and decrease the acceptability of attending because those who are sensitive to public stigma may fear the stigma associated with receiving treatment should their future treatment participation become public knowledge (Mojtabai et al., 2002). Social psychological phenomena relate to these concerns, including impression management and stereotype threat.

People use *impression management* to control how they are evaluated by others (Leary & Kowalski, 1990). The use of alcohol for social approval and peer acceptance is a form of impression management (Leary, Tchividjian, & Kraxberger, 1994). Impression management may interact with alcohol stigma to prevent help seeking through its effects on label avoidance and concealment. The media reinforces the notion that persons affected by AUDs must achieve permanent abstinence from alcohol in order

to achieve recovery, which is known as the *abstinence violation effect* (O'Donnell, 1984; Ruderman & McKirnan, 1984). Individuals may be concerned that if others found out about their treatment participation, they could no longer use alcohol for peer acceptance. Hence, those who have received treatment may conceal their prior treatment history, and those who have not received treatment may forgo seeking help so they can continue to use alcohol for peer acceptance. For example, people may fear rejection from a potential intimate partner, or fear being unwelcome at social gatherings due to their inability to participate in drinking activities. It is notable that seeking help, as compared to handling problems on one's own, is seen as a form of weakness. A case vignette study showed that those who seek help for depression are thought to be more unstable than those with depression who do not seek help (Ben-Porath, 2002). Thus, people may forgo treatment to avoid judgment regarding their ability to handle personal problems.

Stereotype threat may play a role in preventing perceptions of treatment need due to its potential effects on increasing the perceived social costs involved with seeking treatment. Stereotype threat occurs when people fear that others attribute their behavior to the stereotypes associated with a stigmatized identity. Much work on stereotype threat has sought to understand racial discrimination, where social categorization and subsequent stereotyping is accomplished through identifying one's skin color, hair texture, and facial features, among other characteristics (Crocker, Major, & Steele, 1998). Stereotype threat may manifest differently when the cues associated with discrimination are readily concealable. In the case of AUDs, the anticipation of stereotype threat may actually reinforce the concealment of alcohol problems. Individuals might worry that disclosure of their condition would lead others to attribute any potentially deviant

behavior, such as being absent from work, to their problems with alcohol. Hence, stereotype threat might increase the perceived costs of treatment and prevent perceptions of treatment need for persons with alcohol problems.

The Rothman and Salovey (2007) model provides a framework to infer how PAS could lead to decreases in perceptions of treatment need because it describes psychological aspects of problem recognition and the formulation of decisions about receiving treatment. While prior work has used the Aday and Andersen framework (1974; 1995) to investigate correlates of perceived need in national surveys (Edlund et al., 2009; Grella et al., 2009; Hedden & Gfroerer, 2011; Oleski et al., 2010), the present study reserves the Aday and Andersen framework for its traditional purpose – to describe the use of health services (see the following section).

Aday and Andersen framework

The Aday and Andersen framework posits that a combination of predisposing, enabling, and need factors explain the use of health services (Aday & Andersen, 1974; Andersen, 1995). Characteristics of treatment need are those that quantify the severity of problems for which treatment would be sought. Consistent findings show that indicators of problem severity including AUD symptoms and co-occurring conditions are positively associated with an increased likelihood of receiving treatment (Berkson, 1946; Cohen et al., 2007; Glass et al., 2010; Helzer & Pryzbeck, 1988). Enabling factors are the resources available to individuals that may facilitate or impede service use. For example, health insurance can decrease the financial burden of receiving care, which can facilitate help seeking and access (Ilgen et al., 2010; Simon, Grothaus, Durham, VonKorff, & Pabiniak, 1996), whereas living in a highly rural area may deter help seeking because of

distance to care or the availability of services (Pfeiffer et al., 2011). Predisposing factors include individual characteristics that are typically present before the onset of disorder which influence one's propensity to use services. These include sociodemographic characteristics and health beliefs. For example, some studies have found that women are less likely to receive treatment for substance use problems than men (Booth, Kirchner, Fortney, Ross, & Rost, 2000; Glass et al., 2010; Kaskutas, Weisner, & Caetano, 1997; Wu et al., 2003), whereas males are less likely to receive treatment for depression (Hasin et al., 2005).

Many studies have used the Aday and Andersen framework to model person-related characteristics that influence help seeking and access, without incorporating contextual characteristics of healthcare systems and communities as recommended by the framework (Andersen, 1995; Andersen & Davidson, 2007). Examples of context-dependent characteristics include the availability of municipal health insurance, public transportation, and publicly funded mental health and substance use disorder treatment centers. Studies that only consider person-related characteristics typically explain approximately 19% of the variance in service utilization, whereas the inclusion of contextual factors typically explains an additional 13% (Phillips, Morrison, Andersen, & Aday, 1998). In NESARC, studies of alcohol treatment utilization that model individual-level characteristics have achieved pseudo r-square values of 14% (Edlund et al., 2009).¹ With the exception of basic variables such as urban/rural status, few epidemiologic studies such as NESARC include important contextual characteristics. Additionally,

¹ It is important to note the difficulty in comparing the level of variance explained across studies of treatment utilization, where the dependent variable is often dichotomous which

many studies often use the framework to model the presence of any service use, rather than the quantity of use, completion of treatment, or the quality of services received (see *Limitations*, Chapter 6). As mentioned previously, although the framework was developed to explain service use, some have used it to examine correlates of perceived need (Andersen & Davidson, 2007; Grella et al., 2009; Smith, 2003).

Conceptual model for the present study

The broad frameworks and theories described in this chapter underlie a conceptual model (Figures 3.1 & 3.2) that guided the analyses of this dissertation. Although not all of the constructs discussed in this chapter were assessed in NESARC, theoretically informed secondary analyses are useful to build knowledge in these unexplored areas. The conceptual model yields a *practical* depiction of sophisticated theory through its representation of constructs available in the NESARC data.

Figure 3.1 depicts analyses for Aim 1, which involved three hypotheses (H1-H3) to examine specifically how PAS may affect treatment seeking. In accordance with the Rothman and Salovey (2007) model, the dotted arrow from perceived need for treatment to the receipt of treatment depicts a stage-based approach to understanding treatment utilization. That is, stages 1 and 2 of the Rothman and Salovey (2007) model are used to understand processes contributing to individuals' perceived need for treatment. For individuals who complete stages 1 and 2 and develop a perceived need for treatment, they may encounter the decision of whether or not to seek help and receive treatment, which is understood by stage 3 of the Rothman and Salovey (2007) model. The arrow from perceived need for treatment to the receipt of treatment is dotted, instead of solid, to signify that this stage-based process is inferred from the data rather than directly

measured. The predisposing, need, and enabling characteristics of individuals that may influence perceptions of treatment need and help seeking are considered background variables.

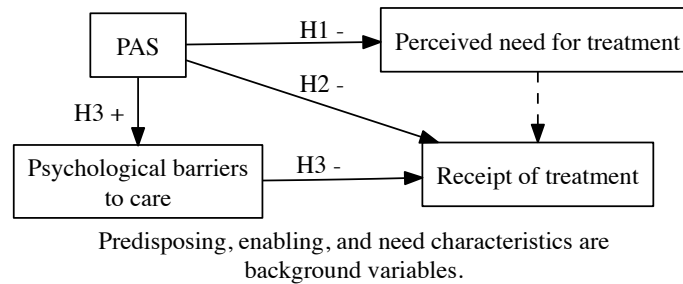


Figure 3.1 A practical conceptual model depicting Aim 1

The arrow pointing from PAS to perceived need for treatment (H1) and the receipt of treatment (H2) indicate that PAS was hypothesized to be inversely associated with perceptions of treatment need and the receipt of treatment. Inverse associations are noted with the “-” symbol, and positive associations are noted with the “+” symbol. The specific social psychological mechanisms of stigma (e.g. concealment, problem recognition, internalized stigma) which may affect perceived need and the receipt of treatment were not available in the NESARC data source thus are not depicted in the model; otherwise, these mechanisms would have been depicted in separate boxes originating from PAS. However, psychological barriers to treatment may capture a broad range of cognitive mechanisms through which PAS may interfere with treatment receipt. The lines from PAS to psychological barriers to care and from psychological barriers to the receipt of treatment depict H3. H3 hypothesized that psychological barriers to care may mediate the effects of PAS on treatment utilization.

Figure 3.2 depicts the analyses of Aim 2 (H4-H6), which examined the relationship between PAS and co-occurring disorders, and how these variables may

interact to affect treatment utilization. The presence of co-occurring psychiatric disorders is given focal attention and thus is depicted in its own box (labeled “COD”).

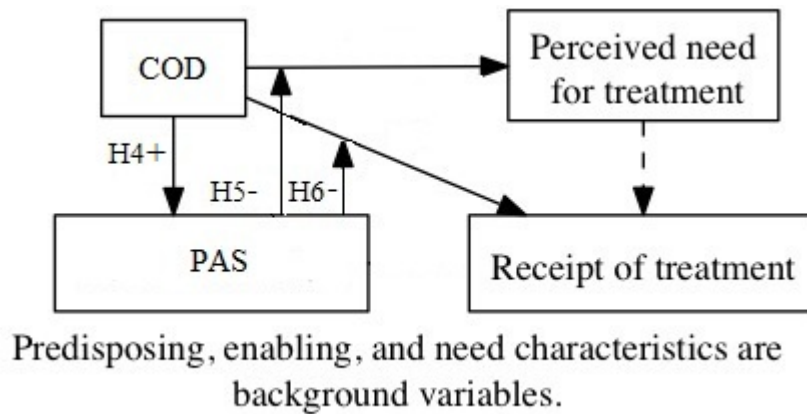


Figure 3.2 A practical conceptual model depicting Aim 2

The arrow pointing from co-occurring psychiatric disorders to PAS represents H4, in which PAS was expected to be higher among persons with co-occurring psychiatric disorders. Two explanations for H4 include that (1) modified labeling theory suggests stigma may increase vulnerability to psychiatric illness, and (2) persons with psychiatric comorbidity may be more susceptible to others’ judgments (see Chapter 2, *Alcohol stigma may be higher among those with co-occurring AUDs and psychiatric disorders*). H5 and H6 in Aim 2 are conceptually similar to H1 and H2 of Aim 1, where PAS was hypothesized to be inversely associated with perceptions of treatment need and the receipt of treatment. However, with the focus on the co-occurrence of psychiatric disorders and AUDs, it was hypothesized that PAS moderates the relationship between the presence of co-occurring psychiatric disorders and treatment utilization. More specifically, although co-occurrence is typically associated with an increased probability of perceived need for treatment and the receipt of treatment, the relationship between the presence of a co-occurring disorder and perceived need for alcohol treatment is expected to be weaker for those with higher levels of PAS. H5 and H6 are based on the

observation in the literature that increases in the likelihood of alcohol treatment seeking occur when another psychiatric disorder is present versus not, yet these rates are modest and inconsistent (Ilgen et al., 2010; Kessler et al., 1994). In contrast, the likelihood of treatment for non-substance-related psychiatric disorders is consistently higher when a substance use disorder is present versus not (Burnett-Zeigler, Zivin, Islam, & Ilgen, 2012; Kessler et al., 1994). H5 and H6 explore the possibility that PAS helps explain these differences.

Chapter 4. Methods

Data Source

Data from Wave 1 (W1) and Wave 2 (W2) of the National Institute of Alcohol Abuse and Alcoholism's National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) were analyzed (Grant, Kaplan, & Stinson, 2007; Grant, Moore, et al., 2003). NESARC used a complex survey design to yield population-representative estimates of United States adults aged 18 and above living in noninstitutionalized settings in 2000. W1 interviews were conducted face-to-face during 2001-2002, yielding 43,093 respondents with an overall response rate of 81.0%. W2 interviews were conducted from 2004-2005 and yielded 34,653 respondents (only those who were interviewed at W1 were eligible for a W2 interview), reflecting an 86.7% follow-up rate among W1 participants who were eligible for re-interview. The cumulative response (total number of respondents with both W1 and W2 interviews, or the total target population) rate was 70%. W2 respondents have been compared to eligible W2 non-respondents, and no significant differences existed in age, race/ethnicity, gender, socioeconomic status, or – importantly for the analyses of this study - lifetime psychiatric disorder including substance use disorders and psychiatric disorders (Grant, Goldstein, et al., 2009). NESARC W1 and W2 data are limited access data files, made available for this research through dissertation committee member Dr. Bucholz at the Midwest Alcohol Research Center and Department of Psychiatry, Washington University in St. Louis. NESARC data are de-identified, meaning that no HIPAA identifiers such as names, addresses, or other personal information are included.

NESARC is the only large national epidemiologic survey to date that contains a validated measure of PAS. However, PAS was assessed only in the W2 interview. Hence, analyses were cross-sectional and participants who did not complete W2 were excluded. Variables from W1 and W2 data were used to create lifetime measures (see the *Measures* section of this chapter). Given the study's interest in AUD treatment, the overall analytic sample included 11,303 respondents who completed W1 and W2 interviews and met criteria for DSM-IV AA or AD at some point in their lifetime based on information obtained at W1 and W2. Depending on the hypothesis that was tested, all 11,303 respondents or a targeted subset of these 11,303 respondents were analyzed.

Analytic samples

The use of several analytic samples was necessary for hypothesis testing. Figure 4.1 graphically depicts the exclusion processes used to derive the analytic samples. Although not described here, the analytic samples were further stratified by AUD type (see *Stratification of analytic samples* in the *Analyses* section).

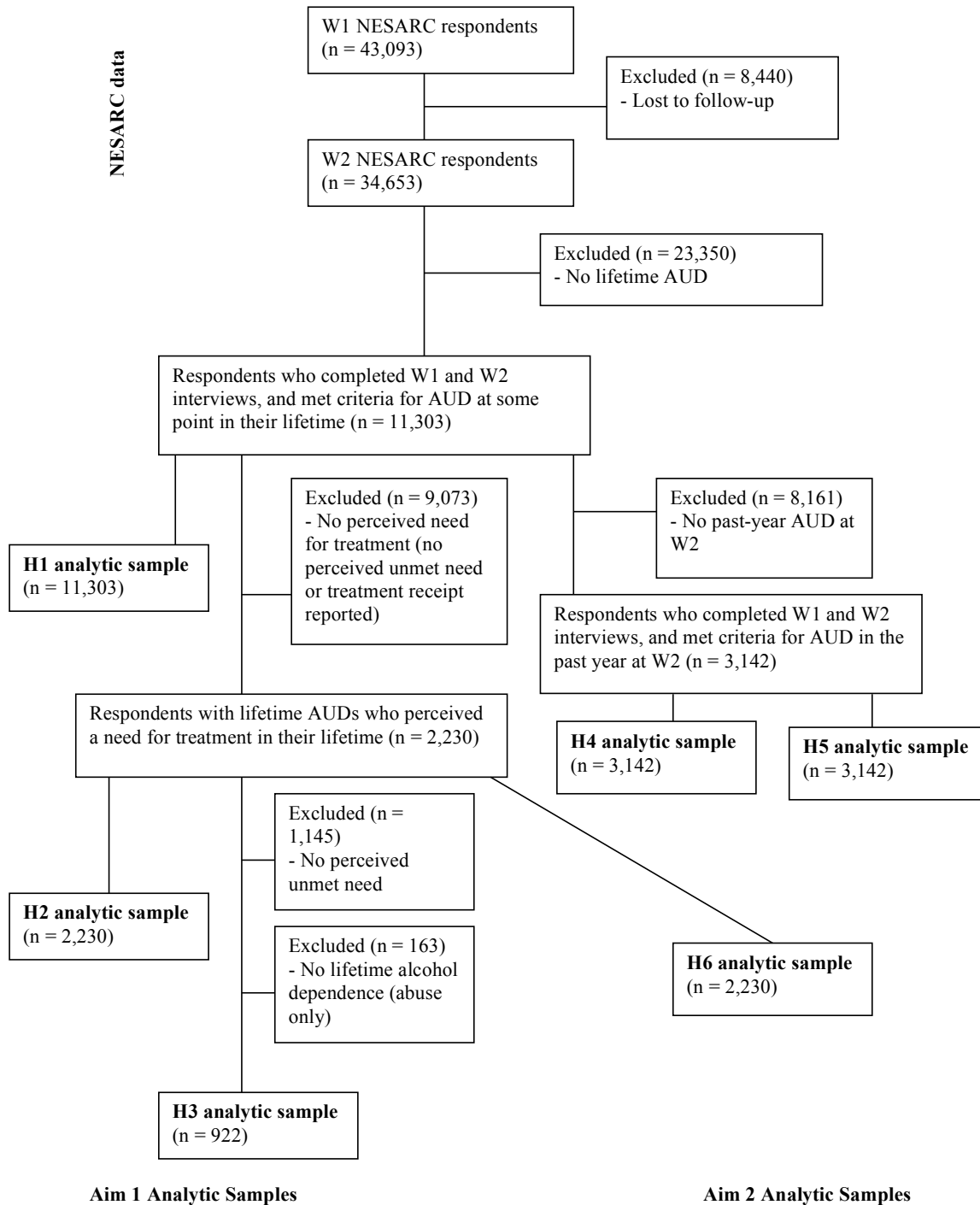


Figure 4.1 Flowchart for deriving the analytic samples

Table 4.1 summarizes each analytic sample used in Aim 1. Aim 1 hypotheses were concerned with the association between PAS and perceived need for treatment (H1), the receipt of alcohol treatment (H2), and barriers to treatment (H3) over respondents’

lifetimes. Thus, the samples for H1-H3 required that participants met lifetime AUD criteria. H1 was pertinent to all participants with lifetime AUDs (n=11,303), whereas H2 also required that participants perceived a need for treatment in their lifetime (n=2,230; see description of *Perceived need for treatment* in the Measures section of this chapter). H3 was tested only among respondents who perceived a need for treatment but did not go, and additionally met criteria for lifetime AD with or without AA (n=922). The additional exclusion criteria for H3 were due to the design of NESARC. The instrument that assessed barriers to treatment was administered only to respondents who perceived a need for treatment but did not go (n=1,085). Of these participants, 163 met criteria for AA only, and 922 met criteria for AD with or without AA. Due to the small number of participants meeting criteria for AA only, there was insufficient statistical power to detect mediation when stratifying by AUD type (see Chapter 5, *Power Analyses*). Furthermore, the endorsement proportions for the majority of the barriers to treatment items were low (see Table 4.7), yielding inadequate bivariate cell sizes in the AA only group.

Table 4.1. Analytic samples for Aim 1

Hypothesis	Entry requirements	Sample size
H1. Higher PAS is associated with decreased perceptions of treatment need among those with lifetime AUDs	1. Lifetime alcohol use disorder (AUD)	11,303
H2. Higher PAS is associated with reductions in help seeking among those with lifetime AUDs who also ever perceived a need for treatment	1. Lifetime AUD 2. Lifetime perceived need for treatment (perceived a need for treatment but did not go, or received treatment)	2,230
H3. Psychological barriers to care will mediate the relationship between PAS and the receipt of alcohol treatment among those with lifetime AUDs	1. Lifetime alcohol dependence 2. Lifetime perceived unmet need for treatment (perceived a need for treatment but did not go)	922

Table 4.2 summarizes the inclusion requirements for Aim 2’s analytic samples.

Aim 2 analyses attempted to identify whether levels of PAS varied across persons based on classifications of co-occurring psychiatric disorders (H4), and whether the relationship between co-occurring psychiatric disorders and perceived need for treatment (H5) and the receipt of alcohol treatment (H6) was moderated by PAS.

Table 4.2. Analytic samples for Aim 2

Hypothesis	Entry requirements	Sample size
H4. PAS will be higher among individuals with past-year AUDs and co-occurring psychiatric disorders, compared to their counterparts with past-year AUD alone	1. Past-year AUD (at W2)	3,142
H5. PAS will moderate the relationship between the presence of co-occurring psychiatric disorders and perceived need for alcohol treatment among persons with past-year AUDs	1. Past-year AUD (at W2)	3,142
H6. PAS will moderate the relationship between the presence of co-occurring psychiatric disorders and the receipt of alcohol treatment among persons with lifetime AUDs who ever perceived a need for treatment.	1. Lifetime AUD 2. Lifetime perceived need for treatment (perceived a need for treatment but did not go, or received treatment)	2,230

Aim 2 analyses targeted respondents with past-year AUDs at W2 so results could be generalized to persons who concurrently experience (within the same year) AUDs and other psychiatric disorders. Thus, H4 & H5 included all participants who met past-year AUD criteria at W2 (n=3,142). While H6 analyses intended to target those with past-year AUDs who also perceived a need for treatment (n=343), power analyses indicated that

this sample size was inadequate to detect a statistically significant moderation effect given the modeling conditions (see *Statistical power* in this chapter). Thus, statistical power issues made it necessary to test H6 in the sample of persons with lifetime AUDs who ever perceived a need for treatment.

For completeness, variables involved in the creation of the analytic samples are listed in Table 4.3, along with their source (i.e. W1 and/or W2 interview data) and available information regarding their reliability.

Table 4.3. Variables used to create the analytic samples

SAMPLE DEFINITION VARIABLES			
Construct	Operationalization	Measurement details	Defines sample for hypothesis
Lifetime DSM-IV alcohol use disorder (AUD)	Met criteria for lifetime DSM-IV lifetime alcohol abuse (AA) or lifetime alcohol dependence (AD) ^{W1+W2}	Dichotomous. Kappa=0.70 (Grant et al., 2003)	H1-H3; H6
Past-year DSM-IV AUD	Met criteria for past-year DSM-IV AA or AD at W2 ^{W2}	Dichotomous. Kappa=0.74 (Grant et al., 2003)	H4 & H5
Perceived need for treatment	Reported perceived unmet need for treatment or received treatment ^{W1+W2}	Dichotomous*	H2 & H5
Perceived unmet need	Reported perceived unmet need for treatment ^{W1+W2}	Dichotomous*	H3

^{W1}Variable was created using data from the W1 interview. ^{W2}Variable was created using data from the W2 interview. ^{W1+W2}Variable was created using data from both W1 and W2 interviews. *Reliability is unknown, but variable creation was based on procedures used in prior NESARC studies.

Measures

Table 4.4 contains detailed information about the measures included in the dissertation analyses. The table lists the constructs that were represented, their operationalization, available information on reliability and/or validity, the hypotheses for which they were used, and the variables' purpose for each hypothesis. Briefly, perceived

need for treatment and the receipt of alcohol treatment were dependent variables. PAS was primarily used as a focal independent variable and moderator, although it was also a dependent variable in one hypothesis. The latent psychological barriers to treatment variable was a mediator. The remaining variables were classified according to the Aday and Andersen (1974) framework. Need characteristics included type of AUD, AUD course, AUD severity, alcohol consumption, and co-occurring psychiatric disorders. Predisposing characteristics included occupational prestige, age, gender, race/ethnicity, marital status, education, and urban/rural status. Enabling characteristics included health insurance status and family income. Each variable is described in the sections that follow the table.

In the NESARC data, diagnosis and treatment status measures were available for four time intervals. W1 contained a past-year interval and prior-to-past-year interval. W2 included a past-year interval and a “prior to past year, since last interview” interval. All four intervals were collapsed to create lifetime diagnosis or treatment status at W2 (1=positive at any interval, 0=negative at all intervals). W2 past-year status was used to create past-year diagnosis and treatment variables. PAS, predisposing characteristics, and enabling characteristics were created from respondents’ current status at W2.

Table 4.4. Analysis variables from the NESARC dataset

DEPENDENT VARIABLES			
Construct	Operationalization	Measurement details	Hypothesis: Purpose
Perceived need for treatment	Perceived need for treatment (perceived unmet need or received treatment)	Dichotomous* W1+W2 W2	H1,H5: DV
Any alcohol treatment	Received any treatment (in professional and/or informal settings) versus not	Dichotomous* W1+W2 W2	H2,H3,H6: DV
Type of alcohol treatment: alcohol specific versus not	Received both treatments, received alcohol-specific treatment, received treatment that was not alcohol-specific, received no treatment	Multinomial* W1+W2 W2	H2,H3,H6: DV
Type of alcohol treatment: formal vs. informal	Received both treatments, only received treatment in a professional setting, only received treatment in a informal/paraprofessional setting, received no treatment.	Multinomial* W1+W2 W2	H2,H3,H6: DV
FOCAL INDEPENDENT VARIABLE, MODERATOR, AND MEDIATOR			
Construct	Operationalization	Measurement details	Hypothesis: Purpose
Perceived alcohol stigma (PAS)	Alcohol-adapted Perceived Devaluation-Discrimination scale (PDD) with 6-point Likert-type scales	Latent variable. 12-items measured by 6 point Likert-type scales. Summed scale ICC=0.93, $\alpha=0.82$ (Ruan et al., 2008) ^{W2}	H1,H2,H3: Primary IV H4: DV H5,H6: Moderator
Barriers to treatment	27 barriers assessed by NESARC	Will determine factor structure and internal consistency W1+W2	H3: Mediator
INDEPENDENT VARIABLES			
Need characteristics			
Construct	Operationalization	Measurement details	Hypothesis: Purpose
Type of DSM-IV AUD	AA without AD; AD with or without AA	Dichotomous. Kappa=0.70 (Grant et al., 2003) W1+W2 W2	H1-H6: Stratify each analytic sample
AUD course	Incident (past-year only), persistent (past-year and prior	Multinomial. (Kappa for	H1-H6: Control for lifetime

	to past-year [recurrent or persistent]), and recovered (prior to past-year but not past-year). <i>Note:</i> The recovered category is not present in H4 & H5 due to the sample's requirement of past-year AUD	constituent variables are 0.70-0.74) (Grant et al., 2003) ^{W1+W2}	AUD course.
AUD severity	11 criteria of alcohol abuse and alcohol dependence. Lifetime measure created from W1 & W2 assessments. Past-year measure created from W2 assessment.	Latent variable. ICCs are 0.86 and 0.78 for AA and AD symptoms, respectively (Grant, Dawson, et al., 2003) ^{W1+W2}	H1-H6: IV (account for varying levels of severity)
Alcohol consumption	Alcohol consumption factor score (ACFS) (Agrawal et al., 2009; J. D. Grant et al., 2009) represented by behavioral measures of drinking (quantity/frequency of usual consumption, quantity/frequency of max consumption, frequency of drinking to intoxication)	Latent variable. ACFS in Missouri and Australian samples had good reliability (ICC=0.76) and high factor loadings (0.61-0.93) (Agrawal, et al., 2009; J. D. Grant, et al., 2009) ^{W1+W2 W2}	H1-H6: IV (account for varying levels of consumption)
Co-occurring psychiatric disorders (non-alcohol)	<i>Externalizing:</i> drug use disorders, antisocial personality disorder, conduct disorder; <i>Internalizing:</i> major depression, dysthymia, bipolar I&II, generalized anxiety, post-traumatic stress, panic with or without agoraphobia, social phobia; <i>Both internalizing and externalizing</i> (see above); <i>Neither</i> (i.e. no comorbidity)	Multinomial. Kappa's for the individual disorders range from 0.42 to 0.71 (Grant, Dawson, et al., 2003; Ruan, et al., 2008) ^{W1+W2 W2}	H1-H3: IV (account for psychiatric comorbidity) H4-H6: Primary IV

Predisposing characteristics

Construct	Operationalization	Measurement details	Hypothesis: Purpose
Occupational prestige	Technical/support/clerical, unskilled labor, skilled labor, never employed, professional	Multinomial ^{*W2}	H1-H6: IV
Age	<35, 35-49, 50-64, >=65	Multinomial ^{*W2}	

Gender	Female, Male	Dichotomous ^{*W2}
Race/ethnicity	White, Black, Native, Asian, Hispanic	Multinomial ^{*W2}
Marital status	Never married, previously married, presently married	Multinomial ^{*W2}
Education	< HS; HS or GED; > HS	Multinomial ^{*W2}
Urban/rural residence	In metro statistical area (MSA) and residing in central city, in and MSA but not in central city, not in MSA	Multinomial ^{*W2}

Enabling characteristics

Construct	Operationalization	Measurement details	Hypothesis: Purpose
Family income	<\$20k, \$20k-\$35k, \$35k-\$60k, >\$60k. A log-transformed quasi-continuous measure was used for sensitivity analysis.	Multinomial ^{*W2}	H1-H6: IV
Health insurance status	Public health insurance, private health insurance, no insurance. Private health insurance took precedence over public.	Multinomial ^{*W2}	

Control variable

Construct	Operationalization	Measurement details	Hypothesis: Purpose
Closeness to persons with alcohol problems	Reporting alcohol problems in any first-degree relative or any live-in relationship with a partner versus not	Dichotomous ^{*W1+W2}	H4: Account for social distance

^{W1}Variable was measured from W1 data. ^{W2}Variable was measured from W2 data. ^{W1+W2}Variable was measured by combining W1 and W2 data. ^{W1+W2|W2}Variable was measured by combining W1 and W2 data for lifetime analyses, or used only W2 data for past-year analyses. *Reliability is unknown, but created based on procedures used in prior NESARC studies. IV=independent variable, DV=dependent variable

Perceived need for treatment

This measure followed from studies that collapsed two survey questions into a single dichotomous variable to assess the construct (Edlund, et al., 2009; Mojtabai, et al., 2002). NESARC queried “perceived unmet need” at W1 and W2 by asking “*was there ever a time where you thought you should see a doctor, counselor, or other*

health professional for your drinking, but did not go?" This question was asked among all respondents who drank alcohol, regardless of whether they received treatment. Respondents were classified as having a perceived a need for treatment if they a) had perceived unmet need, and/or b) received any alcohol treatment (see *Receipt of alcohol treatment*). Respondents were classified as not having a perceived need for treatment if they both a) did not report perceived unmet need and b) did not report receiving treatment.

It is noted that two major approaches have been used to operationalize perceived need for treatment and treatment utilization in NESARC or other national surveys that have used similar instruments of perceived need and treatment utilization. First, some have used the same approach of the present study where perceived unmet need and treatment utilization were collapsed into one construct of perceived need (Edlund, et al., 2009; Mojtabai, et al., 2002). Second, others have analyzed both constructs in a multinomial dependent variable that included three categories of 1) no treatment, 2) perceived unmet need, and 3) receipt of any treatment (Grella et al., 2009; Oleski et al., 2010). The first approach was chosen because it is more consistent with the conceptual framework used in the present study, which formulated two separate goals of analyzing 1) correlates of perceived need among persons who meet criteria for a disorder, and 2) correlates of the utilization of services among those who perceived a need for treatment.

Receipt of alcohol treatment

Treatment for alcohol problems was assessed among respondents who reported any drinking by querying, *"Have you gone anywhere or seen anyone for a reason that was related in any way to your drinking?"* while listing 13 sources of help. Weighted

frequencies for each of the thirteen types of help received by W2 respondents with lifetime AUDs (n=11,303) are displayed in Table 4.5.

Table 4.5 Types of treatment received by Wave 2 NESARC participants with lifetime alcohol use disorders (n=11,303)

Type of treatment	% (SE)
Alcoholics Anonymous or other 12-step	10.6 (0.38)
Private physician, psychiatrist, psychologist, social worker, or other professional	6.1 (0.27)
Alcohol/drug rehabilitation program	6.5 (0.28)
Family services or other social service agency	3.3 (0.21)
Other agency or professional	1.9 (0.14)
Outpatient clinic, including outreach and day/partial patient program	4.1 (0.24)
Clergyman, priest or rabbi	2.2 (0.15)
Alcohol/drug detoxification ward/clinic	4.6 (0.25)
Emergency room	3.5 (0.20)
Inpatient ward of psychiatric/general hospital or community mental health program	3.1 (0.20)
Crisis center	0.6 (0.08)
Halfway house/therapeutic community	1.1 (0.12)
Employee assistance program	1.1 (0.12)

Three conceptualizations of alcohol treatment were used as dependent variables. The first alcohol treatment variable included a broad conceptualization of the receipt of any treatment (receipt of treatment from any of the 13 help sources, versus not). For the second alcohol treatment variable, a four-level classification made a distinction between treatment in professional settings (e.g. alcohol or drug clinics, inpatient wards, private practices, rehabilitation programs), treatment in informal settings (e.g. Alcoholics anonymous and other 12-step, clergy, crisis centers), treatment in both settings, and no treatment (see Table 4.6 for these classifications). For the third alcohol treatment variable, a four-level classification made a distinction between alcohol-specific treatments, treatments that were not alcohol specific, both types of treatment, and no

treatment. It is noted that while inpatient wards and emergency rooms were not queried using alcohol-specific language, these settings may be sought for alcohol detoxification services and/or treatment (Weisner, 2001), thus they were classified as alcohol-specific. Additionally, although outpatient and partial hospital programs were also not queried using alcohol-specific language, alcohol treatment programs are often designed for these settings, thus they were classified as alcohol-specific.

Table 4.6. Thirteen types of alcohol treatment assessed by NESARC and their classifications for Aim 2 analyses

Type of service	Informal versus professional		Alcohol-specific versus not	
	Informal	Professional	Alcohol-specific	Not alcohol-specific
Alcoholics Anonymous, Narcotics or Cocaine Anonymous Meeting, or any 12-step meeting?	X		X	
Family services or another social service agency?		X		X
Alcohol or drug detoxification ward or clinic?		X	X	
Inpatient ward of psychiatric or general hospital or community mental health program?		X	X	
Outpatient clinic, including outreach programs and day or partial patient programs?		X	X	
Alcohol or drug rehabilitation program?		X	X	
Emergency room for any reason related to your drinking?		X	X	
Halfway house or therapeutic community?		X	X	
Crisis center for any reason related to your drinking?	X			X
Employee assistance program (EAP)?		X		X
Clergyman, priest, rabbi, or any type of religious counselor for any reason related to your drinking?	X			X
Private physician, psychiatrist, psychologist, social worker, or any other professional?		X		X
Other agency or professional		X		X

Perceived alcohol stigma

The Perceived Devaluation-Discrimination scale (PDD), adapted for measuring the stigma of AUDs, was included in W2 to assess PAS (Glass et al., In press; Link,

1987; Ruan et al., 2008). The PDD was administered to all W2 respondents (regardless of alcohol consumption status) after the alcohol section of the interview. Twelve items assessed perceived discrimination (the belief that others will discriminate against those with current or prior AUDs) or perceived devaluation (the belief that others will devalue or discredit affected individuals). Responses were measured with a six-point Likert-type scale, ranging from “strongly agree” to “strongly disagree.” Six items used reverse wording to prevent response biases. Items with reverse wording were recoded so that higher scores indicated higher levels of PAS. Item wording for this measure is displayed in Chapter 5, Table 5.3.

The current study used a one-factor approach to modeling PAS identified in prior analyses. To summarize, a factor analytic study with these data conducted by Glass, Bucholz, and Kristjansson (In press) deemed that a one-factor solution to modeling PAS was optimal when applying an adjustment for method effects introduced by reverse-item wording. Both one factor (perceived devaluation-discrimination) and two factor (perceived devaluation, perceived discrimination) CFA models fit the data well (CFI=0.958, TLI=0.942, RMSEA=0.056 [90% CI=0.056-0.059]; CFI=0.962, TLI=0.946, RMSEA=0.054 [90% CI=0.054-0.056]; respectively) when adjusting for reversed-item wording effects. Despite having a better fit to the data ($\chi^2(1) = 542, p < 0.0001$), the two factors had an extremely high correlation ($r=0.90$). Thus, a one-factor model was favored. Structural equation models provided evidence for the construct validity of PAS among alcohol-affected respondents through its relationship with perceived interpersonal social support (Glass et al., In press).

Alcohol use disorder

DSM-IV alcohol abuse (AA) and alcohol dependence (AD) (American Psychiatric Association, 2000) were assessed at W1 and W2 with the AUD and Associated Disabilities Interview Schedule (AUDADIS-IV) (Grant, Dawson, et al., 2003; Ruan et al., 2008). The DSM-IV AD diagnosis requires that at least three of seven AD criteria be met within a 12-month period. A DSM-IV AA diagnosis requires that at least one of four AA criteria be met within a 12-month period. The general domains for each of the eleven criteria are listed in Table 5.2.

AUD course

A polytomous AUD course variable represented transitions in and out of AUD status across W1 and W2 intervals. Three categories included 1) *incident* (W2 past-year AUD only), 2) *persistent* (met criteria for AUD at the W2 past-year interval and at any other W1 or W2 interval), and 3) *recovered* (did not meet criteria in the W2 past-year interval, but met criteria at any other W1 or W2 interval). For analyses that involved only persons with past-year AUD, the recovered category did not apply. It is noted that the persistent category actually collapsed those with recurrent and persistent AUD. The term persistence would typically imply that the diagnosis was present across consecutive periods of observation, whereas recurrent would typically imply that distinct episodes existed with a period of remission in between the episodes.

AUD severity

The AUDADIS-IV measured AA and AD symptoms with good reliability (ICC= 0.86-0.89) (Grant, Dawson, et al., 2003). For the present study, a one-factor measurement model of the 11 criteria of DSM-IV AA and AD was evaluated. The

combination of the AUD severity measure and a measure of alcohol consumption was used in this study (see *Overall alcohol severity*).

Alcohol consumption

The operationalization of alcohol consumption was guided by the alcohol consumption factor score (ACFS) measure created by researchers at the Washington University Department of Psychiatry and Midwest Alcohol Research Center (Agrawal et al., 2009; Grant, Agrawal, et al., 2009). The ACFS is a latent representation of alcohol consumption severity constructed from behavioral measures of drinking (e.g. quantity/frequency of alcohol consumption). For the present study, CFA analyses were conducted to evaluate ACFS as a measure of alcohol consumption severity among NESARC respondents with AUDs. Four alcohol consumption indices were generated from the NESARC data: 1) typical consumption (usual number of daily drinks consumed multiplied by the frequency of any drinking, log transformed), 2) maximum consumption (largest number of daily drinks consumed multiplied by the frequency of drinking this amount, log transformed), 3) frequency of drinking 5 or more drinks, and 4) frequency of drinking until intoxication. ACFS indices 1-3 were available for the lifetime interval, whereas all four indices were available for the past-year interval.

Overall alcohol severity

An investigation of combining the symptom-based AUD severity factor and the alcohol consumption factor was warranted due to the results of several prior studies, which are briefly summarized here. A prior factor analytic study evidenced good model fit when adding a consumption measure (e.g. frequency of drinking 5 or more drinks) to a symptom-based factor of alcohol severity (Borges et al., 2010). Validation analyses of

the ACFS measure found a high genetic correlation between the ACFS and the number of self-reported AD symptoms, suggesting a common (genetic) cause of both alcohol consumption and symptoms (Grant, Agrawal, et al., 2009). Item response theory analyses suggested that adding alcohol consumption indices, and particularly a binge drinking item, to a latent factor of AUD symptoms increased the ability to detect heterogeneity in the lower-end of the AUD severity spectrum (Borges et al., 2010; Saha, Stinson, & Grant, 2007). Yet, one study found that adding a dichotomous lifetime binge drinking indicator to an observed lifetime AUD symptom count measure distorted the linearity of the relationship between the AUD count variable and certain AUD risk factors (Hasin & Beseler, 2009). As an alternative to fitting separate AUD severity and alcohol consumption factors, the possibility of a single dimension encompassing AUD symptoms and consumption measures was explored for the present study.

Co-occurring psychiatric disorders

This study adopted the strategy employed in a NESARC study that demonstrated the use of four categories of internalizing, externalizing, both internalizing and externalizing, and neither internalizing nor externalizing disorders to optimally assess a broad range of psychiatric comorbidity with AUDs (Dawson, Goldstein, Moss, Li, & Grant, 2010). The individual psychiatric disorders assessed in NESARC have test-retest reliabilities (κ) that range from 0.40 to 0.77 (Grant, Dawson, et al., 2003; Ruan et al., 2008). Results from latent class analyses have provided support for the validity of these categories in the study of PAS (Glass, Kristjansson, & Bucholz, 2012). Specific disorders included in the categories of internalizing and externalizing psychiatric disorders for the present study are listed in Table 4.4.

Sociodemographic characteristics

Sociodemographic characteristics were conceptualized as predisposing and enabling characteristics per the Andersen and Aday framework (1974). The categories for sociodemographic variables (see Table 4.4) were chosen to be consistent with prior NESARC alcohol stigma studies so that the dissertation results can be compared with prior work (Keyes et al., 2010; Smith, Dawson, Goldstein, & Grant, 2010). One exception is that family income, rather than personal income, was used in the present study to account for a spouse/partner's wages from paid employment. While H4 did not involve analyses of treatment, the justification for including sociodemographic characteristics as covariates in H4 is based on the fact that sociodemographic differences in PAS have been reported in prior empirical studies (Keyes et al., 2010; Smith et al., 2010). Further, perceived stigma develops during the socialization process which is influenced by social and demographic factors, therefore perceived stigma is theorized to be a function of sociodemographic characteristics (Link et al., 1989).

Barriers to treatment

W1 and W2 assessed 27 barriers to treatment among those who reported having a perceived unmet need for treatment. Factor analyses of similar measures have found two-factor solutions representing internal/psychological versus external/structural barriers to treatment (Xu, Rapp, Wang, & Carlson, 2008; Xu, Wang, Rapp, & Carlson, 2007). For the present analyses, a two-factor measurement model of psychological barriers and external barriers was hypothesized and tested with CFA. Table 4.7 contains barriers to treatment and their endorsement proportions for respondents with lifetime AUDs who reported perceived unmet need for treatment. As can be inferred from the table, the low

endorsement proportions precluded factor analyses of barriers to treatment in the AA only subsample.

Table 4.7 Endorsement proportions for barriers to alcohol treatment assessed in NESARC

		Respondents with lifetime AUDs who ever perceived a need for treatment (n=1,085)		
		Overall (n=1,085)	AA only (n=163)	AD with or without AA (n=922)
		N (%)		
1	Wanted to go, but health insurance didn't cover	100 (9.4)	12 (7.7)	88 (9.6)
2	Didn't think anyone could help	169 (15.8)	19 (11.2)	150 (16.4)
3	Tried getting help before and it didn't work	111 (10.4)	16 (10.3)	95 (10.4)
4	Didn't know of any place to go for help	149 (13.9)	13 (8.3)	136 (14.9)
5	Couldn't afford to pay the bill	89 (8.3)	8 (5.1)	81 (8.9)
6	Didn't have any way to get there	83 (7.8)	8 (5.1)	75 (8.2)
7	Didn't have time	320 (29.9)	40 (25.6)	280 (30.6)
8	Thought the problem would get better by itself	274 (25.6)	21 (13.5)	253 (27.7)
9	Was too embarrassed to discuss it with anyone	148 (13.8)	9 (5.8)	139 (15.2)
10	Was afraid of what my boss, friends, family, and others would think	388 (36.2)	45 (28.9)	353 (37.5)
11	Thought it was something that I should be strong enough to handle alone	165 (15.4)	14 (9.0)	151 (16.5)
12	Was afraid they would put me in the hospital	84 (7.9)	7 (4.5)	77 (8.4)
13	Was afraid of the treatment they would give me	107 (10.0)	15 (9.6)	92 (10.1)
14	Hated answering personal questions	51 (4.8)	2 (1.3)	49 (5.4)
15	The hours were inconvenient	21 (2.0)	0 (0.0)	21 (2.3)
16	A member of my family objected	89 (8.3)	10 (6.4)	79 (8.6)
17	My family thought I should go but I didn't think it was necessary	30 (2.8)	1 (0.6)	29 (3.2)
18	Can't speak English very well	28 (2.6)	2 (1.3)	26 (2.9)
19	Was afraid I would lose my job	19 (1.8)	2 (1.3)	17 (1.9)
20	Couldn't arrange child care	21 (2.0)	1 (0.6)	20 (2.2)

		Overall (n=1,085)	AA only (n=163)	AD with or without AA (n=922)
21	Had to wait too long to get into a program	153 (14.3)	16 (10.3)	137 (15.0)
22	Wanted to keep drinking or got drunk	208 (19.4)	22 (14.1)	186 (20.3)
23	Didn't think drinking problem was serious enough	205 (19.2)	20 (1.9)	185 (20.3)
24	Didn't want to go	213 (19.9)	18 (11.5)	195 (21.3)
25	Stopped drinking on my own	103 (9.6)	13 (8.3)	90 (9.9)
26	Friends or family helped me stop drinking	56 (5.2)	7 (4.5)	49 (5.4)
27	Other	93 (8.7)	19 (12.2)	74 (8.1)

Closeness to persons with alcohol problems

Following Keyes and colleagues (2010), we coded as positive anyone reporting alcohol problems in any first-degree relative or in any live-in relationship with a partner to account for differences in PAS due to social distance/proximity to persons with alcohol problems.

Occupational prestige

A measure of occupational prestige was created from the data by adapting methods employed in a prior NESARC study (McLaughlin, Xuan, Subramanian, & Koenen, 2010). NESARC queried respondents' current or most recent job by presenting 14 occupational categories that were aggregated from the 2000 Census Standard Occupational Classification System. For the present study, occupations were collapsed into the following categories: (1) technical/support/clerical (including technical and related support, sales, administrative support, clerical, private household, protective services, and other services), (2) unskilled/manual (including operators, fabricators, laborers, transportation and material moving, handling, equipment cleaners), (3)

skilled/manual (farming, precision production, military), (4) Not applicable (never worked for pay), and (5) professional (including executive, administrative, managerial, and professional specialty). While McLaughlin et al. (2010) collapsed categories (2) and (3), a distinction between unskilled and skilled labor was preserved in the present study to acknowledge the different pay scales and social class that may be associated with skilled and unskilled labor (Pevalin & Rose, 2002).

Analyses

Descriptive statistics for the observed variables

SUDAAN 10.0.1 (Research Triangle Institute, 2008) was used to calculate descriptive statistics, and SAS 9.2 (SAS Institute Inc., 2008) was used for data management and variable screening. All descriptive analyses and significance tests accounted for the complex design of NESARC using W2 strata, weight, and cluster variables (Grant et al., 2007). SUDAAN uses a Taylor series linearization to adjust the standard errors of estimates to account for the statistical clustering that is introduced by complex sampling methodology.

Sample sizes were reported as unweighted values, and the means of continuous variables and percentages of categorical variables were reported as weighted values representative of the United States adult general population in 2000. The adjusted Wald-F test (Fellegi, 1980) was used to detect significant overall differences in continuous or categorical measures across subgroups. When an overall difference was established, pairwise contrasts (t-tests) detected significant mean or percentage differences across categories of the subgroup variable.

Estimation techniques for structural equation models

Structural equation modeling (SEM) was the primary analytic technique used in this study. SEM is a family of methods that can analyze measurement models (e.g. factor analysis) and structural relationships (e.g. regressions between variables) concurrently (Bollen, 1989). Measurement models offer a way to analyze underlying constructs (i.e., “latent variables”) from observed variables. Using latent variables to measure the constructs of PAS, AUD severity, alcohol consumption, and barriers to treatment enhanced their reliability due to the removal of measurement error (Bollen, 1989). Furthermore, SEM provides an optimal framework for tests of mediation and moderation as compared to traditional regression approaches (Baron & Kenny, 1986; Mackinnon, Lockwood, & Williams, 2004; Preacher & Hayes, 2008).

SEM analyses were conducted with Mplus version 6.12 (Muthén & Muthén, 1998-2012). While SUDAAN uses a Taylor-series linearization to account for the complex sampling methodology of NESARC, Mplus uses a sandwich estimator for this purpose. SEM models were fitted to the data using the weighted least squares with mean and variance correction (WLSMV) estimator and confirmed with the maximum-likelihood robust (MLR) estimator to ensure consistency.² WLSMV and MLR estimators are implemented in Mplus to properly analyze items with ordinal measurement properties (Lubke & Muthén, 2004).

To evaluate the fit of SEM and CFA models, the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and the Root Mean Square Error of Approximation (RMSEA) were examined. Hu and Bentler (1999) recommend that models with a TLI and CFI greater than approximately 0.95 and an RMSEA less than approximately 0.06 be

² Cases where only the MLR or WLSMV estimator was available were noted in the text.

considered acceptable. Others argue that these guidelines are too strict, and instead recommend that models that are slightly below the TLI or CFI or slightly above the RMSEA cutoff be accepted and deemed as having “close to good fit” (Byrne, 2011). These fit indices were examined in models generated by both the WLSMV and MLR estimators.³

The likelihood ratio test (LRT), also known as the chi-square difference test, was used to evaluate the equivalence of structural parameters among nested models. A conservative alpha of <0.001 was set due to the sensitivity of LRT in larger samples (Little, 1997). When analyzing categorical or continuous data with MLR estimator, the p-value of the LRT was generated using the Satorra-Bentler scaled correction factor for the chi-square or loglikelihood statistic (Satorra, 1999). When evaluating categorical data with the WLSMV estimator, the p-value of LRT was generated by the *Mplus* DIFFTEST procedure (Muthén & Muthén, 1998-2010).

To confirm the robustness of findings, a “split-half” approach (Kline, 2010) was used by halving the analytic samples and first conducting analyses in the first half, which was designated as the “test” sample, then confirming results in the second half, which was designated as the “validation” sample. Test and validation samples were generated for the analyses using simple random sampling in PROC SURVEYSELECT of SAS V9.2 (SAS Institute Inc., 2008). Discrepancies in results between the test validation, and overall samples were only reported if found.

³ CFI, TLI, and RMSEA are based on the chi-square statistic. WLSMV optimizes its chi-square to maximize the accuracy of the p-value for the likelihood ratio test generated by the *Mplus* DIFFTEST procedure, which can potentially compromise the accuracy of RMSEA, TLI, and CFI (Morin et al., 2011). Thus, all available fit statistics were evaluated in combination with substantive consideration.

Missing data analysis

Among the 11,303 respondents with lifetime AUDs, the unweighted proportion of missing data for the 12 perceived alcohol stigma items ranged from 0.7% to 1.5% (n=82 to 171). Listwise, an unweighted 6.5% (n=741) had incomplete data on one or more PAS items. For alcohol treatment, 106 participants in the lifetime sample (0.9%) had missing data on lifetime alcohol treatment and 73 in the past-year sample (2.3%) had missing data on past-year alcohol treatment.

The results of two approaches to address missing data were compared, namely data-based multiple imputation and full information maximum likelihood (FIML) estimation (Asparouhov & Muthén, 2010; Enders, 2010). Variables included in these imputation models were age, race/ethnicity, education, marital status, AUD course, and family income due to their statistically significant relationship with missingness on perceived alcohol stigma or alcohol treatment.

Multiple imputation was accomplished through Markov Chain Monte Carlo (MCMC) algorithms in *Mplus* (Asparouhov & Muthén, 2010). For the imputation phase, 20 replications were created. Data were imputed as categorical with a fully saturated variance-covariance imputation model and adjustment for NESARC's clustered design at the primary sampling unit level. For the analysis phase, *Mplus* conducts analyses in each of the 20 imputed datasets then averages parameter estimates over the 20 replications, and more intensive algorithms calculate the standard errors and fit statistics.

FIML estimation was accomplished using the default settings of *Mplus*. FIML uses all available data during estimation, including observations with partially complete data. Respondents with complete data or missing data on one or more dependent

measures were retained, as well as respondents with missing data on one or more (but not all) indicators of exogenous latent variables.

Summary of the approach for the hypothesis tests

In this section, the model specification procedures are described for each hypothesis. Basic SEM path diagrams accompany each hypothesis to depict the general structural paths in the models. Ovals and rectangles are used to represent latent variables and observed variables, respectively. Observed covariates including predisposing, enabling, and need characteristics are depicted as one single rectangle for brevity, although they were each represented by multiple separate variables in the analyses. PAS and overall alcohol severity (see “overall alcohol severity” in the *Results* chapter) were modeled as latent variables.

H1. Higher PAS is associated with decreased perceptions of treatment need among those with lifetime AUDs.

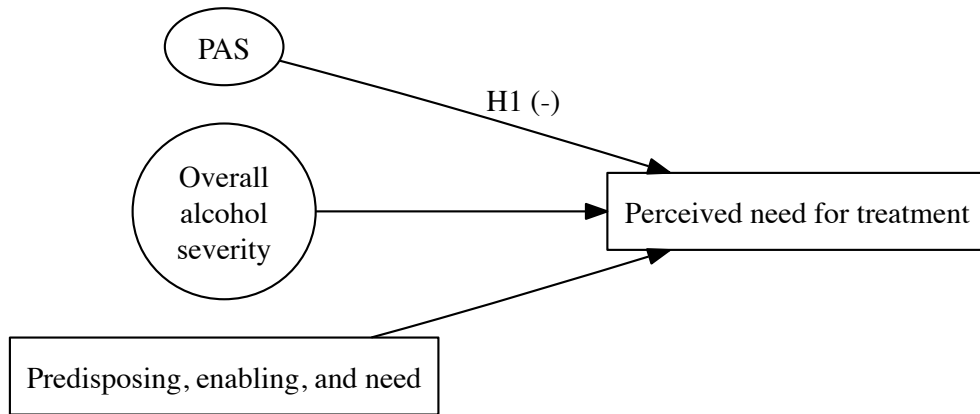


Figure 4.2 Path diagram for H1

Probit regression analyses were conducted among all participants with lifetime AUDs (n=11,303). The WLSMV estimator in *Mplus* uses probit regression for dichotomous dependent variables, whereas the MLR estimator uses logistic regression.

A path model regressed lifetime perceived need for treatment on PAS and all predisposing, enabling, and need characteristics (see Figure 4.2).

H2. Higher PAS is associated with reductions in help seeking among those with lifetime AUDs who also ever perceived a need for treatment.

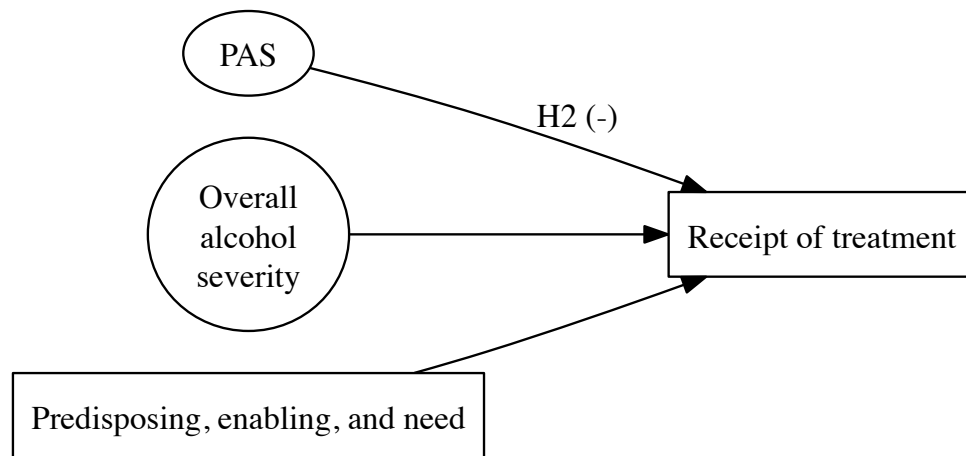


Figure 4.3 Path diagram for H2

Probit regression analyses were conducted among all participants with lifetime AUDs who had ever perceived a need for treatment (n=2,230). A path model regressed the receipt of lifetime alcohol treatment on PAS and all predisposing, enabling, and need characteristics (see Figure 4.3).

These procedures were replicated for two additional dependent variables using multinomial logistic regression. The first model determined if PAS was differentially associated with the receipt of professional treatment only, informal treatment only, both treatments, or no treatment. The second model determined if PAS was differentially associated with the receipt of alcohol-specific treatment only, informal treatment only, both treatments, or no treatment. The reference group for the dependent variable in both models was no treatment.

The fit statistics reported for the multinomial logistic regression models included the AIC, BIC, and loglikelihood due to the *Mplus* implementation of multinomial dependent variables with the MLR estimator (Muthén & Muthén, 1998-2010).⁴ Lower values of these fit statistics indicate better model fit. Cutoff guidelines are not available because these statistics are model-dependent. Model difference testing was available using the Satorra-Bentler scaled LRT using loglikelihood values.

H3. Psychological barriers to care will mediate the relationship between PAS and the receipt of alcohol treatment among those with lifetime AUDs.

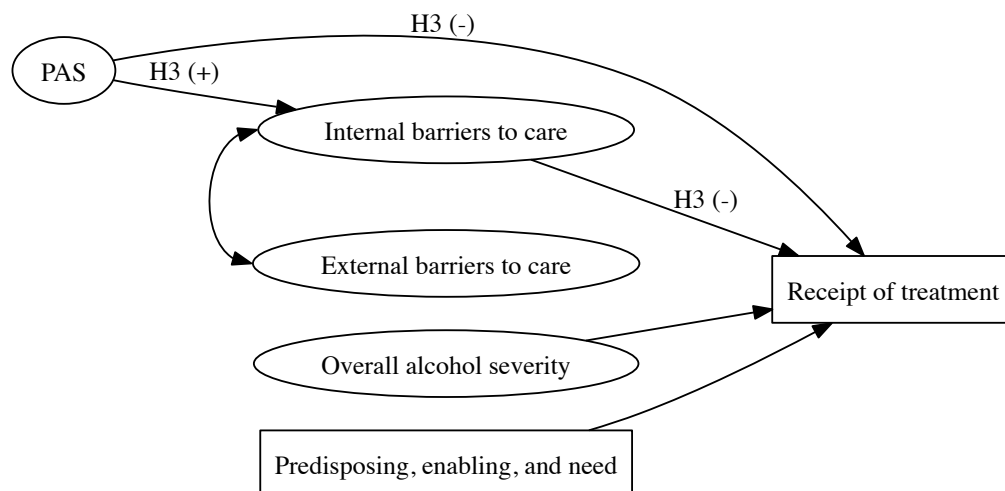


Figure 4.4 Path diagram for H3

H3 analyses were conducted among all participants with lifetime AD who had ever perceived a need for treatment but didn't go (n=922). CFA analyses preceded the hypothesis test to determine whether the barriers to treatment instrument reflected the hypothesized two-factor model. After the best fitting model was identified, logistic

⁴ MLR estimation does not produce chi-square fit statistics in the presence of large frequency tables. Large frequency tables resulted from the use PAS items, which each contained 6 categories due to the use of Likert-type response categories.

regression analyses regressed the receipt of treatment on PAS, psychological barriers to care, and predisposing, enabling, and need characteristics (see Figure 4.4). Treatment was not regressed on external barriers to care due to the high correlation between the internal and external barriers to care factors (see *Barriers to treatment*, Chapter 5).

The statistical significance of the total indirect effect from PAS to the receipt of alcohol treatment through psychological barriers to care was inspected to determine if a mediation effect existed (MacKinnon, 2008). Although the data were cross sectional, the mediation effect was used to indicate whether psychological barriers to care explained the association between stigma and treatment. Indirect effects were tested for statistical significance using the Sobel test (see *Limitations* in Chapter 6).

These procedures were replicated for two other dependent variables using multinomial logistic regression. The first model determined if PAS was differentially associated with the receipt of professional treatment only, informal treatment only, both treatments, or no treatment. The second model determined if PAS was differentially associated with the receipt of alcohol-specific treatment only, informal treatment only, both treatments, or no treatment. The reference group for the dependent variable in both models was no treatment.

H4. PAS will be higher among individuals with past-year AUDs and co-occurring psychiatric disorders, compared to their counterparts with past-year AUD alone.

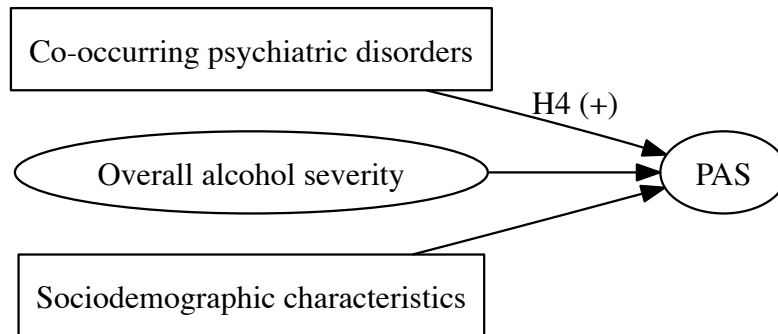


Figure 4.5 Path diagram for H4

H4 analyses were conducted among participants with past-year AUDs at W2 (n=3,142). Using linear regression, PAS was regressed on co-occurring disorder status, overall alcohol severity, and sociodemographic characteristics (see Figure 4.5).

H5. PAS will moderate the relationship between the presence of co-occurring psychiatric disorders and perceived need for alcohol treatment among persons with past-year AUDs.

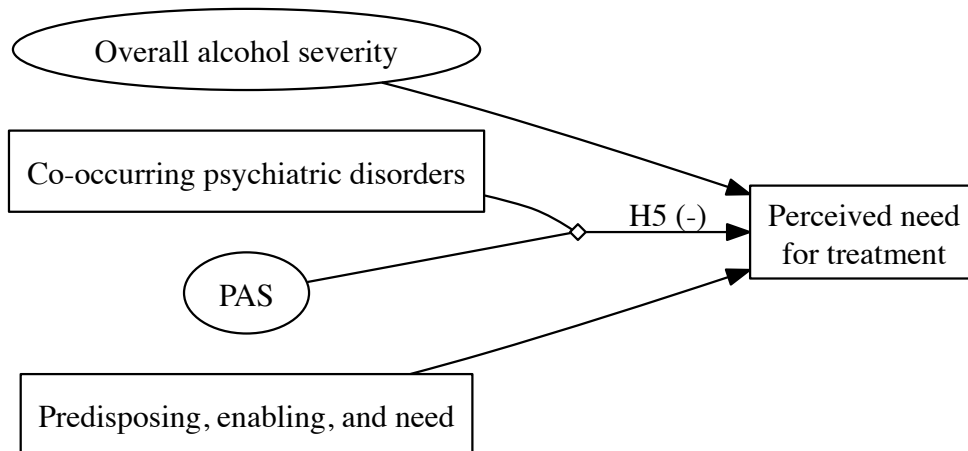


Figure 4.6 Path diagram for H5

Probit regression analyses were conducted among all participants with past-year AUDs (n=3,142). A path model regressed past-year perceived need for treatment on PAS, co-occurring psychiatric disorders, and all predisposing, enabling, and need characteristics. In addition, the interaction between co-occurring psychiatric disorders and PAS was modeled using the *Mplus* latent moderated structural equations approach with the maximum likelihood estimator (Klein & Moosbrugger, 2000).

H6. PAS will moderate the relationship between the presence of co-occurring psychiatric disorders and the receipt of alcohol treatment among persons with lifetime AUDs who ever perceived a need for treatment.

Probit regression analyses were conducted among all participants with lifetime AUDs who had ever perceived a need for treatment (n=2,230). It was necessary to use the lifetime rather than the past-year AUD sample to achieve adequate power to detect moderation (see *Statistical Power* in this chapter). A path model regressed the receipt of lifetime alcohol treatment on PAS, co-occurring psychiatric disorders, and all predisposing, enabling, and need characteristics. The interaction between co-occurring psychiatric disorders and PAS was modeled using the *Mplus* latent moderated structural equations approach with the maximum likelihood estimator (Klein & Moosbrugger, 2000).

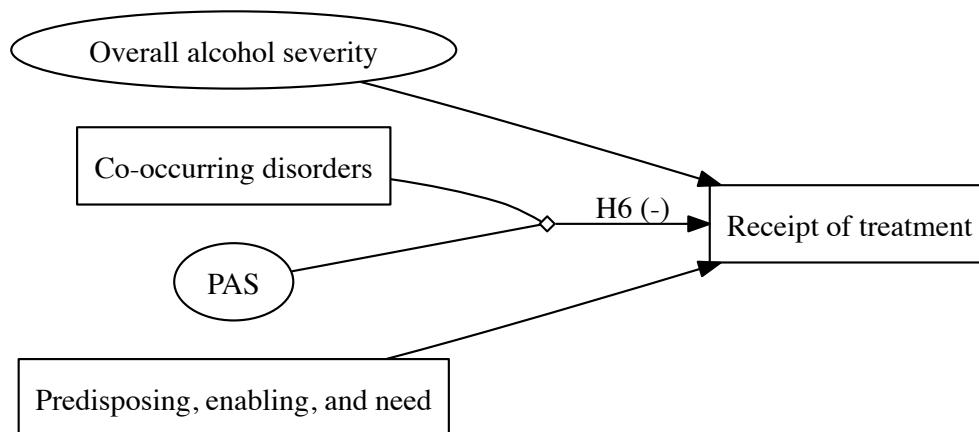


Figure 4.7 Path diagram for H6

These procedures were replicated for two other lifetime treatment status variables using multinomial logistic regression. The first model determined if PAS was differentially associated with the receipt of professional treatment only, informal treatment only, both treatments, or no treatment. The second model determined if PAS was differentially associated with the receipt of alcohol-specific treatment only, informal treatment only, both treatments, or no treatment. The reference group for the dependent variable in both models was no treatment.

Model re-specification

During hypothesis testing, initial models were fit and estimates were inspected. Structural paths for covariates that did not approach statistical significance (paths with $p \geq 0.07$) were sequentially removed to achieve a well-specified model. This cutoff of 0.07 was chosen because p -values for parameters may change during model modification, and as a result could change to a value of less than 0.05.

Stratification of analytic samples

To account for diagnostic heterogeneity, hypotheses tests were conducted in a multiple-group analysis framework using AUD type as a grouping variable (AA only

versus AD with or without AA). A process of invariance testing for structural regression models was followed which used a “model trimming” approach (Bollen, 1989; Kline, 2010). First, latent factors were tested for measurement invariance as described in the following subsection entitled *Measurement invariance*. Next, the full structural equation model was fit with all path coefficients freely estimated across groups (the “least restrictive model”) and compared using a chi-square difference test to more restrictive models that had one or more path coefficients constrained to be equal across groups. In this context, the null hypothesis of the chi-square difference test is that the structural paths are equivalent or have “equal form” across groups (H_{form}). If H_{form} was rejected, the paths remained freely estimated across groups; if not rejected, the paths were specified to be equal across groups.

This process of model trimming was completed in steps informed by the study’s conceptual framework. Specifically, the least-restrictive model was compared to four models which had (1) paths for all predisposing characteristics constrained to be equal, (2) paths for enabling characteristics constrained to be equal, (3) paths for enabling characteristics constrained to be equal, and finally (4) paths for PAS constrained to be equal. This procedure offered a parsimonious and theoretically informed test of statistical moderation by AUD type.⁵

For H3, stratification by AUD diagnosis was not conducted due to inadequate power to detect moderation in the AA subsample (n=163) (see *Statistical Power*) as well

⁵ This process of model trimming was conducted after (1) removing paths from the model that did not approach statistical significance in either group and (2) removing covariates with no significant paths in any part of the model. The distinctions between (1) and (2) arise from the fact that some covariates were involved in more than one regression (e.g. both PAS and alcohol treatment were regressed on gender).

as low cell counts for the barriers to treatment items in this subsample (see *Analytic Samples* in this chapter). Rather, only the AD sample was analyzed in H3, obviating the need for invariance tests. Table 4.8 contains the subgroup sizes for each analytic sample.

Table 4.8 Size of the overall analytic sample and the subgroups used in multiple-group analyses for each hypothesis

Hypothesis	Inclusion criteria	Overall analytic sample (any AUD)	Subgroup sizes	
			AA only	AD with or without AA
H1	Lifetime AUD	11,303	6,389	4,914
H2	Lifetime AUD & perceived need for treatment	2,230	568	1,662
H3	Lifetime AUD & perceived unmet need for treatment	922	Not analyzed	922
H4	Past-year AUD	3,142	1,709	1,433
H5	Past-year AUD	3,142	1,709	1,433
H6	Lifetime AUD & perceived need for treatment	2,230	6,389	4,914

For models analyzed with the MLR estimator, *Mplus* implements multiple group analyses using the KNOWNCLASS procedure in a mixture modeling framework (Muthén & Muthén, 1998-2010). The KNOWNCLASS procedure emulates traditional multiple-group analysis by linking each level of a class variable to an observed grouping variable (i.e. the “known classes”), as opposed to inferring latent classes from the data. Results with the KNOWNCLASS procedure are identical to those achieved with traditional multiple-group analysis (Muthén & Muthén, 1998-2010).

Measurement invariance

Tests of measurement invariance were conducted for all latent variables using multiple-group analysis with AUD type as a grouping variable (Brown, 2006).

Measurement invariance refers to the situation where certain statistical parameters of a CFA model (the “measurement parameters”) are equivalent across subgroups of interest. When a CFA model exhibits measurement invariance, any observed differences between groups that involve the latent construct are considered “true differences.” When measurement invariance cannot be established, these observed differences may arise from differences in the performance of one or more items of a scale across groups.

Measurement non-invariance is closely related to the concept of item bias. *Strong invariance* was the level of measurement equivalence targeted for the present study.

Strong invariance is achieved when the factor loadings and intercepts (or thresholds when using categorical indicators) of the manifest variables are sufficiently similar across subgroups in a multiple-group CFA analysis (Gregorich, 2006). When strong invariance was not achieved, *partial measurement invariance* was deemed acceptable (Byrne, 2011). Partial invariance occurs when most measurement parameters are equivalent across groups, but some are not. Appendix 1 describes the rationale and procedures used to evaluate measurement invariance.

Statistical Power

Power analyses were conducted using Monte Carlo simulation in Mplus with 500 replications each for all hypotheses (Muthén & Muthén, 2002). H3 was deemed the most sensitive to power given the test of mediation with a smaller sample size. When using the AD subsample, there was 81% power to detect significant mediation (using the product of coefficients approach) (MacKinnon, 2008) with path coefficients of $\beta \geq |0.17|$

(a total indirect of β -0.03 , $n=922$) (see Table 4.9). Power was not adequate to detect mediation in the AA only subsample of ($n=163$).

Table 4.9 Power to detect a total indirect effect given a range of potential path coefficients for mediation analysis in H3

PAS to TX STD β	PAS to barriers STD β	Barriers to treatment STD β	Power
-0.20	0.20	-0.20	0.90
-0.18	0.18	-0.18	0.85
-0.17	0.17	-0.17	0.81
-0.15	0.15	-0.15	0.70
-0.10	0.10	-0.10	0.27

Power analyses were conducted with a fixed sample size ($n=922$ to represent respondents with perceived need for treatment and lifetime AD without AA)

Chapter 5. Results

Sample characteristics

The characteristics of NESARC respondents are described in the following subsections. The DSM-IV AUDs of respondents are presented first, followed by information regarding the latent measurement variables used in this study (PAS, AUD severity, ACFS, and barriers to treatment). Next, the observed measures are described, including the dependent measures, focal independent variables and mediators, and independent variables including predisposing, enabling, and need characteristics.

DSM-IV AUDs and AUD course

Alcohol diagnoses (AA only vs. AD with or without AA) for W2 NESARC respondents with lifetime AUDs (n=11,303) and past-year AUDs (n=3,142) are displayed in Table 5.1. These results are stratified by respondents' AUD course for illustrative purposes. Just over half of respondents in both the lifetime and past-year samples had AA only. The most prevalent group in the lifetime sample was comprised of those who met criteria for AA only in the past, but were recovered at the time of the W2 interview ("Recovered") (72%). The past-year sample, because of the requirement to have current AUD, did not include recovered persons. The most prevalent group in the past-year sample included those who met past-year criteria for AA only, and also met criteria for an AUD prior to the past year ("Persistent") (56%). The incident AUD course group was the least common in both samples (3% and 11% in the lifetime and past-year samples, respectively).

In the lifetime sample, the mean lifetime AUD symptom count was significantly higher among the recovered ($M=4.4$) and persistent AUD ($M=5.5$) course groups as compared to the incident course group ($M=3.2$). In the past-year sample, the past-year AUD symptom count was significantly higher in the persistent AUD course group ($M=3.3$) as compared to the incident course group ($M=2.9$).

Table 5.1 Alcohol diagnosis characteristics of Wave 2 NESARC participants with lifetime and past-year DSM-IV alcohol use disorders

Characteristic	Overall	By AUD course, % or Mean (SE)			F (df)
	% or Mean (SE)	Incident (n=363)	Recovered (n=8,161)	Persistent (n=2,779)	
Participants with lifetime DSM-IV AUDs (n=11,303)					
Overall % (SE)		3.2 (0.21)	72.0 (0.56)	24.8 (0.53)	
Type of lifetime DSM-IV AUD					65.4 (2)*
Abuse only (n=6,389)	55.9 (0.70)	41.7 (3.61) _b	62.6 (0.74) _a	38.1 (1.19) _b	
Dependence, with or without abuse (n=4,914)	44.1 (0.70)	58.4 (3.61) _b	37.4 (0.74) _a	61.9 (1.19) _b	
Mean AUD symptom count	4.6 (0.03)	3.2 (0.09) _a	4.4 (0.04) _b	5.5 (0.07) _c	224.4 (2)*
Participants with past-year DSM-IV AUDs (n=3,142)					
Overall % (SE)		11.4 (0.73)	N/A	88.7 (0.73)	
Type of past-year DSM-IV AUD					12.5 (1)*
Abuse only (n=1,709)	54.6 (1.14)	41.7 (3.61) _a	N/A	56.3 (1.17) _b	
Dependence, with or without abuse (n=1,433)	45.4 (1.14)	58.4 (3.61) _a	N/A	43.7 (1.17) _b	
Mean AUD symptom count	3.2 (0.05)	2.9 (0.09) _a	N/A	3.3 (0.05) _b	15.5 (1)*

AUD=alcohol use disorder, SE=standard error, SD=standard deviation. The Adjusted Wald F statistic detected significant differences across groups for continuous and categorical variables. Significant pairwise comparisons across AUD course are indicated by different subscripts. Mean symptom counts are reported from the observed measures. *= $p < 0.001$.

Measurement models

The latent constructs of AUD severity, alcohol consumption, overall alcohol severity, PAS, and barriers to treatment were evaluated for use in hypothesis testing. The factor structures of the latent variables were evaluated in several samples to ensure their robustness. For example, the factor structure of PAS was evaluated in three samples (past-year and lifetime AUD sample and lifetime AD sample with perceived need). The factor structures were evaluated using the “split-half” approach (see *Estimation techniques for structural equation models*, Chapter 4). Subsequently, measurement invariance was tested using multiple-group analysis with AUD type as a grouping variable (see *Measurement invariance*, Chapter 4).

Alcohol use disorder severity

A one-factor model of AUD severity with the 11 AUD criteria (seven criteria of AD and four criteria of AA) was hypothesized. In the lifetime sample, fit was acceptable (CFI=0.984, TLI=0.980, RMSEA=0.033 [90% CI=0.031-0.035]). Yet, the standardized factor loading for the hazardous use variable (AA criterion #2) was negative (-0.059). This contrasted with all other items, which had high factor loadings (range 0.516-0.901). Sensitivity analyses were performed. Fitting a model with the two drinking while driving survey items removed from the hazardous use criterion resulted in noticeable improvements.⁶ A positive factor loading was achieved (0.513), as well as small

⁶ The AUDADIS-IV queries whether respondents had 1) driven a car or other vehicle while drinking, 2) driven after drinking, or 3) got into any other situations while drinking or after drinking that increased one’s chances of getting hurt. Positive responses to any of these items traditionally satisfy the hazardous use criterion in the NESARC data.

increases in the other factor loadings and global model fit (CFI=0.986, TLI=0.983, RMSEA=0.031 [90% CI=0.029-0.034]).

The AUD severity factor was tested with past-year AUD symptoms to evaluate their use in the past-year AUD analytic sample (for H4 and H5). A CFA model with past-year AUD symptoms failed tests of configural invariance by AUD type. Next, the lifetime AUD symptom measures, which by definition incorporate the experience of past-year symptoms, were tested in the past-year sample. Strong measurement invariance by AUD type was achieved without modifications. To summarize, lifetime AUD symptoms were used to represent the latent AUD severity factor for the past-year and lifetime AUD samples.

Alcohol consumption

Four alcohol consumption indices were generated from the NESARC data: 1) typical consumption (usual number of daily drinks consumed multiplied by the frequency of any drinking, log transformed), 2) maximum consumption (largest number of daily drinks consumed multiplied by the frequency of drinking this amount, log transformed), 3) frequency of drinking 5 or more drinks, and 4) frequency of drinking until intoxication. Indices 1-3 were available for the lifetime interval, whereas all four indices were available for the past-year interval. When fitting the CFA models for alcohol consumption, chi-square fit statistics were only available for the past-year interval due to the requirement of four indicators to achieve sufficient degrees of freedom to calculate a chi-square value in a one-factor model.

The past-year ACFS had good fit with TLI and CFI of 1.00, RMSEA of 0.000 (90% CI=0.000-0.025), and SRMR 0.002.⁷ Standardized factor loadings ranged from 0.532-0.891. For lifetime ACFS, standardized factor loadings ranged from 0.585-0.917. Measurement invariance was tested for the past-year ACFS. The test for strong invariance was marginal, but relaxing the intercept invariance for the frequency of drinking to intoxication item achieved partial measurement invariance for the model (see Appendix 1).

Overall alcohol severity

The possibility of a single dimension encompassing AUD symptom and consumption-based measures (“overall alcohol severity”) was investigated. As reviewed previously (see *Overall alcohol severity* in the measures section of Chapter 4), prior studies have recommended the addition of an alcohol consumption indicator to a latent AUD symptom factor (Borges et al., 2010; Saha et al., 2007).

A one-factor model of 11 lifetime AUD symptoms plus the frequency of binge drinking item was fit in the lifetime and past-year samples.⁸ This model fit the data well (past-year: CFI=0.982, TLI=0.979, RMSEA=0.032 [90% CI=0.027-0.036]; lifetime: CFI=0.980, TLI=0.975, RMSEA=0.034 [90% CI=0.031-0.036]) and achieved strong measurement invariance across AUD type. It is noted that before investigating their combination, the AUD severity and alcohol consumption factors were tested in a two-

⁷ The alcohol consumption factor was only tested with the maximum-likelihood robust estimator (MLR) for the skewed continuous data. WLSMV requires categorical data.

⁸ Analyses of the lifetime AUD sample used the lifetime binge drinking item. Analyses of the past-year sample used the past-year binge drinking item.

factor CFA due to their adequate performance when operationalized individually in separate models. Marginal fit was found in the lifetime sample and configural invariance did not hold. A one-factor model was also tested that combined all AUD symptoms and consumption items, which did not fit the data well. Hence, the one-factor overall alcohol severity factor was favored over the individual alcohol consumption or AUD severity factors and was used for all hypothesis testing. Factor loadings for the alcohol severity factor, fit in the lifetime AUD sample, are displayed in Table 5.2.

Table 5.2 Confirmatory factor analysis results for the *overall alcohol severity* factor in NESARC wave 2 participants with lifetime alcohol use disorders (n=11,303)

Item	Parameter estimates		
	Std.	Unstd.	SE
<i>Alcohol use disorder criteria</i>			
Tolerance (AD#1)	0.643	1.000	0.000
Withdrawal (AD#2)	0.707	1.100	0.026
Larger/longer (AD#3)	0.615	0.957	0.022
Quit (AD #4)	0.637	0.990	0.023
Time spent (AD #5)	0.803	1.249	0.025
Reduced activities (AD #6)	0.899	1.398	0.028
Psychological/Medical (AD #7)	0.815	1.268	0.023
Interference (AA #1)	0.852	1.341	0.028
Hazardous use (AA #2)	0.513	0.799	0.024
Legal problems (AA #3)	0.531	0.826	0.025
Social/interpersonal (AA #4)	0.745	1.158	0.022
<i>Alcohol consumption</i>			
Frequency of binge drinking	0.582	3.112	0.090
Factor variance	1.000	0.413	0.014
Model fit	$\chi^2=740$, $df=54$, CFI=0.980, TLI=0.975, RMSEA=0.034 (90% CI=0.031-0.036)		

Parameters are displayed from WLSMV models estimated with full information maximum likelihood to address missing data. All freely estimated parameters were significant at $p<0.001$. AD=alcohol dependence, AA=alcohol abuse. Standard errors (SEs) are displayed for unstandardized coefficients.

Perceived alcohol stigma (PAS)

The one-factor model of PAS identified by Glass, Bucholz, and Kristjansson (In press) was tested for measurement invariance across AUD type using multiple-group CFA. Regardless of the approach used to address missing data (the analysis of multiple imputed datasets or FIML estimation), similar results were achieved. The one-factor representation of PAS achieved strong measurement invariance across AUD type. Parameter estimates for PAS fitted in the lifetime AUD sample are displayed in Table 5.3.

Table 5.3 Confirmatory factor analysis results for the alcohol-adapted Perceived Devaluation-Discrimination scale in NESARC wave 2 participants with lifetime alcohol use disorders (n=11,303)

Item	Parameter estimates		
	Std.	Unstd.	SE
Most people believe that a person who has had alcohol treatment is just as intelligent as the average person	0.424	1.000	0.000
Most people believe that a former alcoholic is just as trustworthy as the average person	0.472	1.115	0.024
Most people feel that entering alcohol treatment is a sign of personal failure (R)	0.487	1.148	0.032
Most people think less of a person who has been in alcohol treatment (R)	0.679	1.603	0.038
Once they know a person was in alcohol treatment, most people will take his or her opinion less seriously (R)	0.710	1.676	0.038
Most people would willingly accept a former alcoholic as a close friend	0.350	0.825	0.024
Most people would accept a fully recovered former alcoholic as a teacher of young children in a public school	0.506	1.195	0.027
Most people would not hire a former alcoholic to take care of their children, even if he or she had been sober for some time (R)	0.596	1.406	0.037
Most employers will hire a former alcoholic if he or she is qualified for the job	0.505	1.191	0.033
Most employers will pass over the application of a former alcoholic in favor of another applicant (R)	0.591	1.395	0.036
Most people in my community would treat a former alcoholic just as they would treat anyone else	0.493	1.164	0.029
Most young women would be reluctant to date a man who has been hospitalized for alcoholism (R)	0.401	0.946	0.031
Factor variance	1.000	0.180	0.008
Model fit	$\chi^2=1,389$, $df=39$, $CFI=0.979$, $TLI=0.965$, $RMSEA=0.055$ [90% CI=0.053-0.058]		

Parameters are displayed from WLSMV models estimated with full information maximum likelihood to address missing data. All freely estimated parameters were significant at $p<0.001$. Correlated uniquenesses were specified for positively worded items. “(R)” indicates that the item used reverse-wording.

Last, to characterize the level of stigma in the lifetime AUD sample with respect to original scale of the PDD, the model was fit by treating the stigma items as continuous while using effects coding to identify the scale of the latent PAS factor (Little, 1997). This method produces a factor mean and factor variance that reflects the weighted average of the manifest indicators, corrected for their unreliability. Using this method, the mean of latent PAS was 3.076 (SE=0.010, $p < 0.001$) and the variance was 0.348 (SE=0.007, $p < 0.001$).⁹ That is, when correcting for unreliability, the average score across the 12 PAS items was 3.08 with a standard deviation of 0.59. Recall that the Likert scale ranged from 1 to 6 with higher scores indicating more perceived stigma, and the midpoint of the scale was between scores 3 and 4 (“somewhat agree” and “somewhat disagree”, respectively). Therefore, on average, PAS scores were below the midpoint of all possible scores, that is, closer to the “low stigma” end of the scale.

Barriers to treatment

The two-factor CFA model of psychological and external barriers to treatment was fit in the sample of participants with lifetime AD who ever perceived a need for treatment (n=922). Table 4.7 lists all 27 items of the measure. An inspection of bivariate tables led to the removal of items with low endorsement proportions (items 15, 18, 19, and 20). The “other” item (#27) was removed because it did not have a clear conceptual relevance to the hypothesized factors. The remaining items were subjected to CFA in the test sample, which achieved less than adequate fit (CFI=0.908, TLI=0.899, RMSEA=0.025 [90% CI=0.017-0.033]). The item-level residuals and r-square values

⁹ Most fit statistics of this model were acceptable, yet the TLI was slightly below the acceptable range (0.928), which is likely due to the treatment of the items as continuous rather than ordinal.

were inspected to reveal areas of localized strain, which led to the sequential removal of 8 items. For the psychological barriers to care factor, items 3 and 10 had low item-level r-square values, and items 17, 22, and 24 had large residual values. The external barriers to care factor had low item-level r-square values for items 7, 16, and 21. The final model achieved good fit with the remaining 13 items (9 psychological, 4 external) (CFI=0.953, TLI=0.943, RMSEA=0.028 [90% CI=0.009-0.041]). The model was replicated in the validation and full samples. The validation sample had close to good fit (CFI=0.940, TLI=0.927, RMSEA=0.022 [90% CI=0.000-0.037]), and the full sample had a good fit to the data ($\chi^2=91$, $df=64$, $p=0.0158$, CFI=0.960, TLI=0.952, RMSEA=0.021 [90% CI=0.010-0.031]). Factor loadings in the full sample are displayed in Table 5.4. Tests of measurement invariance were unnecessary because stratified analyses by AUD type were not conducted with this variable.

Table 5.4 Confirmatory factor analysis results for the two-factor model of barriers to treatment for NESARC wave 2 participants with lifetime alcohol dependence who ever perceived a need for treatment (n=922)

Item	Parameter estimates		
	Std.	Unstd.	SE
<i>Factor 1: Psychological barriers</i>			
Didn't think anyone could help	0.593	1.000	0.000
Thought the problem would get better by itself	0.601	1.013	0.129
Was too embarrassed to discuss it with anyone	0.764	1.288	0.160
Thought it was something that I should be strong enough to handle alone	0.646	1.088	0.158
Was afraid they would put me in the hospital	0.750	1.263	0.138
Was afraid of the treatment they would give me	0.668	1.126	0.145
Hated answering personal questions	0.677	1.140	0.186
Didn't think drinking problem was serious enough	0.558	0.940	0.129
<i>Factor 2: External barriers</i>			
Wanted to go, but health insurance didn't cover	0.492	1.000	0.000
Didn't know of any place to go for help	0.670	1.362	0.372
Couldn't afford to pay the bill	0.643	1.308	0.356
Didn't have any way to get there	0.768	1.562	0.321
Factor variance: psychological barriers	1.000	0.352	0.078
Factor variance: external barriers	1.000	0.242	0.101
Factor covariance	0.703	0.205	0.052
Model fit	$\chi^2=91$, $df=64$, $CFI=0.960$, $TLI=0.952$, $RMSEA=0.021$ [90% CI=0.010-0.031]		

Parameters are displayed from WLSMV models estimated with full information maximum likelihood to address missing data. All freely estimated parameters were significant at $p<0.001$.

Summary of the latent variables

Model-estimated correlation matrices for the latent constructs within the lifetime AUD, past-year AUD, and lifetime AD with perceived need samples are displayed in Table 5.5. PAS and overall alcohol severity were not significantly associated in any

sample. Among persons with lifetime AD who ever perceived a need for treatment, PAS had a significant positive association with psychological barriers to treatment ($r=0.221$). Psychological barriers to treatment were also significantly positively associated with external barriers to treatment ($r=0.690$) and overall alcohol severity ($r=0.346$). External barriers to treatment were significantly associated with overall alcohol severity ($r=0.214$). The high correlation between internal and external barriers to care is noted ($r=0.690$), which required multicollinearity considerations in the analyses (see *Results of hypothesis tests* for H3).

Although not shown in a table, results from multiple-group models revealed no significant differences in PAS between those with AA only versus those with AD with or without AA in the lifetime or past year samples (result from the lifetime sample: standardized latent mean difference=0.038, SE=0.032, $X^2_{diff}=1.4$, $df_{diff}=1$, $p=0.2310$).¹⁰ In contrast, there was significant population heterogeneity in overall alcohol severity across AUD type. Overall alcohol severity was significantly greater among the AD with or without AA group as compared to the AA only group (result from the lifetime sample: standardized latent mean difference=4.274, SE=0.192, $X^2_{diff}=2,689$, $df_{diff}=1$, $p<0.0001$). A test of equal variances for the overall alcohol severity factor across AUD type was also rejected ($X^2_{diff}=369$, $df_{diff}=1$, $p<0.0001$).

¹⁰ X^2 difference testing was conducted with a WLSMV DIFFTEST comparing a less constrained model with freely estimated means to a nested model with means constrained to be equal.

Table 5.5 Model-estimated correlations among the latent variables

<u>Lifetime AUD sample (H1-H2; H6)</u>		1.	2.		
1. Perceived alcohol stigma		1.000			
2. Overall alcohol severity		-0.002	1.000		
<u>Past-year AUD sample (H4-H5)</u>		1.	2.		
1. Perceived alcohol stigma		1.000			
2. Overall alcohol severity		0.006	1.000		
<u>Lifetime AD who perceived a need for treatment (H3)</u>		1.	2.	3.	4.
1. Perceived alcohol stigma		1.000			
2. Psychological barriers to treatment		0.221	1.000		
3. External barriers to treatment		0.100	0.690	1.000	
4. Overall alcohol severity		0.069	0.346	0.214	1.000

Correlations in bold are statistically significant ($p < 0.001$). Partial correlations are displayed when there are more than two latent variables.

Dependent Measures

Perceived need for treatment

Respondents' perceived need for treatment is reported separately for those with lifetime AUDs ($n=11,303$) and past-year AUDs ($n=3,142$) in Table 5.6. Prevalence estimates are population-representative, with the exception that 17 participants in the lifetime AUD sample (unweighted 0.1%) and 73 participants in the past-year AUD sample (unweighted 2.3%) were excluded from these descriptive analyses due to missing data on alcohol treatment utilization.

Results are stratified by AUD type (AA only vs. AD with or without AA) for illustrative purposes. Approximately 19% of the lifetime sample and 11% of the past-year sample perceived a need for treatment. In this study, respondents were considered to have perceived a need for treatment if they (1) received treatment or if they (2) reported that they thought that they needed treatment but did not go (perceived unmet need). In

both the past-year and lifetime samples, of those that were classified as having perceived a need for treatment, about half of respondents met criteria for perceived need for treatment by only receiving treatment (50.0% and 44.6% in the lifetime and past-year samples, respectively) (not shown). The remaining reported either only perceived unmet need (20.6% and 32.4% in the lifetime and past-year samples, respectively), or both perceived unmet need and the receipt of treatment (27.3% and 23.1% in the lifetime and past-year samples, respectively) (not shown).

Significantly more respondents that had AD with or without AA perceived a need for treatment (33.0% and 20.5% in the lifetime and past-year samples, respectively), as compared to those with AA only (8.2% and 3.2% in the lifetime and past-year samples, respectively). In addition, each of the individual criteria that that could be satisfied to meet this measure (i.e., received treatment or perceived unmet need) were more prevalent among those with AD with or without AA as compared to those with AA only (see Table 5.6).

Table 5.6 Perceived need for treatment among Wave 2 NESARC participants with lifetime and past-year DSM-IV alcohol use disorders

Participants with lifetime DSM-IV AUDs (n=11,303)				
Characteristic	Overall	By AUD type, % (SE)		F (df)
	% (SE)	AA only (n=6,375)	AD w/ or w/o AA (n=4,911)	
Perceived a need for treatment (PN) in their lifetime?				177.0 (1)**
Yes (n=2,230)	19.2 (0.48)	8.2 (0.46) _a	33.0 (0.86) _b	
No (n=9,056)	80.9 (0.48)	91.8 (0.46) _a	67.0 (0.86) _b	
Criteria satisfying PN = "Yes"				57.2 (3)**
Perceived unmet need only (n=479)	4.4 (0.24)	1.5 (0.20) _a	8.0 (0.49) _b	
Treatment only (n=1,145)	9.6 (0.35)	5.9 (0.40) _a	14.2 (0.58) _b	
Both (n=606)	5.2 (0.25)	0.8 (0.12) _a	10.9 (0.52) _b	
Participants with past-year DSM-IV AUDs (n=3,142)				
Characteristic	Overall	By AUD type, % (SE)		F (df)
	% (SE)	AA only (n=1,692)	AD w/ or w/o AA (n=1,383)	
Perceived a need for treatment (PN) in the past-year?				82.5 (1)**
Yes (n=343)	10.9 (0.66)	3.2 (0.51) _a	20.5 (1.33) _b	
No (n=2,732)	89.1 (0.66)	96.8 (0.51) _a	79.6 (1.33) _b	
Criteria satisfying PN = "Yes"				28.2 (3)**
Perceived unmet need only (n=128)	3.5 (0.37)	0.8 (0.21) _a	6.9 (0.76) _b	
Treatment only (n=142)	4.9 (0.45)	2.3 (0.50) _a	8.0 (0.84) _b	
Both (n=73)	2.5 (0.35)	0.1 (0.06) _a	5.6 (0.79) _b	

AUDs=alcohol use disorders, SE=standard error, SD=standard deviation. The Adjusted Wald *F* in SUDAAN detects significant differences across groups for categorical variables. Significant pairwise comparisons (conservative $\alpha=0.01$) across stratification variables are indicated by different subscripts. Estimates excluded 17 participants in the lifetime sample and 73 in the past-year sample with missing data on alcohol treatment utilization. *= $p<0.001$. **= $p<0.0001$.

Receipt of treatment

Respondents' receipt of any alcohol treatment, and the types of treatment received including informal vs. professional alcohol treatment and treatment in alcohol-specific vs. non-alcohol-specific settings, are reported in Table 5.7 for W2 respondents with lifetime AUDs who ever perceived a need for treatment (n=2,230). Results are stratified by type of AUD (AA only vs. AD with or without AA) for illustrative purposes. A total of 17 respondents (unweighted 0.7%) had missing data on any alcohol treatment and 77 respondents (unweighted 3.5%) had missing data on the specific types of treatment that were received.

Approximately 77.3% of those with AUDs classified as having perceived a need for alcohol treatment in their lifetime reported actually receiving treatment. Differences in the prevalence of any alcohol treatment by AUD type were not statistically significant. It is notable, however, that this is in contrast to the overall sample of persons with lifetime AUDs (i.e., irrespective of perceived need, see Table 5.6), where treatment participation was clearly higher among persons who had AD with or without AA as compared to persons with AA only (25.1% versus 6.7%, respectively, inferred from the "treatment only" and "both" rows of Table 5.6).

It is also important to note that the any treatment estimate (77.3%) for the sample of persons with lifetime AUDs who perceived a need for treatment must be interpreted within the context of the sample's defining characteristics. About half of respondents in this sample were classified as having perceived a need for treatment only because they received it (see Table 5.6). The other half is made up of persons who both received

treatment and reported that they perceived a need for it, or only reported that they perceived a need for treatment.

Table 5.7 Type of alcohol treatment received among Wave 2 NESARC participants with lifetime DSM-IV alcohol use disorders (AUDs) who perceived a need for treatment (n=2,230)

Characteristic	Overall	By AUD type, % (SE)		F (df)
	% (SE)	AA only (n=568)	AD w/ or w/o AA (n=1,662)	
Overall % (SE)		24.0 (1.26)	76.1 (1.26)	
Received any alcohol treatment in their lifetime?				4.6 (1) [±]
Yes (n=1,751)	77.3 (1.09)	81.6 (2.34)	75.9 (1.24)	
No (n=479)	22.8 (1.09)	18.4 (2.34)	24.1 (1.24)	
Received professional or informal treatment? ²				8.7 (3)*
Informal only (n=290)	13.2 (0.98)	23.7 (2.73) _a	9.9 (0.86) _b	
Professional only (n=346)	17.4 (1.12)	21.7 (2.53)	16.1 (1.21)	
Received both (n=1,055)	46.1 (1.35)	35.3 (2.70) _a	49.4 (1.57) _b	
Neither (n=479)	23.3 (1.11)	19.3 (2.44)	24.6 (1.25)	
Received treatment that was alcohol-specific or not alcohol specific? ²				11.2 (3)**
Non-alcohol-specific only (n=206)	10.9 (0.92)	11.0 (1.85)	10.9 (1.07)	
Alcohol-specific only (n=624)	27.6 (1.25)	42.2 (2.89) _a	23.2 (1.26) _b	
Received both (n=861)	38.2 (1.22)	27.5 (2.14) _a	41.4 (1.51) _b	
Neither (n=479)	23.3 (1.11)	19.3 (2.44)	24.6 (1.25)	

SE=standard error, SD=standard deviation. The Adjusted Wald *F* in SUDAAN detects significant differences across groups for categorical variables. Significant pairwise comparisons (conservative $\alpha=0.01$) across stratification variables are indicated by different subscripts. ¹Estimates excluded 17 participants with lifetime AUDs with missing data on alcohol treatment utilization. ²Estimates exclude 77 participants with lifetime AUDs who had missing data on the type of treatment received. [±] $p<0.05$. * $p<0.01$. ** $p<0.001$.

While the rates of receiving any treatment were similar across AUD type, there were significant differences in the types of treatment received. To assist with the

interpretation of these differences, the weighted percentages of the categories for each treatment classification variable are graphed in bar charts in Figure 5.1.

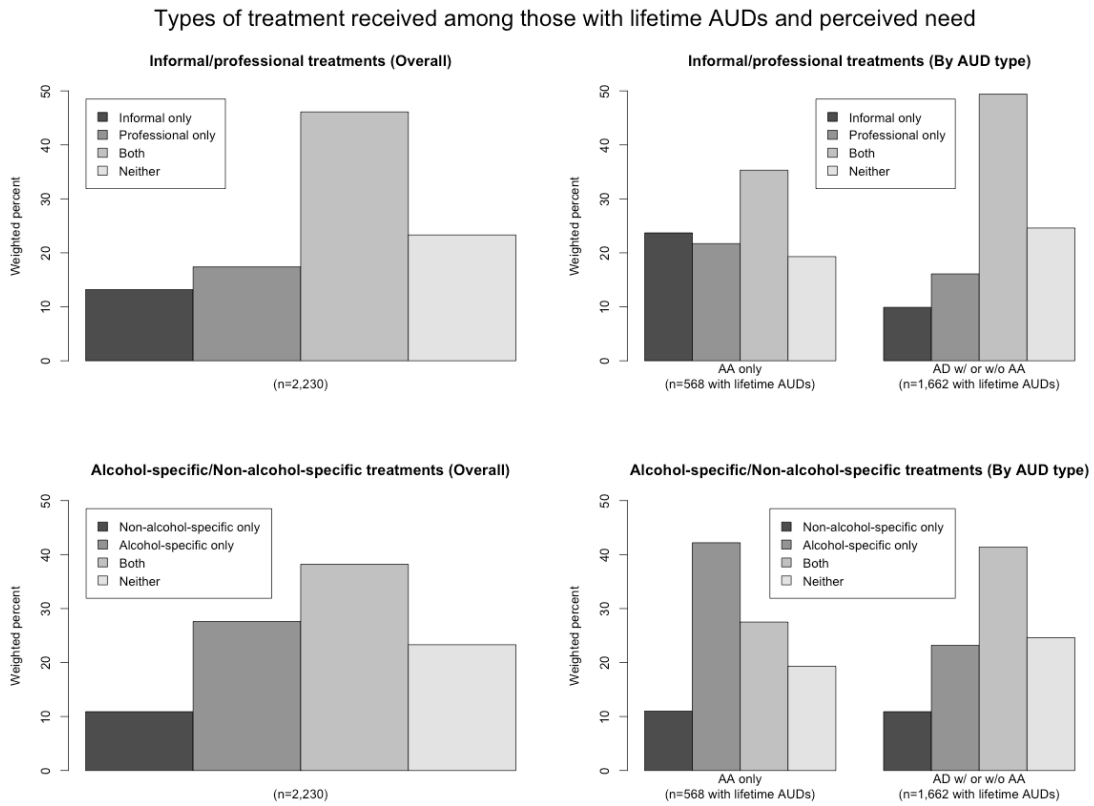


Figure 5.1 Weighted percentages for the treatment classification variables

Depicted are the informal/professional treatment (top row) and alcohol-specific/non-alcohol-specific (bottom row) classifications. The left graphs depict data for overall respondents with lifetime AUDs and perceived need, and the right graphs depict these data by AUD type.

When all respondents were collapsed, the receipt of both informal/professional treatments (top left graph) and the receipt of both alcohol-specific/alcohol-non-specific treatments (bottom left graph) were the most common categories for each of the

classification variables. However, when separating respondents by AUD status, a different pattern emerged for both of the treatment classifications.

With regard to the informal/professional treatment classification (top right graph), a large proportion of persons in the AD with or without AA group received both informal and professional treatments. The receipt treatment from professionals only or from informal sources only was much less common. This was in contrast to the AA only group, where there was a more even spread across each of the informal/professional treatment types (although the receipt of both treatments was still the most common).

With regard to the alcohol-specific/non-alcohol-specific treatments (bottom right graph), the category of both treatments was again the most prevalent for the AD with or without AA group. In contrast, the AA only group had a high prevalence of those who received alcohol-specific treatment only.

It is important to note that the alcohol or drug rehabilitation treatment and 12-step treatments are the two most prevalent types of alcohol treatment in NESARC (Cohen et al., 2007). In the professional/informal classification, the former is considered a professional treatment and the latter is considered an informal treatment. In contrast, in the alcohol-specific/non-alcohol-specific classification, these treatments are both considered alcohol-specific.

Observed independent and mediating variables

Weighted data for the observed measures, including predisposing, enabling, and need characteristics, are displayed in Table 5.8. The analytic samples were mostly male and of younger age groups, which reflected the higher prevalence of AUDs among men and young persons in the general population. In the past-year AUD sample, the youngest

age group (<35 years) was the most prevalent, whereas persons aged 35 to 49 were the most prevalent age group in the other samples. White was the most prevalent race/ethnicity group, Hispanic and Black were the next most prevalent groups, and Native Americans and Asians were the groups having the lowest prevalence. Most persons were married and had greater than a high school education. For all of the samples, family incomes of less than \$20,000 were the most common. Urban/rural residence statuses were similar across all samples. With regard to occupational prestige, the unskilled labor and technical/support/clerical groups appeared to be overrepresented in the sample of persons with lifetime AD who perceived a need for treatment. Persons with psychiatric comorbidity, persons who lived in close proximity to those with alcohol problems, persons with first-degree relatives with alcohol problems, and persons with no insurance or public insurance as compared to private insurance were also overrepresented among those with lifetime AD who perceived a need for treatment.

Table 5.8 Predisposing, enabling, and need characteristics for Wave 2 NESARC participants in each analytic sample^a

Characteristic	Lifetime AUDs (n=11,303)	Past-year AUDs (n=3,142)	Lifetime AD & perceived need for treatment (n=922)
	Weighted % (SE)		
<i>Predisposing characteristics</i>			
Gender			
Male	66.2 (0.57)	71.5 (0.88)	68.1 (1.78)
Female	33.8 (0.57)	28.5 (0.88)	32.0 (1.78)
Age			
<35	29.3 (0.60)	44.4 (1.10)	26.3 (1.76)
35-49	36.8 (0.57)	35.2 (1.08)	43.0 (1.90)
50-64	23.5 (0.47)	16.7 (0.76)	26.0 (1.90)
>=65	10.4 (0.32)	3.8 (0.36)	4.8 (0.73)
Marital status			
Presently married	62.5 (0.56)	49.5 (1.18)	55.7 (1.97)
Previously married	17.2 (0.42)	17.3 (0.80)	25.8 (1.64)
Never married	20.2 (0.55)	33.2 (1.13)	18.5 (1.52)
Race/ethnicity			
Hispanic	8.9 (0.93)	10.5 (1.29)	9.3 (1.67)
Black	8.3 (0.55)	10.1 (0.83)	9.3 (0.98)
Native American	2.9 (0.26)	2.6 (0.43)	5.4 (1.12)
Asian	1.8 (0.33)	2.2 (0.51)	0.9 (0.36)
White	78.1 (1.17)	75.0 (1.57)	75.1 (2.05)
Education			
<HS	11.3 (0.47)	25.6 (1.14)	16.9 (1.63)
HS or GED	25.9 (0.67)	32.0 (1.08)	28.8 (1.77)
>HS	62.9 (0.79)	42.5 (1.24)	54.3 (2.22)
Urban/rural residence			
Metro area, residing in a city	32.8 (0.84)	31.5 (1.25)	30.9 (1.95)
Metro area, not residing in a city	51.2 (0.86)	51.7 (1.29)	52.4 (2.16)
Rural residence	16.0 (0.67)	16.9 (0.96)	16.7 (1.84)
Occupational prestige			
Technical/support/clerical	37.3 (0.62)	40.2 (1.02)	40.5 (2.03)
Unskilled labor	15.7 (0.53)	18.6 (0.95)	20.3 (1.78)
Skilled labor	8.1 (0.41)	8.9 (0.68)	9.5 (1.27)
Never employed	7.3 (0.30)	3.6 (0.39)	7.0 (0.87)
Professional	31.6 (0.77)	28.8 (1.02)	22.7 (1.90)
<i>Enabling characteristics</i>			
Insurance status			

	Lifetime AUDs (n=11,303)	Past-year AUDs (n=3,142)	Lifetime AD & perceived need for treatment (n=922)
Public	13.8 (0.41)	9.8 (0.65)	17.2 (1.38)
Private	72.7 (0.63)	70.7 (1.11)	61.8 (2.02)
No insurance	13.5 (0.51)	19.5 (1.00)	21.0 (1.73)
Family income			
<=19,999	33.5 (0.68)	34.2 (0.99)	43.3 (2.34)
20,000-34,999	23.9 (0.53)	24.9 (1.03)	25.0 (1.71)
35,000-69,999	29.3 (0.53)	29.2 (0.95)	24.0 (1.72)
>= 70,000	13.4 (0.67)	11.7 (0.84)	7.8 (1.23)
Quasi-continuous family income: <i>M</i> (SE) ^b	8.5 (0.09)	8.3 (0.10)	7.30 (0.20)
<i>Need characteristics^a</i>			
<i>Psychiatric comorbidity^c</i>			
Externalizing only	15.6 (0.45)	11.3 (0.67)	17.0 (1.73)
Internalizing only	22.0 (0.45)	20.5 (0.81)	22.4 (1.54)
Both int. and ext.	16.8 (0.47)	10.1 (0.70)	46.6 (2.01)
No comorbidity	45.6 (0.67)	58.1 (1.13)	14.0 (1.36)
<i>Closeness to persons with alcohol problems</i>			
First degree relative with alcohol problems	49.5 (0.67)	45.1 (1.11)	78.2 (1.55)
Lives or lived with a life partner with alcohol problems	20.38 (0.52)	19.2 (0.81)	45.5 (2.02)

^aPerceived alcohol stigma and additional need characteristics not presented in this table were modeled as latent variables (overall alcohol severity, AUD course).

^bThe quasi-continuous family income variable is displayed for descriptive purposes; its values are not meaningful. ^cPast-year co-occurring disorders are shown for the past year AUD sample; the other samples show lifetime co-occurring disorders. AUD=alcohol use disorder, AD=alcohol dependence, SE=standard error.

Results of hypothesis tests

Aim 1 Results

H1: Higher PAS is associated with decreased perceptions of treatment need among those with lifetime AUDs.

H1 was fit in a multiple-group analysis with perceived need for treatment as the dependent variable among respondents with lifetime AUDs (n=11,303). The least-

restrictive model with all covariates freely estimated for both AUD types had good fit to the data ($X^2=4,095$, $df=1,957$, $CFI=0.955$, $TLI=0.952$, $RMSEA=0.014$ [90% CI=0.013-0.015]). To achieve an accurately specified baseline model for structural invariance testing, three covariates were removed¹¹ because their regression paths did not approach statistical significance in any part of the model, and several regression paths to perceived need were dropped¹² that did not approach statistical significance in either group. Structural invariance was tested to determine if paths for PAS and predisposing, enabling, and need characteristics were equal across groups (baseline model $X^2=3,910$, $df=1,805$, $CFI=0.957$, $TLI=0.954$, $RMSEA=0.014$, [90% CI=0.014-0.015]). The null hypothesis for equal form was not rejected ($\alpha=0.001$) for predisposing ($X^2_{diff}=26$, $df_{diff}=11$, $p=0.0064$) and enabling characteristics ($X^2_{diff}=4$, $df_{diff}=3$, $p=0.2396$), but was rejected for need characteristics ($X^2_{diff}=180$, $df_{diff}=7$, $p<0.0001$) and PAS ($X^2_{diff}=13$, $df_{diff}=1$, $p=0.0004$).

The final model, which freely estimated all covariates except predisposing and enabling characteristics across groups, is displayed in Table 5.9. Fit statistics for this model were $X^2=3,923$, $df=1,819$, $CFI=0.957$, $TLI=0.955$, $RMSEA=0.014$ [90% CI=0.014-0.015]. As seen in the table, the relationship between PAS and perceived need for treatment was significant for the AA only group, but not the AD with or without AA group. Thus, an interaction was found indicating that H1 was rejected among persons with AD yet not rejected among persons with AA only.

¹¹Insurance status, urban/rural status, and race/ethnicity were removed.

¹²Paths for the regression of perceived need for treatment on race/ethnicity, gender, occupational prestige, and having a partner with alcohol problems were removed.

Table 5.9 Hypothesis 1: Structural equation model of perceived need for treatment regressed on perceived alcohol stigma, predisposing, enabling, and need characteristics for Wave 2 NESARC participants with lifetime alcohol use disorders (n=11,303)

Characteristic	Alcohol dependence with or without abuse (Group 1: Reference group)				Alcohol abuse only (Group 2: Comparison group)			
	Std	Unstd	SE	<i>p</i>	Std	Unstd	SE	<i>p</i>
Perceived alc. stigma	-0.020	-0.051	0.059	0.382	-0.145	-0.367	0.068	0.000
<i>Predisposing characteristics^a</i>								
Age								
<35	-0.014	-0.032	0.082	0.700	-0.012	-0.032	0.082	0.700
35-49	0.058	0.137	0.073	0.061	0.063	0.137	0.073	0.061
50-64	0.063	0.181	0.071	0.011	0.076	0.181	0.071	0.011
>=65	0.000	0.000	--	--	0.000	0.000	--	--
Marital status								
Presently married	-0.050	-0.114	0.053	0.032	-0.051	-0.114	0.053	0.032
Previously married	0.041	0.120	0.060	0.045	0.042	0.120	0.060	0.045
Never married	0.000	0.000	--	--	0.000	0.000	--	--
Education								
<HS	0.043	0.147	0.058	0.012	0.043	0.043	0.058	0.012
HS or GED	0.019	0.049	0.044	0.269	0.020	0.020	0.044	0.269
>HS								
<i>Enabling characteristics^a</i>								
Family income								
<=19,999	0.170	0.394	0.072	0.000	0.171	0.394	0.072	0.000
20k-34,999	0.107	0.279	0.070	0.000	0.111	0.279	0.070	0.000
35k-69,999	0.068	0.172	0.063	0.006	0.076	0.172	0.063	0.006
>= 70k	0.000	0.000	--	--	0.000	0.000	--	--
<i>Need characteristics</i>								
Overall alc. severity	0.761	3.292	0.308	0.000	0.692	1.403	0.171	0.000
Psychiatric comorbidity								
Ext. only	-0.027	-0.078	0.070	0.268	-0.042	-0.130	0.081	0.110
Int. only	0.024	0.064	0.069	0.356	-0.002	-0.004	0.080	0.959
Int. and ext.	-0.048	-0.122	0.068	0.074	-0.051	-0.186	0.086	0.031
Neither	0.000	0.000	--	--	0.000	0.000	--	--
Lifetime alcohol course								
Incident	0.053	0.299	0.155	0.054	0.043	0.299	0.262	0.254
Recovered	-0.012	-0.028	0.047	0.553	0.028	0.074	0.077	0.334
Persistent	0.000	0.000	--	--	0.000	0.000	--	--

Characteristic	Std	Unstd	SE	<i>p</i>	Std	Unstd	SE	<i>p</i>
Live-in partner with alcohol problems	0.159	0.413	0.062	0.000	0.096	0.272	0.072	0.000

Std=standardized regression coefficient, Unstd= unstandardized regression coefficient, SE=standard error. Bolded values indicate that the unstandardized coefficient reached statistical significance at $p < 0.05$. Paths for predisposing and enabling characteristics were constrained to be equal across groups due to the results of structural invariance tests across AUD type.

H2: Higher PAS is associated with reductions in help seeking among those with lifetime AUDs who also ever perceived a need for treatment.

Dependent variable: any alcohol treatment

H2 was fit in a multiple-group analysis with receipt of treatment as the dependent variable among respondents with lifetime AUDs who ever perceived a need for treatment ($n=2,230$). The least-restrictive model with all covariates freely estimated for both AUD types had good fit to the data ($\chi^2=2,090$, $df=1,744$, $CFI=0.963$, $TLI=0.960$, $RMSEA=0.013$ [90% CI=0.011-0.015]). Two covariates were removed¹³ because their regression paths did not approach statistical significance in any part of the model, and several structural paths were removed for covariates that did not approach statistical significance.¹⁴ Structural invariance was tested to determine if paths for PAS and predisposing, enabling, and need characteristics were equal across groups (baseline model $\chi^2=1,819$, $df=1,460$, $CFI=0.963$, $TLI=0.961$, $RMSEA=0.015$ [90% CI=0.013-0.017]). The null hypothesis for equal form was not rejected ($\alpha=0.001$) for PAS ($\chi^2_{diff}=0.3$, $df_{diff}=1$, $p=0.5900$), predisposing characteristics ($\chi^2_{diff}=14$, $df_{diff}=7$, $p=0.0437$),

¹³ The covariates occupational status and live-in partner with alcohol problems were removed from the model.

¹⁴ Paths for the regression of the receipt of alcohol treatment on gender, race/ethnicity, and educational status were removed

and enabling characteristics ($\chi^2_{diff}=9$, $df_{diff}=5$, $p=0.0993$). The null hypothesis of equal form was rejected for need characteristics ($\chi^2_{diff}=38$, $df_{diff}=7$, $p<0.0001$).

The final model, which freely estimated enabling characteristics but constrained PAS, predisposing, and enabling characteristics across groups, is displayed in Table 5.10. Fit statistics for this model were $\chi^2=1,834$, $df=1,473$, CFI=0.963, TLI=0.961, RMSEA=0.015 [90% CI=0.012-0.017]. As seen in the table, the relationship between PAS and the receipt of alcohol treatment was not statistically significant for either AUD type. Thus, H2 was rejected. The receipt of treatment for alcohol problems did not vary as a function of latent PAS.

Table 5.10 Hypothesis 2: Structural equation model of receipt of any lifetime alcohol treatment regressed on perceived alcohol stigma, predisposing, enabling, and need characteristics for Wave 2 NESARC participants with lifetime alcohol use disorders (n=11,303^a)

Characteristic	Alcohol dependence with or without abuse (Group 1: Reference group)				Alcohol abuse only (Group 2: Comparison group)			
	Std	Unstd	SE	<i>p</i>	Std	Unstd	SE	<i>p</i>
Perceived alc. stigma	-0.035	-0.080	0.085	0.347	-0.035	-0.080	0.085	0.347
<i>Predisposing characteristics</i>								
Age								
<35	-0.133	-0.308	0.165	0.062	-0.123	-0.308	0.165	0.062
35-49	-0.019	-0.041	0.154	0.789	-0.019	-0.041	0.154	0.789
50-64	-0.029	-0.069	0.157	0.658	-0.030	-0.069	0.157	0.658
>=65	0.000	0.000	--	--	0.000	0.000	--	--
Marital status								
Presently married	-0.140	-0.294	0.111	0.008	-0.141	-0.294	0.111	0.008
Previously married	-0.043	-0.104	0.132	0.430	-0.043	-0.104	0.132	0.430
Never married	0.000	0.000	--	--	0.000	0.000	--	--
<i>Enabling characteristics</i>								
Insurance status								
Public	0.124	0.337	0.129	0.009	0.133	0.337	0.129	0.009
Private	0.087	0.188	0.114	0.100	0.087	0.188	0.114	0.100
None	0.000	0.000	--	--	0.000	0.000	--	--
Family income								
<=19,999	0.198	0.419	0.164	0.011	0.200	0.419	0.164	0.011
20k-34,999	0.105	0.255	0.155	0.099	0.108	0.255	0.155	0.099
35k-69,999	0.087	0.210	0.168	0.211	0.088	0.210	0.168	0.211
>= 70k	0.000	0.000	--	--	0.000	0.000	--	--
<i>Need characteristics</i>								
Overall alc. Severity								
	0.235	0.602	0.137	0.000	-0.141	-0.174	0.097	0.073
Psychiatric comorbidity								
Ext. only	0.087	0.229	0.150	0.126	0.090	0.244	0.256	0.341
Int. only	-0.156	-0.399	0.118	0.001	-0.071	-0.181	0.230	0.433
Int. & ext.	-0.088	-0.188	0.126	0.137	0.055	0.149	0.235	0.527

Characteristic	Std	Unstd	SE	<i>p</i>	Std	Unstd	SE	<i>p</i>
None	0.000	0.000	--	--	0.000	0.000	--	--
Lifetime alcohol course								
Incident	0.095	0.998	0.398	0.012	-0.058	-0.491	1.216	0.686
Recovered	0.020	0.043	0.100	0.670	0.047	0.137	0.236	0.561
Persistent	0.000	0.000	--	--	0.000	0.000	--	--
1st degree relative w/ alc problems	-0.089	-0.207	0.098	0.035	0.002	0.004	0.198	0.985

Std=standardized regression coefficient, Unstd= unstandardized regression coefficient, SE=standard error. Bolded values indicate that the unstandardized coefficient reached statistical significance at $p < 0.05$. Paths for PAS, predisposing, and enabling characteristics were constrained to be equal across groups due to the results of structural invariance tests across AUD type.

Dependent variable: types of treatment received

These analyses were replicated using multinomial logistic regression for two additional outcome variables to determine if PAS was associated with the types of treatment received.¹⁵ The first model determined if PAS was differentially associated with the receipt of professional treatment only, informal treatment only, both treatments, or no treatment. The second model determined if PAS was differentially associated with the receipt of alcohol-specific treatment only, informal treatment only, both treatments, or no treatment. The reference group for the dependent variable in both models was no treatment. In both models, the estimates for PAS were not significant for any of the treatment types (see Table 5.11; this transposed table has the dependent variables in rows, PAS estimates by each AUD type in columns).

¹⁵ Persons of Asian race/ethnicity (n=9) were removed from the analyses due to zero cell sizes for some of the treatment types. The “incident” and “persistent” lifetime alcohol course variable had zero cell sizes for some of the treatment types, thus the lifetime alcohol course variable was not used.

Table 5.11 Hypothesis 2: Multinomial logistic regression for the association between perceived alcohol stigma and types of alcohol treatment received among Wave 2 NESARC participants with lifetime alcohol use disorders who perceived a need for treatment (n=2,230)^a

Dependent variable	Regression coefficient for perceived alcohol stigma							
	Alcohol dependence with or without abuse				Alcohol abuse only			
	OR	Unstd	SE	<i>p</i>	OR	Unstd	SE	<i>p</i>
<i>Informal versus formal alcohol treatments</i>								
Formal	0.954	-0.048	0.086	0.578	0.912	-0.092	0.144	0.525
Informal	0.965	-0.035	0.078	0.648	0.988	-0.012	0.157	0.940
Both types	0.935	-0.067	0.064	0.293	0.884	-0.124	0.137	0.365
No treatment (reference)	1.000	0.000	---	---	1.000	0.000	---	---
Model fit	LL=-53,465, AIC=107,597, aBIC=108,443							
<i>Alcohol-specific versus non-alcohol-specific treatments</i>								
Non-specific	1.109	0.104	0.094	0.268	0.980	-0.020	0.173	0.909
Alcohol-specific	0.887	-0.120	0.070	0.088	0.880	-0.128	0.125	0.307
Both types	0.925	-0.078	0.066	0.240	0.959	-0.042	0.152	0.781
No treatment (reference)	1.000	0.000	---	---	1.000	0.000	---	---
Model fit	LL=-53,527, AIC=107,722, aBIC=108,568							

Unstd=unstandardized regression coefficient, OR=odds ratio, SE=standard error. The fit statistics reported include the AIC, BIC, and loglikelihood values due to the use of the mixture-modeling framework required to analyze multinomial outcomes with multiple groups.

H3: Psychological barriers to care will mediate the relationship between PAS and the receipt of alcohol treatment among those with lifetime AUDs.

Dependent variable: any alcohol treatment

H3 was fit in the sample of individuals with lifetime AD who ever reported perceived unmet need for treatment (n=922). The psychological treatment barriers factor

was hypothesized to mediate the relationship between PAS and lifetime alcohol treatment, while controlling for predisposing, enabling, and need characteristics. The external treatment barriers factor was included in the model, but lifetime alcohol treatment was not regressed on this factor to avoid multicollinearity introduced by the high correlation between the two factors ($r=0.690$). Both psychological and external barriers were regressed on PAS and alcohol severity, and psychological and external variables were allowed to covary. The quasi-continuous family income variable (log transformed) was used in this model due to an empty bivariate cell for the highest income group and the external barrier “*didn’t go to treatment because I couldn’t afford to pay the bill.*” This initial model was fit to the data, which evidenced relatively acceptable fit ($\chi^2=1,711$, $df=1,425$, $CFI=0.926$, $TLI=0.920$, $RMSEA=0.016$ [90% CI=0.013-0.019]).

The model was re-specified with several variables and non-significant paths were removed.¹⁶ Similar fit was achieved ($\chi^2=1,427$, $df=1,146$, $CFI=0.934$, $TLI=0.929$, $RMSEA=0.016$ [90% CI=0.013-0.019]). As displayed in Table 5.12, PAS and overall alcohol severity were significantly associated with psychological barriers, but not external barriers. Overall alcohol severity significantly predicted the receipt of treatment, but PAS and psychological barriers did not. The indirect effect of PAS on alcohol treatment through psychological barriers was not significant, resulting in the rejection of H3.

¹⁶ Urban/rural status, race/ethnicity, education, and insurance status were removed due to non-significant paths.

Table 5.12 Hypothesis 3: Mediation model of the receipt of any lifetime alcohol treatment. Perceived alcohol stigma was hypothesized to have an indirect effect through psychological barriers to treatment. The sample included Wave 2 NESARC participants with lifetime alcohol dependence who ever perceived a need for treatment but didn't go (n=922)

	Coefficients for dependent variables (columns) regressed on independent variables and mediators (rows)											
	Lifetime alcohol treatment				Psychological barriers				External barriers			
Direct effects	Std	Unstd	SE	<i>p</i>	Std	Unstd	SE	<i>p</i>	Std	Unstd	SE	<i>p</i>
Perceived alcohol stigma	0.079	0.079	0.143	0.580	0.206	0.268	0.082	0.001	0.038	0.037	0.060	0.535
Psychological barriers	-0.014	-0.062	0.116	0.596	--	--	--	--	--	--	--	--
Overall alcohol severity	-0.585	1.138	0.149	0.000	0.243	0.272	0.105	0.009	0.131	0.108	0.060	0.069
Indirect effects												
Perceived alcohol stigma through psychological barriers	0.028	0.062	0.133	0.640	--	--	--	--	--	--	--	--
Model fit	$X^2=1,427$, $df=1,146$, $CFI=0.934$, $TLI=0.929$, $RMSEA=0.016$ (90% CI=0.013-0.019)											

Std=standardized regression coefficient, Unstd=unstandardized regression coefficient, SE=standard error. Bolded values indicate that the unstandardized coefficient reached statistical significance at $p < 0.05$. Higher family income and marital status (presently married versus never married) were inversely associated with alcohol treatment.

Dependent variables: Informal/professional & alcohol specific/non-alcohol-specific treatments

Replications of H3 were conducted using the multinomial dependent variables to distinguish among the types of treatment received. In separate models predicting informal vs. professional treatments and alcohol specific vs. non-specific treatments, psychological barriers and PAS were not significantly associated with the types of treatment received (not shown). The indirect effect of PAS on each type of treatment received through psychological barriers was not significant in either model.

Sensitivity analyses

Sensitivity analyses were performed for each model described above, which included removing the external barriers to care factor and also specifying a higher-order factor with restrictive assumptions (equal loadings for both first-order factors) in order to identify a higher-order structure. In addition, for the analyses predicting types of treatment received, the reference groups for the multinomial treatment variables were changed. None of these solutions resulted in changes in path estimates from non-significant to significant for any of the variables involved in the mediation analyses.

Summary of Aim 1 Results

Aim 1 sought to examine how PAS may influence the receipt of alcohol treatment for those who have met criteria for AUDs in their lifetime. H1 hypothesized that higher PAS would be associated with decreased perceptions of treatment need among those with lifetime AUDs. The analyses, which were stratified by AUD type to account for diagnostic heterogeneity, found that the relationship between PAS and perceived need for treatment was moderated by AUD type. For persons with AA only, PAS was inversely

associated with perceived need ($\beta=-0.367$, $SE=0.068$, $p < 0.001$), which provided support for H1. However, the relationship between PAS and perceived need was not statistically significant for persons who had AD with or without AA.

H2 hypothesized that higher PAS would be associated with reductions in help seeking among those with lifetime AUDs who also ever perceived a need for treatment. H2 was rejected. In analyses stratified by AUD type, PAS was not associated with alcohol treatment utilization among those who perceived a need for treatment for both AUD types. This was true for the use of any type of alcohol treatment, and for specific types of alcohol treatments that were classified by professional/informal status or alcohol-specific/non-alcohol-specific status.

H3 hypothesized that psychological barriers to care would mediate the relationship between PAS and the receipt of alcohol treatment among those with lifetime AUDs. H3 was also rejected. Interestingly, PAS was significantly associated with psychological barriers to care ($\beta=0.268$, $SE=0.082$, $p = 0.001$). However, PAS and psychological barriers to care were not significantly associated with the receipt of alcohol treatment, and the total indirect effect from PAS through psychological barriers to care on the receipt of alcohol treatment was not statistically significant. The total indirect effect was also not significant when examining the types of treatment received when classified by alcohol-specific/non-alcohol-specific or professional/informal treatments.

Aim 2 Results

H4: PAS will be higher among individuals with past-year AUDs and co-occurring psychiatric disorders, compared to their counterparts with past-year AUD alone.

H4 analyses were conducted among participants with past-year AUDs (n=3,142). Using linear regression with AUD type as a grouping variable, PAS was regressed on past-year co-occurring disorder status while adjusting for sociodemographic and clinical characteristics. The model had good fit to the data ($\chi^2=1,791$, $df=1,147$, $CFI=0.956$, $TLI=0.956$, $RMSEA=0.019$ [90% CI=0.017-0.020]).¹⁷ All covariates were freely estimated across groups because there were many noticeable differences in parameter estimates across AUD type.

Among those with AD with or without AA, PAS was positively associated with internalizing disorders, but was not associated with the other psychiatric disorder classifications (see Table 5.13). For the AA only group, PAS was not associated with other psychiatric disorders. H4 was not rejected for the AD group, yet the findings appeared to be specific to one disorder subgroup and moderation was found by AUD type.

Supplemental analysis: proposed DSM-5 AUD conceptualization

H4 was replicated in a sample of those meeting criteria for past-year AUD using the proposed DSM-5 AUD conceptualization (n=3,368) (Agrawal, Heath, & Lynskey, 2011). In NESARC, all proposed DSM-5 criteria were assessed at W2 only. The proposed DSM-5 AUD conceptualization differs from DSM-IV in several important

¹⁷ Occupational prestige, marital status, education, income, urban/rural status, live-in partner with alcohol problems, and immediate family member with alcohol problems did not approach statistical significance.

ways (Agrawal et al., 2011). There is no longer a distinction between abuse and dependence. AUD is a single disorder including three of four criteria for the diagnosis of DSM-IV AA (the recurrent legal problems criterion of DSM-IV AA was dropped), all seven criteria for DSM-IV AD, plus a new criterion involving cravings for alcohol. To be diagnosed with DSM-5 AUD, at least two of eleven criteria must be met, whereas in DSM-IV, 3 AD criterion and 1 AA criterion were required for a diagnosis of AD and AA, respectively. A severity distinction has also been proposed for DSM-5 AUD, with the designations of “mild”, “moderate”, and “severe” for those meeting a total of 2-3, 4-5, and 6+ criteria, respectively.

The model for H4 among those with DSM-5 AUD had close to good fit to the data ($\chi^2=1,339$, $df=577$, $CFI=0.948$, $TLI=0.943$, $RMSEA=0.020$ [90% CI=0.018-0.021]).¹⁸ Interestingly, a slightly different pattern emerged where PAS was associated with internalizing disorders and the combination of both internalizing and externalizing disorders, but not externalizing disorders only (see Table 5.13).

¹⁸ Income, education, urban/rural status, live-in partner with alcohol problems, immediate family member with alcohol problems, and occupational prestige were removed due to non-significant paths.

Table 5.13 Hypothesis 4: Structural equation model of perceived alcohol stigma regressed on past-year co-occurring psychiatric disorders and covariates for Wave 2 NESARC participants with past-year DSM-IV & DSM-5 alcohol use disorders

Characteristic	DSM-IV AUD (n=3,142)				DSM-5 AUD (n=3,368)							
	Alcohol dependence with or without abuse				Alcohol abuse only				All who met DSM-5 AUD criteria			
	Std	Unstd	SE	<i>p</i>	Std	Unstd	SE	<i>p</i>	Std	Unstd	SE	<i>p</i>
Co-occurring psychiatric disorders												
Ext. only	-0.074	-0.085	0.046	0.062	-0.025	-0.027	0.037	0.468	0.118	-0.044	0.033	0.193
Int. only	0.097	0.081	0.036	0.022	0.048	0.046	0.029	0.109	0.143	0.074	0.022	0.001
Both int. & ext.	0.031	0.032	0.040	0.423	0.026	0.038	0.041	0.352	0.286	0.063	0.030	0.037
No comorbidity (ref)	0.000	0.000	--	--	0.000	0.000	--	--	0.000	0.000	--	--
AUD severity	0.094	0.086	0.048	0.071	-0.085	-0.065	0.029	0.028	-0.004	-0.003	0.025	0.898
Gender												
Female	-0.005	-0.004	0.031	0.891	-0.119	-0.091	0.024	0.000	-0.075	-0.063	0.020	0.002
Male	0.000	0.000	--	--	0.000	0.000	--	--	0.000	0.000	--	--
Race/ethnicity												
Hispanic	0.132	0.142	0.035	0.000	0.074	0.095	0.030	0.002	0.122	0.145	0.023	0.000
Black	0.081	0.092	0.032	0.004	0.063	0.078	0.030	0.009	0.074	0.090	0.024	0.000
Native American	0.053	0.115	0.087	0.188	-0.059	-0.136	0.071	0.057	-0.020	-0.045	0.070	0.523
Asian	0.032	0.074	0.076	0.327	0.031	0.080	0.063	0.201	0.041	0.098	0.048	0.040
White	0.000	0.000	--	--	0.000	0.000	--	--	0.000	0.000	--	--
Model Fit						Model Fit						
$\chi^2=1,791$, $df=1,147$, CFI=0.956, TLI=0.955, RMSEA=0.019 (90% CI=0.017-0.020)						$\chi^2=1,339$, $df=577$, CFI=0.948, TLI=0.943, RMSEA=0.020 (90% CI=0.018-0.021)						

AUD=alcohol use disorders, Std=standardized, unstd=unstandardized, SE=standard error. Martial status was inversely associated with PAS in the DSM-5 model, but is not depicted to save space. Std=standardized, unstd=unstandardized coefficient, SE=standard error. Bolded values indicate that the unstd coefficient was significant at $p < 0.05$.

H5: PAS will moderate the relationship between the presence of co-occurring psychiatric disorders and perceived need for alcohol treatment among persons with past-year AUDs.

Multiple-group logistic regression analysis with AUD type as a grouping variable among NESARC respondents with past-year AUDs (n=3,142) was examined. Perceived need for treatment was regressed on PAS, past-year psychiatric disorders, and the interaction of PAS and past-year psychiatric disorders, as well as predisposing, enabling, and need characteristics. However, as described in the following subsections, these analyses were only conducted in the DSM-V sample due to low cell counts and convergence problems with the stratified DSM-IV sample.

DSM-IV conceptualization

Due to low rates of perceived need in the past-year sample (10.9% overall, 3.2% in the AA only group, 20.5% in the AD group), crosstabulations between perceived need and all covariates were inspected for each AUD type stratified by the co-occurring psychiatric disorder variable. In the AA only subgroup, a total of 54 respondents reported perceived need, with only 4 to 10 having perceived need in three of four co-occurring psychiatric disorder categories (>10 had perceived need in the externalizing disorders category). Empty cells or cell counts of n=1 existed for a number of the categorical covariates, including certain lower-prevalence categories of race/ethnicity, occupational prestige, urban/rural status, age, and income. Two of the AD symptoms had complete separation with perceived need in the externalizing only group and the internalizing only co-occurring psychiatric disorder groups. A main-effects model (i.e. specified with no interaction terms) with AUD type as a grouping variable had unreliable

parameter estimates even with these variables collapsed and/or removed. Rather than only reporting estimates for those with AD only, the DSM-V sample was chosen due to the ability to conduct the analyses in a broader sample without needing stratification.

DSM-5 conceptualization

H5 was fit with MLR estimation using interaction terms between latent PAS and observed past-year psychiatric disorders, with no psychiatric disorder as a reference group. A main effects model converged ($LL=-82,316$, $AIC=164,903$, $aBIC=165,300$), which showed a positive association between internalizing disorders and perceived need ($\beta=0.547$, $SE=0.196$, $p=0.005$) but no association between the other psychiatric disorder categories and perceived need. PAS was not associated with perceived need. The final model, which added the latent interaction term, is displayed in Table 5.14 ($LL=-82,329$, $AIC=164,929$, $aBIC=165,326$). The interaction terms for PAS and co-occurring disorder status were not significant, and thus H5 was rejected.

Table 5.14 Hypothesis 5: Structural equation model of the relationship between co-occurring disorders and perceived need for treatment in the past-year DSM-V AUD sample. Moderation by PAS was hypothesized, but not supported.

Characteristic	Dependent variable: perceived need for treatment		
	Unstd	SE	<i>p</i>
Perceived alcohol stigma (PAS)	-0.009	0.119	0.940
Co-occurring psychiatric disorders			
Externalizing only	-0.542	0.294	0.065
Internalizing only	0.548	0.197	0.005
Both int. and ext.	0.040	0.243	0.869
No comorbidity (ref)	0.000	--	--
Interaction (PAS * co-occurring psychiatric disorders)			
PAS*Externalizing only	-0.142	0.206	0.492
PAS*Internalizing only	0.055	0.192	0.776
PAS*Both int. and ext.	0.193	0.210	0.357
PAS*No comorbidity (ref)	0.000	--	--

Unstd=unstandardized coefficient, SE=standard error. Standardized coefficients are not available in the presence of latent variable interactions. Marital status, family income, and live-in partner with alcohol problems were associated with perceived need; all other covariates did not approach significance.

H6: PAS will moderate the relationship between the presence of co-occurring psychiatric disorders and the receipt of alcohol treatment among persons with lifetime AUDs who ever perceived a need for treatment.

Dependent variable: any alcohol treatment

Multiple-group logistic regression analysis with AUD type as a grouping variable among NESARC respondents with lifetime AUDs who ever perceived a need for treatment (n=2,206) was conducted. Perceived need for treatment was regressed on PAS, lifetime psychiatric disorders, and their interaction, as well as predisposing, enabling, and

need characteristics. MLR estimation was required due to the use of a latent variable interaction term.

A main effects model converged ($LL=-53,936$, $AIC=108,131.4$, $aBIC=108,459$), which showed that the relationship between perceived need and both independent variables of interest (PAS and co-occurring disorders) were not significant. The final model, which added the latent interaction term, is displayed in Table 5.15 ($LL=-53,933$, $AIC=108,137$, $aBIC=108,480$). The interaction terms for PAS and co-occurring disorder status were not significant.

Table 5.15 Hypothesis 6: Structural equation model of the relationship between co-occurring psychiatric disorders and the receipt of alcohol treatment in the lifetime DSM-IV AUD sample who perceived a need for treatment (n=2,206), stratified by AUD type. Moderation by PAS was hypothesized, but not supported.

Characteristic	Dependent variable: receipt of any alcohol treatment							
	Alcohol dependence with or without abuse (n=1,678)				Alcohol abuse only (n=528)			
	OR	Unstd	SE	<i>p</i>	OR	Unstd	SE	<i>p</i>
Perceived alcohol stigma (PAS)	0.837	-0.177	0.102	0.081	0.744	-0.296	0.250	0.236
Co-occurring psychiatric disorders								
Externalizing only	1.402	0.338	0.289	0.243	1.875	0.629	0.465	0.176
Internalizing only	0.529	-0.636	0.187	0.001	0.641	-0.445	0.342	0.193
Both int. and ext.	0.718	-0.331	0.209	0.113	1.151	0.141	0.443	0.751
No comorbidity (ref)	1.000	0.000	--	--	1.000	0.000	--	--
Interaction (PAS * co-occurring psychiatric disorders)								
PAS*Externalizing only	1.196	0.179	0.271	0.509	1.196	0.432	0.430	0.315
PAS*Internalizing only	1.147	0.137	0.142	0.336	1.147	0.427	0.314	0.173
PAS*Both int. and ext.	1.207	0.188	0.135	0.165	1.207	0.159	0.299	0.594
PAS*No comorbidity (ref)	1.000	0.000	--	--	1.000	0.000	--	--

OR=Odds ratio, Unstd=unstandardized coefficient, SE=standard error. Standardized coefficients are not available in the presence of latent variable interactions.

Dependent variables: Informal/professional & alcohol specific/non-alcohol-specific treatments

Replications of H6 were conducted using the multinomial dependent variables to distinguish among the types of treatment received. The reference group for the dependent variable in the multinomial logistic regression was the receipt of no treatment. In the model predicting alcohol specific vs. non-alcohol-specific treatments, the interaction between PAS and the presence of both internalizing and externalizing psychiatric comorbidity was significantly associated with the category of treatment received for both AUD types (see Table 5.16). For persons who had AD with or without AA, the interaction was associated with the receipt of both treatments. For persons who had AA only, the interaction was associated with the receipt of non-alcohol-specific treatment only.

Before describing these interactions, it is noted that among persons who had AD with or without AA, persons with higher alcohol severity were less likely to receive non-alcohol-specific treatment as compared to no treatment, but were more likely to receive alcohol-specific treatment and both treatments. For persons who had AA only, persons with higher alcohol severity were less likely to receive non-alcohol-specific and alcohol-specific treatments as compared to no treatment, but were not more likely to receive both treatments as compared to no treatment.

Table 5.16 Hypothesis 6: Multinomial logistic regression of the relationship between co-occurring psychiatric disorders and alcohol-specific versus non-alcohol-specific treatments in the lifetime DSM-IV AUD sample who perceived a need for treatment (n=2,206). Analyses were stratified by AUD type.

Dependent variable: type of treatment received (reference group was no treatment)													
Characteristic	Non-alcohol-specific only				Alcohol-specific only				Both treatments				
	OR	Unstd	SE	<i>p</i>	OR	Unstd	SE	<i>p</i>	OR	Unstd	SE	<i>p</i>	
Alcohol dependence, with or without abuse (n=1,678)													
Perceived alcohol stigma (PAS)	0.922	-0.081	0.153	0.597	0.874	-0.135	0.132	0.307	0.715	-0.336	0.142	0.018	
Overall alcohol severity	0.552	-0.595	0.241	0.014	1.575	0.454	0.189	0.016	3.836	1.344	0.211	<0.001	
Co-occurring psychiatric disorders													
Ext. only	1.698	0.529	0.432	0.220	0.908	-0.096	0.319	0.763	1.665	0.510	0.314	0.105	
Int. only	1.001	0.001	0.319	0.999	0.304	-1.191	0.241	<0.001	0.690	-0.372	0.228	0.104	
Both int. & ext.	1.055	0.054	0.358	0.881	0.357	-1.029	0.247	<0.001	1.044	0.043	0.232	0.853	
No comorbidity (ref)	1.000	0.000	--	--	1.000	0.000	--	--	1.000	0.000	--	--	
Interaction (PAS * co-occurring psychiatric disorders)													
PAS*Ext. only	1.765	0.568	0.336	0.121	0.804	-0.218	0.333	0.514	1.475	0.388	0.336	0.248	
PAS*Int. only	1.090	0.086	0.245	0.726	1.166	0.154	0.191	0.421	1.258	0.230	0.184	0.211	
PAS*Both int. & ext.	1.174	0.160	0.224	0.475	1.076	0.074	0.178	0.680	1.419	0.350	0.178	0.049	
PAS*No comorbidity (ref)	1.000	0.000	--	--	1.000	0.000	--	--	1.000	0.000	--	--	
Alcohol abuse only (n=528)													

Perceived alcohol stigma (PAS)	0.791	-0.235	0.262	0.370	0.790	-0.235	0.237	0.321	0.814	-0.206	0.243	0.397
Overall alcohol severity	0.707	-0.346	0.136	0.011	0.696	-0.363	0.124	0.003	1.029	0.029	0.119	0.807
Co-occurring psychiatric disorders												
Ext. only	1.236	0.212	0.595	0.721	1.789	0.582	0.492	0.237	1.938	0.662	0.520	0.203
Int. only	0.482	-0.731	0.684	0.285	0.519	-0.656	0.383	0.086	0.878	-0.130	0.406	0.749
Both int. & ext.	0.124	-2.091	0.830	0.012	1.103	-0.098	0.493	0.842	1.575	0.454	0.490	0.354
No comorbidity (ref)	1.000	0.000	--	--	1.000	0.000	--	--	1.000	0.000	--	--
Interaction (PAS * co-occurring psychiatric disorders)												
PAS*Ext. only	1.219	0.271	0.440	0.537	1.129	0.198	0.397	0.618	1.579	0.457	0.485	0.346
PAS*Int. only	1.270	0.343	0.420	0.414	1.270	0.239	0.318	0.453	1.424	0.353	0.336	0.293
PAS*Both int. & ext.	1.113	1.298	0.622	0.037	1.113	0.107	0.325	0.741	1.040	0.039	0.288	0.892
PAS*No comorbidity (ref)	1.000	0.000	--	--	1.000	0.000	--	--	1.000	0.000	--	--

Int. = Internalizing, Ext.= Externalizing. OR=Odds ratio, Unstd=unstandardized coefficient, SE=standard error, AUD=alcohol use disorder, PAS=perceived alcohol stigma. The top half of the table shows estimates for respondents who had AD with or without AA, the bottom half shows estimates for respondents who had AA only.

To facilitate the interpretation of these interactions, the predicted probabilities of each multinomial outcome variable category were graphed across varying levels of the latent moderator (Muthén, 2012). Figure 5.2 depicts the significant interaction predicting the receipt of both treatments for persons who had AD with or without AA (top left graph), and Figure 5.3 depicts the significant interaction predicting non-alcohol-specific treatment only for persons who had AA only. In these figures, the Y-axis represents the predicted probability of receiving the type of treatment, the X-axis represents categories of psychiatric comorbidity, and the lines represent different levels of PAS. Low, mid, and high PAS were operationalized at one standard deviation below the mean, the mean value, and at one standard deviation above the mean, respectively.

Among persons who had AD with or without AA (Figure 5.2), the top left graph shows that for those with both internalizing and externalizing comorbidity, the probability of receiving both treatments was not dependent on PAS, which was in contrast to those who had no comorbidity, for whom the probability of receiving both treatments appeared to decrease with increasing levels of PAS. To determine whether any of other visible differences in these graphs were statistically significant, the model was re-run with the reference group of the dependent variable swapped. No other differences were statistically significant.

Among persons who had AA only (Figure 5.3), the top right graph shows that for those with both internalizing and externalizing comorbidity, the probability of receiving non-alcohol-specific treatment was more likely given higher levels of PAS – this was in contrast to their probability of receiving no treatment, which did not appear to vary across levels of PAS. When swapping the reference group for the dependent variable, it became

apparent that among these persons with AA only and both types of psychiatric comorbidity who did receive one of the treatment types, the receipt of both treatments (top left graph) and the receipt of alcohol-specific treatments (bottom left graph) varied as a function of PAS in a similar way; their probability of receipt became less likely given higher levels of PAS, which was in contrast to their probability of receiving non-alcohol-specific treatment, which increased as PAS increased.

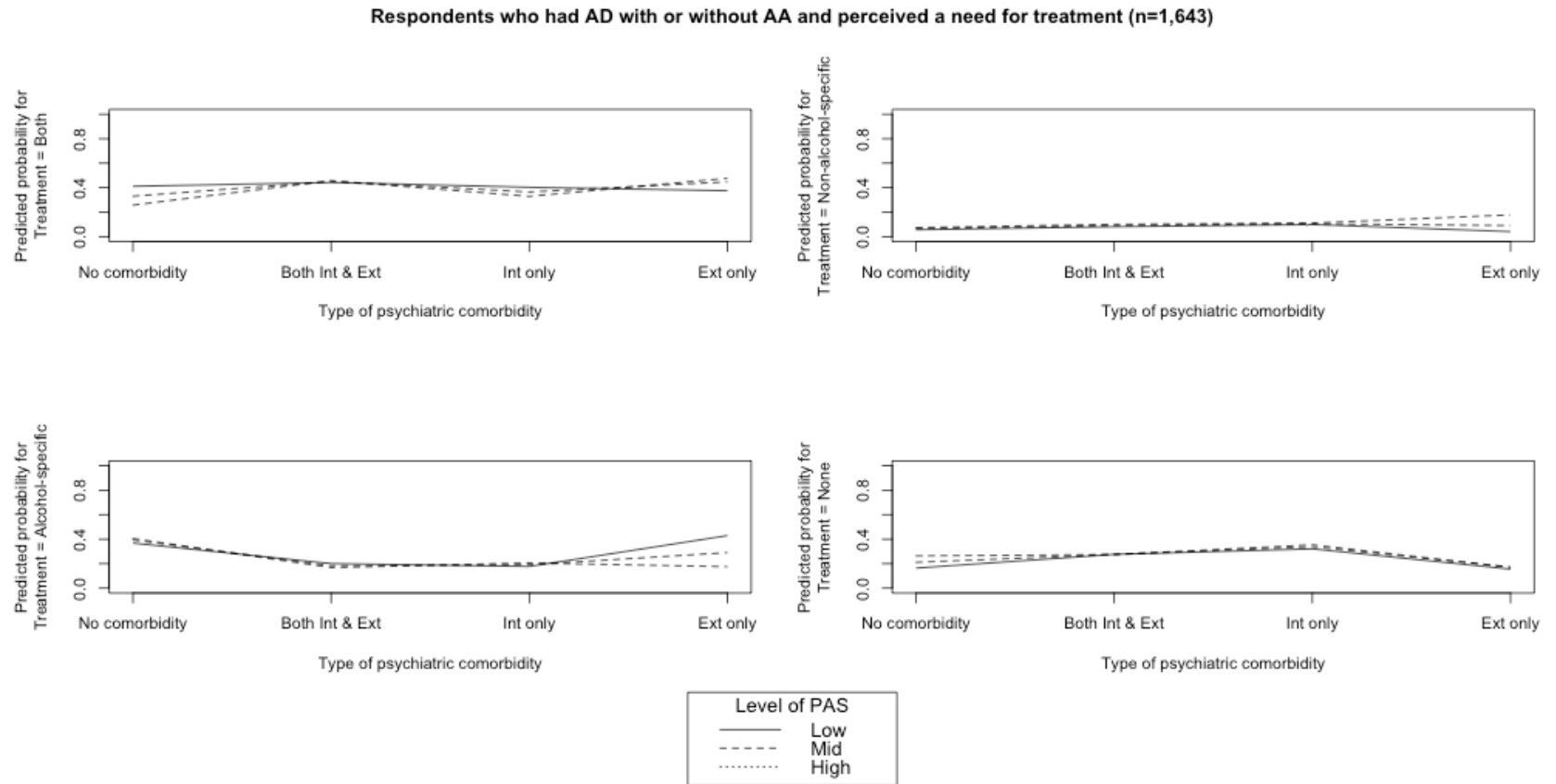


Figure 5.2 Predicted probabilities of alcohol-specific, non-alcohol-specific, both, and no treatments for the alcohol dependence with or without abuse group.

Legend: PAS=perceived alcohol stigma, Int=internalizing, Ext=externalizing. In the top left graph, the probability of both treatments was significantly different across levels of PAS for the No comorbidity group versus the Both Int & Ext group. All other differences in these graphs were not statistically significant.

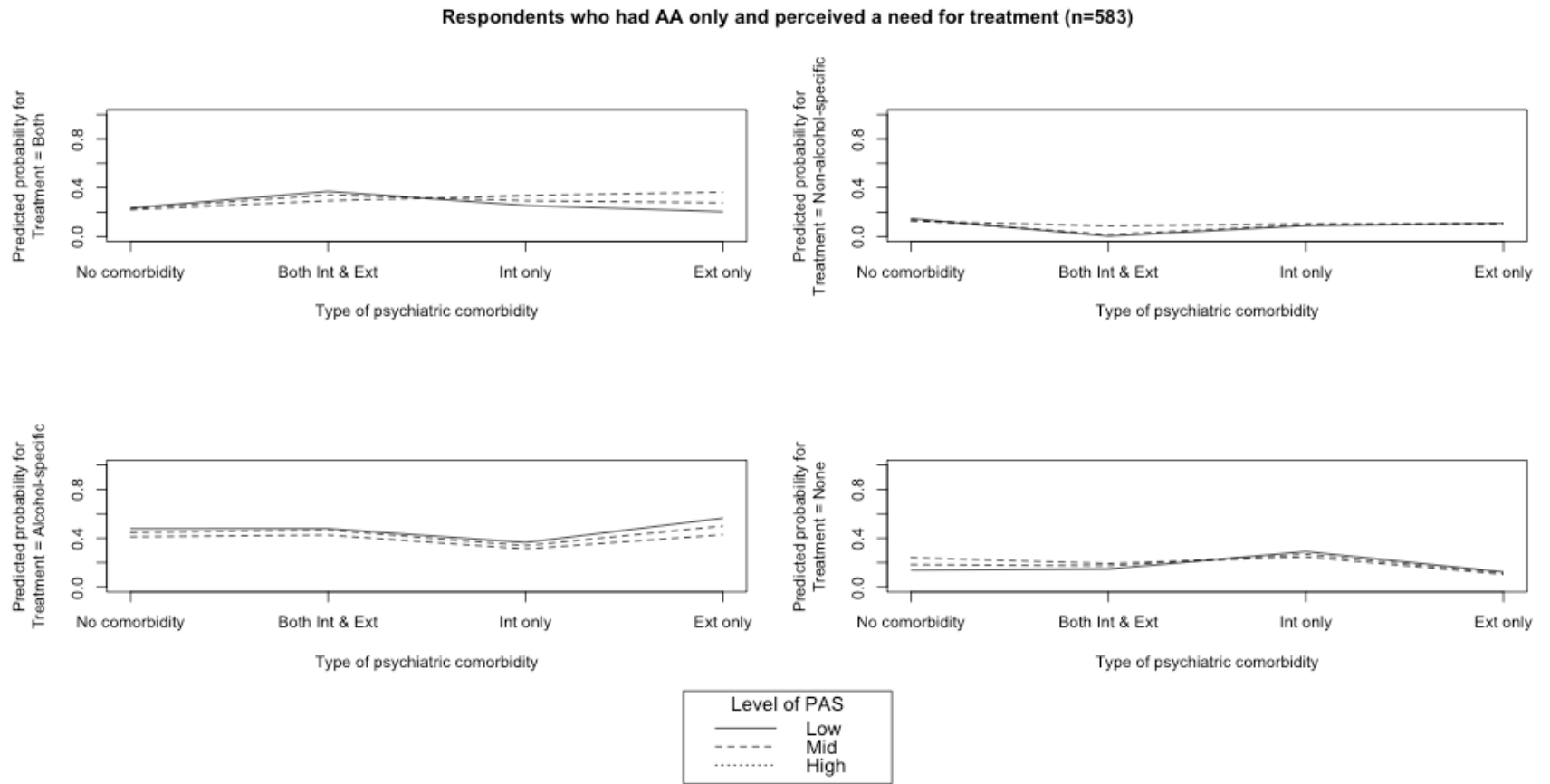


Figure 5.3 Predicted probabilities of alcohol-specific, non-alcohol-specific, both, and no treatments for the alcohol abuse only group. **Legend:** PAS=perceived alcohol stigma, Int=internalizing, Ext=externalizing. In the top right and bottom right graphs, the probability of treatment was significantly different across levels of PAS when comparing Both Int & Ext to the No comorbidity group.

Summary of Aim 2 Results

Aim 2 sought to examine PAS in persons with AUDs and co-occurring AUDs and psychiatric disorders. Co-occurring psychiatric disorders included the categories of internalizing, externalizing, both (internalizing and externalizing), and none (neither internalizing nor externalizing).

H4 hypothesized that PAS would be higher among individuals with past-year AUDs and co-occurring psychiatric disorders, compared to their counterparts with past-year AUD alone. Separate analyses examined H4 using the DSM-IV and proposed DSM-V conceptualizations of AUD. H4 was not rejected, yet the results were conditional upon the type of AUD under examination. The analyses involving the DSM-IV conceptualization, which were stratified by AUD type to account for diagnostic heterogeneity, found that the relationship between co-occurring psychiatric disorders and PAS was moderated by AUD type. Among those who had AD with or without abuse, PAS was positively associated with internalizing disorders ($\beta=-0.097$, $SE=0.081$, $p=0.022$), but PAS was not significantly associated with the other co-occurring psychiatric disorder classifications. For the AA only group, PAS was not associated with any of the co-occurring psychiatric disorder classifications. For the analyses involving the DSM-V conceptualization, PAS was associated with internalizing disorders and the combination of both internalizing and externalizing disorders, but not externalizing disorders only.

H5 hypothesized that PAS would moderate the relationship between the presence of co-occurring psychiatric disorders and perceived need for alcohol treatment among persons with past-year AUDs. H5 intended to conduct separate analyses for the DSM-IV and DSM-V AUD conceptualizations. Analyses involving the DSM-IV

conceptualization were deemed unacceptable due to cell size problems with the AA only group, thus the DSM-V results were preferred and were reported. H5 was not supported. The interaction terms for PAS and each of the co-occurring psychiatric disorder categories were not significant.

H6 hypothesized that PAS would moderate the relationship between the presence of co-occurring psychiatric disorders and the receipt of alcohol treatment among persons with lifetime AUDs who ever perceived a need for treatment. H6 had significant results, although they were more complex than anticipated. When examining the receipt of alcohol-specific versus non-alcohol-specific treatments among persons with AD with or without AA, the probability of receiving both treatments (alcohol-specific and non-alcohol-specific) was dependent on PAS, such that those with no comorbidity were less likely to receive both treatments than no treatment when they had higher levels of PAS. For those who had AA only, the types of treatment received among persons with both types of psychiatric comorbidity varied as a function of PAS such that higher PAS was associated with a higher probability of receiving non-specific alcohol treatment and lower probabilities of receiving alcohol-specific treatments and both treatments. However, when examining the receipt of informal versus professional treatments, or the receipt of any treatment versus none, the interaction terms for PAS and each of the co-occurring psychiatric disorder categories were not significant for either AUD type.

Chapter 6. Summary and discussion of findings

In this chapter, the discussion of findings is ordered by aim and hypothesis.

Special attention is paid to the generalizability of the findings, the study's limitations, and implications for future research. To provide a broad overview of the results of this study, Table 6.1 summarizes the outcomes of the hypothesis tests. Of the six hypotheses that were tested, two were supported by the data. As described in the following sections, the heterogeneity of the analytic samples influenced the findings.

Table 6.1 Summary of hypothesis tests

Research hypothesis	Result
Aim 1	
H1. Higher PAS is associated with decreased perceptions of treatment need among those with lifetime AUDs	Accepted; moderated by AUD type
H2. Higher PAS is associated with reductions in help seeking among those with lifetime AUDs who also ever perceived a need for treatment	Rejected
H3. Psychological barriers to care will mediate the relationship between PAS and the receipt of alcohol treatment among those with lifetime AUDs	Rejected
Aim 2	
H4. PAS will be higher among individuals with past-year AUDs and co-occurring psychiatric disorders, compared to their counterparts with past-year AUD alone	Accepted; moderated by AUD type
H5. PAS will moderate the relationship between the presence of co-occurring psychiatric disorders and perceived need for alcohol treatment among persons with past-year AUDs	Rejected
H6. PAS will moderate the relationship between the presence of co-occurring psychiatric disorders and the receipt of alcohol treatment among persons with lifetime AUDs who ever perceived a need for treatment.	Rejected; unexpected findings

Discussion of Aim 1

To extend prior findings from NESARC which established an inverse relationship between PAS and the receipt of alcohol treatment for persons with lifetime AUDs (Keyes et al., 2010), the first aim of this study sought to examine *how* PAS might influence the receipt of alcohol treatment for persons with lifetime AUDs.

Discussion of H1 findings

Prior work conceptualized the pathway to treatment utilization as a stage-based process (see Chapter 4). For the analyses of the present study, this stage-based process was operationalized with two stages based on the availability of two measures in the data: (1) perceptions of treatment need (which were investigated in H1), and (2) the actual use of alcohol treatment services. Although the analyses were cross-sectional, the relationship between PAS and perceived need for treatment was examined in H1 to build initial evidence regarding the potential influence of PAS on perceived need among persons with lifetime AUDs.

The stratified analyses of H1 by AUD type yielded interesting findings. For persons with AA only, PAS was inversely associated with perceived need, which provided support for H1 among this group. However, the relationship between PAS and perceived need for treatment was moderated by AUD type. Moderation was apparent because the relationship between PAS and perceived need was not significant for persons who had AD with or without AA.

A prior NESARC study highlighted that persons who met criteria for lifetime AA only (without AD) tended to have less severe problems, including lower rates of service utilization and comorbidity, than those who met criteria for lifetime AD with or without

AA (Cohen, et al., 2007). Likewise, in the present study, latent AUD severity and rates of perceived need for treatment were significantly lower among persons with lifetime AA only as compared to those who had lifetime AD with or without AA. Therefore, H1 could suggest that PAS may play a role in the development of perceptions of treatment need for a subgroup of persons characterized as having a lower severity of alcohol problems, but not for a subgroup characterized with a higher severity of alcohol problems.

In Chapter 3, it was proposed that alcohol stigma could affect perceptions of treatment need by decreasing problem recognition, or by influencing attitudes towards receiving treatment. Perceptions of personal risk play a role in developing problem recognition (Rothman & Salovey, 2007), which could be affected by stigma to a greater extent for persons with less severe problems. That is, individuals might not identify with the negative stereotypes associated with the label *alcoholic* if they have mild to moderate problems, thereby decreasing problem recognition. For persons who have severe problems, the stereotypes may appear less inaccurate due to the perceived personal relevance of these negative images.

In addition, attitudes towards treatment could be influenced by stigma to a greater extent for persons with less severe problems. Corrigan (2004) discusses that individuals may forgo treatment to avoid receiving a stigmatized label. If individuals were to conduct a cost-benefit analysis of the utility of receiving treatment, for those with less severe alcohol problems the potential benefits of receiving treatment may not outweigh the costs of being labeled.

Yet, significant heterogeneity exists within each diagnostic classification of AUD. For example, some of the diagnostic criteria of AA (particularly, role interference) are more indicative of a higher problem severity than some of the diagnostic criteria of AD (Duncan et al., 2011; Saha et al., 2007). Further, the proposed DSM-V conceptualization of AUD does not make a distinction between the categories of abuse and dependence (Agrawal et al., 2011), which may make these diagnostic distinctions less useful looking towards the future. It is possible that the findings pertaining to moderation in the present study do not simply reflect differences in levels of severity, and rather, could reflect unmeasured differences between persons with AA only versus those who have AD with or without AA.

In any case, the findings of H1 are useful in highlighting that it is critical to consider the significant heterogeneity among persons with AUDs when conducting studies of alcohol stigma, perceived need, and/or treatment utilization. In addition, these findings demonstrate that when investigating stigma as a barrier to treatment, researchers should assess both perceived need and actual treatment utilization. The current findings, at least those pertaining to persons with AA only, are in line with a recent study of a small general population sample of persons with depression (n=25) (Schomerus et al., 2012). The authors found an inverse association between personal stigma (the agreement with stereotypes about depressed persons) and both problem appraisal and perceived need for depression treatment. The corroboration of an inverse association between stigma and perceived need is noteworthy and would be useful to evaluate in longitudinal studies.

It is also important to interpret these results in the context of the sample and measurement limitations. In particular, a lifetime AUD sample was used, in which AUD

criteria could be met at either the W1 or W2 assessment. The perceived need for treatment measure was ascertained in a similar manner. Although perceived stigma is thought to develop during socialization, independently of whether one develops the stigmatized condition (Link, 1987), it is possible that the levels of PAS ascertained at W2 are not representative of the levels of PAS that were present when the respondents first perceived a need for treatment in their lifetime. It is also possible that the development of perceived need results in changes in PAS. In addition, respondents were considered to have perceived a need for treatment if they perceived a need for treatment but did not go, and/or received treatment. It is possible that some persons received treatment without perceiving a need for it, and thus were improperly classified as having perceived a need for it. For example, a study found that more than 40% of an alcohol treatment sample received an ultimatum to enter treatment from at least one source (e.g., legal, family, healthcare professionals) (Polcin & Weisner, 1999). On the other hand, another study of a treatment sample found no significant relationship between perceived external coercion to enter treatment and readiness to change (Stevens et al., 2006). In the present study, the extent to which the findings of H1 were affected by external pressures to seek help remains unknown, and external pressures could have influenced the findings in either direction.

Discussion of H2 findings

Although the analyses were cross-sectional, in accordance with the stage-based operationalization of treatment utilization in the present study, H2 sought to examine the relationship between PAS and alcohol treatment utilization for those who were considered to have already passed a first stage in the pathway to treatment utilization by

perceiving a need for alcohol treatment. It was hypothesized that higher PAS would be associated with a lower likelihood of help seeking among those with lifetime AUDs who ever perceived a need for treatment. H2 was rejected.

Similar to prior analyses of NESARC and NSDUH that analyzed the receipt of treatment among persons with perceived need and past-year AUDs (Edlund et al., 2009), the present study found that predisposing, enabling, and need characteristics were associated with the receipt of treatment. It may be that once a need is perceived, PAS may not influence the receipt of treatment, and rather, factors such as problem severity and the ability to afford care through having insurance are more important. These findings are in line with a prior cross-sectional study on depression stigma, which found an inverse relationship between perceived stigma and perceived need, but no relationship between perceived stigma and the actual receipt of treatment among younger (yet, not among older) college students with depression (Golberstein, Eisenberg, & Gollust, 2008). Similarly, other studies of non-substance-related psychiatric disorders have established an inverse relationship between stigma and attitudes towards seeking help and help-seeking intentions, but no relationship between stigma and the actual receipt of help (Komiti, Judd, & Jackson, 2006; Wrigley, Jackson, Judd, & Komiti, 2005). Like the present study, these studies were all cross-sectional.

H2 results must be considered exploratory due to the limitations of the measure of perceived need that was used to define the analytic sample. Persons were considered to have perceived a need for treatment if they perceived a need for treatment but did not go, and/or received treatment. Thus, the analytic sample was partially defined by the receipt of treatment itself, which may or may not have been an appropriate indicator of perceived

need for some respondents. As discussed in Chapter 3, it is possible that some received treatment but did not think that they needed it. Therefore, although prior landmark studies on this topic have set a precedent to generalize the findings of such a measure to the general population (Edlund et al., 2009; Mojtabai et al., 2002), the present analyses are considered exploratory.

It is also possible that the receipt of treatment influences PAS, which could mask or otherwise obfuscate any prospective relationship between PAS and the receipt of treatment. However, a prior longitudinal study found no change in the pre- and post-treatment sample mean of a combined measure of the perceived stigma of serious mental illness and drug addiction (Link et al., 1997). However, the time between the initial assessment of perceived stigma at the beginning of treatment and the follow-up assessment of perceived stigma was only one year. In the present study, the lapse between respondents' initial treatment participation and the assessment of perceived stigma varied. Due to the assessment of PAS only at W2 in NESARC, these limitations could not be adequately addressed.

Discussion of H3 findings

It was expected that psychological barriers to care would mediate the relationship between PAS and the receipt of alcohol treatment. This hypothesis was not supported.

Interestingly, PAS was positively associated with psychological barriers to care, providing some evidence for the construct validity of the psychological barriers to care measure. However, PAS and psychological barriers to care were not significantly associated with the receipt of alcohol treatment. It may be that once a need for treatment is perceived, cognitive factors, including psychological barriers and perceived stigma, are

less important than the behavioral constructs assessed in studies of treatment utilization such as the predisposing, enabling, and need characteristics described by Aday and Andersen (1974). On the other hand, in supplemental analyses for H3 (not reported), external barriers were also not associated with the receipt of treatment. This may be in contrast to the finding in H2 that having public insurance, which would alleviate an external barrier to care, was positively associated with treatment receipt. Therefore, it may be that the barriers to treatment instrument employed in NESARC lacks validity.¹⁹ Due to the fact that several data sources are available that employed a similar instrument, the cross-validation of this measure across several data sets could be a feasible topic for future study.

While the analytic sample of H2 included respondents who were considered to perceive a need for treatment because they received treatment and/or reported perceived unmet need regardless of their treatment status, H3 only included the latter group of respondents. This overcomes a limitation of H2 discussed previously, therefore providing more support for the finding that PAS is not associated with treatment utilization among those with perceived need. However, a related sampling limitation remains in H3. The report of perceived unmet need in one's lifetime was required for entry into the analytic sample, which could have been influenced by the receipt of prior treatment (the dependent variable of H3). Prospective studies of PAS, perceived need, and treatment receipt would overcome these limitations.

¹⁹ It is notable that in the literature review for this dissertation, no studies were located that subjected the barriers to treatment measure of NESARC, NSDUH, and the National Longitudinal Alcohol Epidemiologic Study (all which used a similar assessment) to a confirmatory factor analysis.

Discussion of Aim 2

The presence of psychiatric comorbidity, including the internalizing and externalizing disorders, is highly prevalent among persons with AUDs (Dawson et al., 2010) and has been implicated in the utilization of services for alcohol problems (Glass et al., 2010; Ilgen et al., 2011). Aim 2 sought to describe the potential interplay between alcohol stigma and the co-occurrence of AUDs and other psychiatric disorders.

Discussion of H4 findings

It was expected that PAS would be higher among individuals with past-year AUDs and co-occurring psychiatric disorders compared to their counterparts with past-year AUD alone. In the analyses of past-year DSM-IV AUDs that were stratified by AUD type, PAS was positively associated with internalizing disorders among those who had AD with or without abuse. However, the same was not true for those with AA only.

The positive association between PAS and internalizing psychiatric disorders could be due to a number of factors. Prior studies found that perceived substance use stigma (Luoma et al., 2010) and internalized alcohol stigma (Schomerus et al., 2011) were associated with depression and anxiety scores, which represent symptoms that are inherent to the internalizing anxiety and depressive disorders. Per modified labeling theory (Link et al., 1989) it is possible that some persons with AD may feel or experience devaluation and discrimination, resulting in the onset or recurrence of internalizing psychiatric comorbidity through detrimental stigma-related coping mechanisms such as social withdrawal. Consistent with this notion, a recent cross-sectional NESARC study found that higher PAS was inversely associated with perceived social support (Glass et al., In press). However, the study did not examine whether perceived social support

mediated the relationship between PAS and internalizing psychiatric comorbidity. This would be a topic for future research. Such a study would be significantly enhanced if longitudinal data were available, because mediation analyses seek to describe causal processes.

An alternative explanation of H4 findings may be that the clinical presentations of persons with mood and anxiety disorders, including ruminating thought patterns (Nolen-Hoeksema, 2000), lead to an increase in the perception that others will devalue or discriminate against persons who possess their stigmatized condition. It is also possible that personality orientations such as neuroticism, which is associated with self-report measures of stigma and discrimination (Major, Quinton, & McCoy, 2002), increase risk for both PAS and mood and anxiety disorders, or alternatively, are a confounder of their relationship. In addition to the analysis of prospective data, the administration of self-report social desirability and personality trait measures may help overcome or reveal potential design and measurement limitations that are pertinent to studies of alcohol stigma. As was noted previously, the assessment of causal mechanisms such as those specified by modified labeling theory, including concealment or social withdrawal (Link et al., 1989), or the process of the internalization of perceived stigma (Corrigan 2004; Schomerus et al. 2011) would also be illustrative in these investigations.

The comorbidity of both internalizing and externalizing disorders was not associated with PAS in the DSM-IV sample, which was surprising due to the fact that these persons had the broadest range of comorbidity; however, a significant association for this group was found in the DSM-V sample. In both the DSM-IV and DSM-V samples, PAS was not associated with externalizing comorbidity, which may reflect that

specific externalizing disorders including antisocial personality disorder are characterized by behaviors that lack a regard for social norms and others' feelings. On the other hand, these individuals would also be subjected to stigma based on their antisocial diagnosis. In addition, drug use disorders are included on the externalizing spectrum, and the stigma associated with drug use is particularly high and negative (Schomerus, Lucht, et al., 2010). The personal relevance of perceived stigma for persons with other externalizing disorders could also be a topic for future study.

Discussion of H5 findings

It was hypothesized that PAS would moderate the relationship between the presence of co-occurring psychiatric disorders and perceived need for alcohol treatment among persons with past-year AUDs. Results of analyses conducted among persons with DSM-V AUDs led to the rejection of H5.

Prior work identified that among persons with past-year and lifetime AUDs, the presence of a co-occurring psychiatric disorder was positively associated with perceived need (Edlund et al., 2009, 2006; Grella et al., 2009; Oleski et al., 2010). The present study found a positive relationship between the presence of internalizing psychiatric comorbidity and perceived need, yet higher PAS did not attenuate the relationship between several classifications of psychiatric comorbidity and perceived need. It is possible that the increased problem severity associated with psychiatric comorbidity overshadowed any potential effect of PAS on perceived need. Recall that in H1, PAS was inversely associated with perceived need among those with lifetime AA only. In H5, PAS and perceived need were not related, which used a past-year DSM-V AUD sample. It may be that PAS does not influence perceived need among persons with current

problems (e.g. perhaps perceived need is affected during times of AUD remittance). It is also possible that this association was not detected due to exclusion of persons with only one AUD symptom from the DSM-V AUD diagnosis (thereby excluding those with a very low alcohol severity), as opposed to DSM-IV AA, which requires individuals meet a minimum of one symptom of AA to meet full diagnostic criteria. However, the fact that the DSM-5 sample was larger than the DSM-IV sample suggests that the DSM-5 sample was more inclusive of alcohol pathology (e.g. DSM-IV diagnostic orphans and those who reported alcohol cravings) (Agrawal et al., 2011). Additional work is needed to better understand how alcohol nosology (e.g. DSM-IV vs. DSM-5) and assessment intervals (e.g. lifetime vs. past-year) may influence research findings on alcohol stigma.

In H5, the analytic sample had limitations due to the fact that persons who had received treatment prior to the past year were included in the sample, and prior treatment may have influenced their perceived need for treatment in the past year or the report of PAS at the Wave 2 interview. Also, as was discussed for H1, the assumption made for the dependent variable was that persons who received treatment in the past year perceived a need for it, which may not be accurate. These sampling and measurement limitations could influence the findings of H5 in either direction.

Discussion of H6 findings

Several prior studies have established that the likelihood of receiving SUD services was higher for those with co-occurring SUDs (AUDs and/or DUDs in separate studies) and non-substance-related psychiatric disorders as compared to those with SUDs alone (Glass et al., 2010; Grant et al., 1996; Harris & Edlund, 2005; Ilgen et al., 2011). In the present study, it was expected that PAS would attenuate the relationship between

the presence of comorbidity and the receipt of alcohol treatment among persons who perceived a need for treatment.

H6 yielded interesting, yet unexpected findings regarding the use of alcohol treatment services by persons who perceived a need for treatment. PAS did not moderate the relationship between the presence of comorbidity (for each of the comorbidity types) and the receipt of any alcohol treatment versus none. It may be that the effects of having an increased problem severity overshadow the potential effects of PAS on seeking any treatment services, or that more generally, PAS is not an important factor in initiating treatment seeking for persons who already perceived a need for treatment, as was noted in the discussion of H2 findings.

PAS was differentially associated with the types of treatment received among those who perceived a need for treatment when making distinctions between alcohol specific and non-alcohol specific treatments. Among the group with perhaps the highest problem severity in the NESARC sample with respect to the psychiatric disorders of interest in this study (persons who had AD with or without AA and both internalizing and externalizing comorbidity), the probability of receiving both types of treatments was not dependent on PAS. However, this was in contrast to those with the same alcohol diagnosis but no psychiatric comorbidity, for whom the likelihood of receiving both treatments (as compared to no treatment) decreased with increasing levels of PAS. Again, as was discussed in H2, it is possible that PAS may have a greater effect on perceived need and treatment utilization for those with less severe problems, where in this case (H6) the type of problem severity that was relevant was the presence of psychiatric comorbidity versus not. It is also possible that those with non-substance-

related psychiatric comorbidity were more likely to receive both types of treatments (as compared to those with no comorbidity) because they had alcohol-related discussions with psychiatric service providers that did not specialize in alcohol treatment, and were subsequently referred to an alcohol-specific treatment. To conduct a more thorough investigation of how PAS is associated with types of treatments received, future research should employ treatment utilization measures that use diagnostic-specific service assessments (as NESARC did) and also assess the receipt of diagnostic-specific services among those who do not meet full criteria for the psychiatric disorder under question.

H6 analyses indicated that the types of treatment received were also dependent on PAS among persons with AA only. For those with AA only and both types of psychiatric comorbidity, the probabilities of receiving alcohol-specific treatment and both treatments (alcohol-specific and non-alcohol specific) decreased with increasing levels of PAS while the probability of receiving non-alcohol-specific treatment increased. This may suggest that persons with low alcohol severity (AA only) but psychiatric comorbidity may be affected by PAS in such a way that treatment is sought in settings that are not directly associated with alcohol. In these settings, it is apparent that their alcohol use was discussed (due to the respondents' report that they did receive help for their drinking); yet, the discussion of alcohol problems did not result in a successful referral to settings specifically designed to treat alcohol problems. If this were true, perhaps a referral was not made due to their lower alcohol severity, or alternatively, a referral was made but not accepted by individuals to avoid stigma. However, it must be considered that H6 had sampling limitations that were the same as those discussed for H2, thus these findings should be interpreted with caution.

Last, it is important to note that the types of treatment received were strongly associated with overall alcohol severity. When alcohol severity was higher among persons who had AD with or without AA, persons were more likely to receive alcohol-specific treatment or both alcohol-specific and non-alcohol specific treatment as compared to no treatment. In contrast, the receipt of non-alcohol-specific treatment was less likely. This may reflect that persons who have severe alcohol problems tend to seek out services that designed to address their AUD, which may be supplemented with ancillary non-alcohol-specific services to meet additional needs. Or, these persons may have sought non-alcohol-specific treatment and were encouraged to seek an alcohol-specific treatment. These findings are illustrative, and give support to the notion that the treatment categories had validity.

Limitations

In addition to the limitations noted in the discussion of hypothesis tests, several other limitations are noted here. There were limitations of theoretical assumptions in this study. Some stigma research on modified labeling theory uses treatment receipt to infer labeling status, however the present study conceptualized treatment status as an outcome variable. The use of treatment receipt to infer labeling status relies on the assumption that official labeling will occur through the assignment of a psychiatric diagnosis (Link, 1987). This study was interested in prior help seeking, thus treatment receipt could not be used to infer labeling status. Therefore, it is possible that many of the untreated persons in this sample, including those who perceived a need for treatment, had not been subjected to a stigmatized label. Without the availability of another measure in NESARC

to infer labeling status, the heterogeneity in labeling status could not be directly controlled for.

Another limitation with regard to theory is that PAS is just one construct used in stigma research. Other measures such as internalized stigma and stigma coping orientations should be considered in future work. In addition, the treatment barriers instrument was only administered to those with perceived need, yet barriers may affect the development of perceived need, which could not be considered in this study due to the skip patterns in NESARC.

The use of longitudinal, rather than cross-sectional analyses would have improved the ability to make causal inferences. Due to the inability to determine the temporal ordering of important variables, the analyses may have obscured relationships present in the data. For example, levels of PAS at W2 may not be representative of the levels of PAS that were present at the time treatment could have been sought. It is also possible that treatment receipt or the development of perceived need influences PAS. In addition, particularly for the analyses of lifetime treatment, the level of AUD symptoms or presence of psychiatric comorbidity may not have been present during the time that treatment occurred. Also, while a split-sample approach was used to identify and confirm the models tested in the analyses, these models should be replicated in other samples.

With regard to other measurement limitations, analyses involving the treatment barriers instrument should be considered exploratory due to the fact that this measure has not yet been validated. Self-reports of perceived stigma may be influenced by characteristics such as personality traits (e.g. neuroticism) or social desirability (Link et

al. 2004; Major et al. 2002), which were not addressed in the current analyses. Future stigma research should collect data on potentially confounding variables when analyzing self-reports of stigma. Treatment utilization in this study was operationalized as the receipt of any level of alcohol treatment, which may have included a single session or multiple sessions. It may be more meaningful to examine the number of treatment sessions received, or whether a full course of treatment was completed or not. In addition, NESARC assesses the receipt of treatment, but does not query whether respondents tried to seek help but were unsuccessful. There may be important differences between those who did not receive treatment because they did not try to seek help versus those who tried to seek help but were unsuccessful. Importantly, measures of court mandated treatment and other external pressures to enter treatment were not available in the NESARC data. It is possible that the relationship between PAS and treatment receipt is obscured by external pressures to seek help. For example, even if PAS was a strong barrier to treatment, a requirement to attend treatment by the courts could offset this barrier. Last, while this study assigned types of alcohol treatment received into discrete categories (e.g. alcohol-specific, non-alcohol-specific), the validity of these categories remains unknown. For example, the receipt of treatment in the emergency room for alcohol problems is not always a result of choice, therefore psychological barriers including PAS would likely not play a role.

With regard to the analyses, mediation analyses were conducted with the total indirect effect approach in an SEM framework, which is an optimal method for detecting mediation. However, bootstrap and other resampling methods are recommended to adjust for the expectation that the standard error of the total indirect effect may not be

normally distributed (although, this is less likely to be an issue for larger samples like the ones used in the present study) (Mackinnon et al., 2004; Preacher & Hayes, 2008). Such methods are not presently build in to SEM software when analyzing complex survey data with more than two levels (Muthén & Muthén, 2010).

It is also relevant that those with AUDs and non-substance-related psychiatric disorders may choose to seek treatment in non-substance use disorder settings due to PAS. It is unfortunate that for the non-substance-related disorders of interest in this study (e.g. mood/anxiety disorders), NESARC did not assess treatment receipt unless symptom criteria were met. Thus, moderation analyses in H6 could not benefit from a treatment variable that made distinctions between alcohol treatment and non-substance-related treatment. In addition, treatments for drug use disorders were assessed in NESARC but were not considered in this study. While the focus of this study was the receipt of treatment for alcohol problems, there is substantial overlap in drug and alcohol treatment interventions and service sectors. Future work may wish to assess both alcohol and drug stigma and analyze both alcohol and drug treatment services. Another substantive limitation is that the measure of perceived need assessed whether respondents thought that they needed help with their alcohol problems but did not go, yet it did not assess what type of help they thought was needed.

Implications

Implications for policy and practice

Prior work identified that very few individuals with AUDs, and even fewer individuals with co-occurring disorders, receive treatment that is minimally adequate for their conditions (Watkins, et al., 2001). While treatment rates for conditions such as

major depression have increased (Olfson & Marcus, 2009), treatment rates for AUDs remain low and a variety of data sources suggest that treatment rates for AUDs may be decreasing (Chartier & Caetano, 2011).

Although the present study had limitations, it indicated that persons who have alcohol abuse without dependence are at an increased risk of not perceiving a need for treatment when they have higher levels of PAS. High-level policy recommendations, including those from the U.S. Preventative Services Task Force (USPSTF), provide explicit guidance for managing this population of persons who have alcohol abuse without dependence or other forms of unhealthy alcohol use that do not exceed a threshold for alcohol dependence (U.S. Preventative Services Task Force, 2004). The USPSTF recommends routine system-wide alcohol screening among for adults receiving care in medical settings and brief alcohol intervention for those who are screened and meet a threshold for unhealthy alcohol use, including alcohol abuse (U.S. Preventative Services Task Force, 2004). Alcohol screening and brief intervention to decrease unhealthy alcohol use is effective in persons with mild-to-moderate alcohol problems, including alcohol abuse (Kaner et al., 2007, 2009; Whitlock, Polen, Green, Orleans, & Klein, 2004), although evidence for the effectiveness of these interventions among persons with alcohol dependence is presently lacking (Saitz, 2010).

Because these programs opportunistically screen and intervene with individuals with unhealthy alcohol use, they do not require that individuals' perceive a need for alcohol treatment or otherwise volitionally seek help for their alcohol problems to receive a brief intervention. A widespread implementation of such programs may help counteract any potential effects of PAS on perceived need for persons with alcohol abuse

only. Thus, the findings of this study could offer additional evidence in support for implementing alcohol screening and brief interventions. Perhaps, evidence regarding the inverse association between PAS and perceived need for alcohol treatment among persons who have alcohol abuse without dependence would appeal to policy makers who make decisions regarding the funding of screening and brief intervention programs.

Yet, it is also possible that this inverse association between PAS and perceived need may be a manifestation of a reluctance to admit alcohol problems to oneself or others due to fears of judgment. Such reluctance may also manifest as a lack of willingness to openly participate in alcohol screening and brief interventions. For example, due to PAS, individuals may under-report their frequency/quantity of alcohol consumption to their medical providers, and/or deny help that is offered to reduce their alcohol consumption despite the results of alcohol screenings. A prior study of at-risk drinkers recruited from rural communities found significant correlations among individuals' fear of judgment from community members about their drinking, fear of judgment from community members about receiving help about their drinking, and fear of being judged by primary care providers about their drinking (Fortney et al., 2004). In combination with the findings from the present study, it may be that stigma-reduction interventions with healthcare professionals are indicated. Physicians, nurses, and social workers alike display more negative attitudes towards persons with alcohol problems as compared to persons with other psychiatric conditions (Pimlott Kubiak, Ahmedani, Rios-Bedoya, & Anthony, 2011; Ronzani, Higgins-Biddle, & Furtado, 2009). Although more research on this topic is needed, policies may be necessary that require providers receive

education about the potential consequences of displaying negative attitudes regarding behaviors that are associated with stigmatized conditions, including AUDs.

The findings of H6, although unexpected, suggested that PAS could be more likely to affect the receipt of both alcohol-specific and non-alcohol-specific treatments received for persons with alcohol dependence and no psychiatric comorbidity, as compared to those who have alcohol dependence plus other psychiatric comorbidity. Regardless of the reasons why this is so, it remains concerning that PAS may be a barrier to receiving a wider range of help for alcohol problems among those with no psychiatric comorbidity. Due to the fact that an evidence base for brief interventions does not exist for the treatment of alcohol dependence (Saitz, 2010), we cannot rely on brief interventions to counter any potential effects of alcohol stigma on treatment utilization for persons with alcohol dependence. Programs such as the Substance Abuse and Mental Health Services Administration's (SAMHSA) Screening, Brief Intervention, and Referral to Treatment (SBIRT) have been implemented in settings such as primary care, emergency departments, and community agencies to target non-treatment-seeking individuals to intervene with or refer them to specialty treatment interventions (Madras et al., 2009). However, the evidence base for the referral to treatment component of this intervention has not been established. To date, there is a lack of evidence for opportunistic interventions that widely target persons with alcohol dependence, which is even more concerning in the context of the present findings. Future evaluations of the referral to treatment component of these programs should consider that service use patterns differ across persons who have alcohol dependence (with or without abuse) and

alcohol abuse only. Tests of these interventions could be stratified by alcohol diagnosis or psychiatric comorbidity.

It is interesting that prior research has found that people with AUDs and no psychiatric comorbidity often receive treatment in psychiatric settings that are specifically designed to treat problems unrelated to the use of substances, at rates that are equal to or much higher than their rates of receiving treatment in SUD treatment settings (Kessler et al., 1996; Harris and Edlund, 2005). The data sources for those studies used diagnostic-specific assessments of service use, making it less likely that the non-substance-related psychiatric treatment estimates included a provision of services for drug and alcohol problems. Their findings suggest that it is critical for all types of psychiatric treatment providers to understand how to identify and intervene with persons with AUDs, and also make concerted efforts to provide or refer these individuals to specialty SUD treatments. To speak to the findings of the present study, such efforts may help mitigate any potential decrease in alcohol treatment receipt that is attributable to PAS. In summary, policies at the healthcare-system level may be needed to increase the expertise and capability of intervening with AUDs in non-substance-related psychiatric settings.

Implications for social work practitioners

Mary Richmond's *Social Diagnosis*, a guide for caseworkers of the early 20th century, dedicated a full interview schedule to the diagnosis of "the inebriate" (Richmond, 1919). She declared that social work expertise is required to alleviate the social problems experienced by persons with AUDs, stigmatizing terms such as "*culprit*" must be avoided when referring to these persons, and special effort is needed to

encourage alcohol treatment cooperation. Yet, almost 100 years later, less than 40% of masters-level social workers have received training in AUDs according to an NASW survey (Smith, Whitaker, & Weismiller, 2006). Social work students are less willing to help clients with AUDs than clients with other medical and psychiatric conditions (Ahmedani, Kubiak, Rios-Bedoya, Mickus, & Anthony, 2011).

Instead, social work researchers and practitioners must leverage their unique expertise to address AUDs and stigma. Alcohol stigma is relevant to the populations that social workers serve, due to the fact that PAS is higher among persons with certain types of psychiatric comorbidity. Unique education and practice experiences with vulnerable populations, such as those with psychiatric disorders, lie within the field of social work, thus more persons in the field of social work should take concern to understand alcohol stigma.

According to the Institute of Medicine (IOM), professionals employed in the SUD sector, including social workers, often do not possess SUD-specific training or credentials (2006). IOM states that there is a recognized need to improve the quality of SUD education provided to social workers. Thus, while social workers are presented with a unique opportunity to alleviate a significant public health problem, the profession faces significant barriers to accomplishing this task. Training needs pose a barrier, thus sincere efforts must be made to improve the education provided to bachelors- and masters-level social workers. Social workers employed in a number of settings (e.g. mental health, social service, criminal justice, medical settings) can become well positioned to identify individuals who could be appropriate for treatment services and conduct brief interventions or facilitate referral to specialty SUD treatment settings. The

SUD-related training needs of social workers must be addressed beginning at the level of BSW and MSW trainees, then move forward in the phase of continuing education.

Implications for research

In addition to the research implications stated in the discussion of findings for each hypothesis, several others are warranted. The present study, which specified moderation by AUD type and also analyzed varying combinations of psychiatric comorbidity, revealed that studies of stigma must consider the significant heterogeneity in persons with AUDs in order to identify the complexity of the relationships between PAS, perceived need, and the use of services. Future work must pay special attention to such issues related to the nosology of alcohol and other psychiatric conditions. In particular, studies should at a minimum conduct sensitivity analyses to determine if estimates involving PAS, perceived need, and treatment utilization differ across AUD type and psychiatric comorbidity status.

To develop a knowledge base about alcohol stigma, a research agenda for social work must begin with improvements in stigma measures. Measuring perceived stigma is an appropriate initial step towards determining the effects of stigma on treatment utilization and other constructs. However, measures of other dimensions of stigma must be employed to comprehensively quantify any potential effects of alcohol stigma on treatment seeking. The presence of internalized stigma, which refers to the internalization of public stigma, has been specifically hypothesized to decrease treatment seeking (Corrigan, 2004). Supplementing measures of public/perceived alcohol stigma with measures of the self-stigma of alcohol dependence (Schomerus et al., 2011) would

cover a thorough assessment of both of the main stigma-related constructs that have been hypothesized by Corrigan (2004) to interfere with mental health care.

Additionally, many prior studies infer the presence of labeling through the receipt of prior treatment. Cross-sectional analyses that conceptualize treatment utilization as a dependent variable preclude the use of treatment participation to infer labeling status. Alternative measures should be explored that could be used to infer labeling status. For example, measures of group identification, which assess whether one identifies with a stigmatized group, could be employed (Rusch et al., 2009). However, these measures must be adapted and validated in populations with AUDs. Also, while many studies that examine stigma coping orientations only consider detrimental coping orientations such as secrecy and concealment, other coping mechanisms have been discussed that are thought to be protective by mitigating the negative effects of stigma. Measures are available in the stigma literature that assess “righteous anger”, the “perceived legitimacy of discrimination”, and “system justification”, which would be worthwhile to consider as moderators in future studies of alcohol stigma (Crocker et al., 1998; Rusch et al., 2009). While it is appropriate to advocate for the use of a comprehensive set of measures to advance the literature, it may not be feasible to administer all of these measures to a large number of individuals in their current lengthy formats. Thus, future research must refine the present measures of stigma to decrease the number of items needed to measure each construct.

Conclusion

While prior work identified an inverse relationship between PAS and alcohol treatment utilization among persons with lifetime AUDs, the present study revealed that

the relationship between PAS and perceived need for treatment and the actual receipt of treatment is complex. It may be that PAS is more of a barrier to perceived need for alcohol treatment and/or the use of specific types of alcohol treatment among persons with a lower severity of alcohol or psychiatric problems, and that for persons with a broad range of alcohol and psychiatric comorbidity, PAS affects the use of specific types of treatment but does not affect overall treatment utilization. However, longitudinal research and an improvement in the assessments of alcohol stigma, problem recognition, and the perceived need for alcohol treatment must be accomplished in order to accurately quantify and describe any potential affect of PAS on treatment utilization. Without this knowledge, the investigation of alcohol stigma-reduction interventions as a means to boost treatment seeking among this population is arguably premature. However, the relationships between alcohol stigma and constructs related to psychological distress have been more consistent across prior work and the present study. Research on alcohol stigma reduction interventions may be indicated to better understand and reduce psychological distress.

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Appendix 1. Measurement invariance procedures

This appendix describes the procedures and results related to the evaluation of measurement invariance.

Rationale

Hypothesis tests in the current study (H1-H2; H4-H6) involved the stratification of analyses by respondents' type of alcohol use disorder ("AUD type").¹ Respondents were classified into two AUD types: those who only met criteria for alcohol abuse (AA only), and those who met criteria for alcohol dependence without regard to their alcohol abuse status (AD with or without AA). When structural equation models (SEMs) are stratified, the latent constructs used in the analyses should be subjected to tests of measurement invariance to ensure that they perform equivalently across subgroups. More specifically, the *measurement parameters* of items that construct the latent variable should be evaluated to determine if they are equivalent across groups. The measurement parameters of interest include the factor loadings and intercepts (or thresholds when analyzing categorical indicators) (Muthén & Muthén, 2010).²

Several levels of measurement invariance have been established to help researchers evaluate whether constructs and their scales are equivalent across subgroups (Gregorich, 2006). According to the psychometrics literature, to assume that a scale

¹ Stratified analyses were accomplished using multiple-group analysis in a structural equation modeling (SEM) framework

²Residual variances (or scale factors when analyzing categorical indicators) are also measurement parameters, but are generally not required to be equivalent across groups when testing for measurement invariance.

represents the same underlying construct across subgroups, the scale must exhibit *configural invariance* (Horn & Mcardle, 1992). Configural invariance is the least restrictive type of measurement invariance. A scale is configurally invariant if the same pattern of factor loadings is observed across groups and the CFA model has a good fit to the data in each group separately. The model must also have a good fit to the data when fit in both groups simultaneously using multiple-group analysis with the factor loadings and intercepts/thresholds freely estimated across groups.

Weak measurement invariance imposes an additional constraint that the factor loadings are statistically equivalent across groups (i.e. of the same size or magnitude). This additional level of invariance ensures that group differences in the relationships (e.g. regressions or correlations) between the construct and other variables of interest can be attributed to the construct itself, rather than differences in factor loadings across groups. In a similar same way, valid comparisons of a latent factor means across subgroups require an additional level of invariance, referred to as *strong invariance*. Strong invariance is achieved when the factor loadings and intercepts (or thresholds when using categorical indicators) are sufficiently similar across subgroups (Gregorich, 2006).

When examining all of the parameters of a statistical model, it is also possible to achieve *partial invariance*, where most parameters are equivalent across groups but some are not (Byrne, 2011). In the case of partial measurement invariance, differences across groups can still be observed, but the context of the interpretation must not involve the measurement parameters that exhibited non-invariance. For example, if items of the math section of an exam were identified to be non-invariant across males and females, one could adjust for this difference by specifying a partially invariant model. However,

differences in exam scores across gender could only be interpreted with regard to the other parts of the exam. Partially invariant models allow the construct to be represented by all facets of available measurement, which maximizes content validity, while at the same time adjusting for the non-invariance of parameters when making comparisons across groups of interest.

Procedure for the current study

Each measurement model was tested separately for measurement invariance. The technical procedures outlined by Muthén and Muthén (2010) were followed, which are summarized below.

Model specification

Step 1) The CFA model was tested separately in each group and the model was evaluated for good fit and a similar pattern of factor loadings (configural invariance).

Step 2) A configurally-invariant model was specified in a multiple-group analysis. Fit statistics were inspected to ensure that the models retained good fit when the groups were evaluated in a single analysis. The configurally invariant model was also used as the baseline (i.e. a “fully unconstrained model”) for evaluating more restrictive types of measurement invariance.

Step 3) A weak measurement invariance model was specified and its fit was compared with the configurally invariant model.³

Step 4) A strong measurement invariance model was specified and its fit was compared with the configurally invariant model.

³ Weak measurement invariance was not tested for models with categorical indicators due to the general *Mplus* recommendation to relax factor loadings and thresholds in tandem

Step 5) If model fit was significantly degraded in comparison to the baseline model at steps three or four, the modification indices, residuals, and r-square values were inspected and theory was considered to inform the specification of a partially invariant model.

Model comparison

When examining the change in model fit between the configurally invariant model and its more restrictive counterparts, the present study followed recommendations to evaluate a variety of indices rather than any single fit index (Vandenberg & Lance, 2000). For the primary index, the study followed recommendations to consider a change in CFI of greater than 0.01 as an indicator of non-invariance (Cheung & Rensvold, 2002). The p-value of likelihood ratio test (LRT) as well as the change in RMSEA and TLI were also inspected to ensure that the change in CFI performed as expected. These values were inspected in equivalent models generated by the WLSMV and MLR estimators. The LRT cannot be calculated when analyzing multiple imputation data; thus an analogous model was fit with FIML estimation to address missing data to generate the LRT when multiple imputation data were analyzed (Muthén & Muthén, 2010).

Several considerations were made before selecting criteria to evaluate measurement invariance. While some studies rely only on the LRT to evaluate measurement invariance (a chi-square difference test of the configurally invariant model versus the more constrained invariance model, when adjusting for degrees of freedom), the LRT is known to be overly sensitive to trivial model misspecifications and sample size when used for these purposes (Chen, 2007). Based on Monte Carlo simulation studies, a more practical indicator of measurement non-invariance was a change in CFI of

more than 0.01 (Cheung & Rensvold, 2002). Chen (2007) provided more liberal recommendations, that both a change in CFI of 0.01 and a change in RMSEA of 0.015 be observed to indicate non-invariance. Yet, others have recommended, using more strict criteria, that a change in CFI of no more than 0.002 be used. Newer methods are also available that directly test parameters for invariance using bootstrapped sampling distributions (Cheung & Lau, 2011), which are unfortunately unavailable when analyzing complex survey data (Muthén & Muthén, 2010).

Results

AUD Severity

The lifetime AUD severity model was tested for measurement invariance with AUD type as a grouping variable. Similar factor loadings were apparent and fit statistics were acceptable across AUD type, providing evidence for configural invariance. No modifications were required to achieve strong measurement invariance.

The past-year AUD severity model was tested for measurement invariance. Good fit was achieved in the overall past-year AUD sample (n=3,142) (CFI=0.975, TLI=0.969, RMSEA=0.031 [90% CI=0.026-0.036]), with factor loadings ranging from 0.365-0.885. Fit was marginal for the past-year AD with or without AA sample (n=1,433) (CFI=0.913, TLI=0.891, RMSEA=0.046 [90% CI=0.039-0.053]) and factor loadings ranged from 0.065-0.858. In the past-year AA only sample (n=1,709), fit was clearly unacceptable (CFI=0.480, TLI=0.350, RMSEA=0.024 [90% CI=0.017-0.031]) and factor loadings ranged from 0.060-0.706. The alcohol dependence criterion #6 (reduced social/occupational/recreational activities) had empty cells when crosstabulated with three other dependence and one other abuse criteria. The removal of this item did not

appreciably improve model fit for either AUD type. An inspection of the tetrachoric sample correlation matrix showed low correlations between the AUD symptom measures for many of the items.

The lifetime AUD symptoms factor was replicated in the analytic sample of persons with past-year AUD (n=3,142). The model had a good fit to the data in the combined sample (CFI=0.985, TLI=0.981, RMSEA=0.032 [90% CI=0.029-0.034]) as well as in the separate samples of AD with or without AA (CFI=0.988, TLI=0.985, RMSEA=0.016 [90% CI=0.013-0.020]) and AA only (CFI=0.982, TLI=0.978, RMSEA=0.027 [90% CI=0.024-0.031]), and achieved strong measurement invariance.

Alcohol consumption

Configural invariance was apparent for both the lifetime and past-year ACFS measures in the lifetime and past-year AUD samples, respectively. Measurement invariance was tested for the past-year ACFS but not the lifetime ACFS due to the lack of degrees of freedom to generate chi-square based model fit information. Weak measurement invariance was achieved in the past-year ACFS model with no further changes. However, the test for strong invariance showed a change in CFI of greater than ± 0.01 (-0.029). Relaxing the intercept invariance for the frequency of intoxication item achieved partial strong measurement invariance.⁴ Thus, while the frequency of intoxication item contributes to the operationalization of the ACFS construct, mean differences by AUD type should be interpreted without respect to differences across groups in the frequency to intoxication item (Byrne, 2011).

⁴ That is, letting the intercept of the item be freely estimated in both groups rather than constrained to be equal across groups.

Overall alcohol severity

A one-factor model representing all lifetime AUD symptoms and the binge drinking measure evidenced configural invariance by AUD type, per the similar factor loadings in each group. Strong invariance was achieved without further modifications.

Perceived alcohol stigma

The multiply imputed datasets were analyzed. Similar factor loadings were apparent and fit statistics were acceptable across AUD type, providing evidence for configural invariance. When investigating strong measurement invariance, the CFI, TLI, and RMSEA estimates were better in the strong invariance models for both the past-year and lifetime samples, but the p-values from WLSMV DIFFTEST were statistically significant in the lifetime sample but not the past-year sample. A partial invariance model was achieved by relaxing the loadings and intercepts for two items.