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Mental Disorder Comorbidity and Treatment Utilization

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Abstract

Objective—Effective interventions have been developed for myriad common psychological and substance use disorders, though they remain highly underutilized. Previous research has shown that the likelihood of treatment utilization varies across disorder diagnosis. However, studies that focus on individual disorders have resulted in a large, piecemeal literature that neglects the high rates of multivariate comorbidity. The current study investigated the association between treatment utilization and transdiagnostic comorbidity factors.

Method—In a nationally representative sample of the United States adult population ($N=34,653$), we applied the internalizing-externalizing latent comorbidity model to examine its association with lifetime utilization of various treatments for mood, anxiety, and substance use disorders.

Results—Both internalizing and externalizing transdiagnostic factors were positively associated with all forms of treatment utilization. Stronger within-domain domain (e.g., internalizing's association with mood or anxiety treatment) than between-domain (e.g., internalizing's association with substance use disorder treatment) associations were found. Significant antagonistic internalizing-by-externalizing interactions were also observed.

Conclusions—These results underscore the importance of applying a nuanced approach to modeling comorbidity when predicting treatment utilization. Clinical implications are discussed.

Keywords

transdiagnostic psychopathology; treatment utilization; comorbidity

1. Introduction

Despite the availability of effective treatments for most common mood, anxiety, and substance use disorders (SUDs) [1–9], such treatments remain underutilized [10–17]. For example, treatment utilization among those with alcohol use disorders has lingered around

20% since the early 1990s [11, 18]. Given the disability associated with mental and SUDs [11, 18, 19], improving treatment utilization for these disorders is a major public health issue that must be informed by factors influencing such utilization.

The presence of psychiatric or SUDs is associated with increased treatment utilization [20, 21]. Specific disorders vary in their likelihood of being treated [13, 23, 24]. For instance, the odds of utilizing treatment have been shown to be 3.5 times higher for mood than anxiety disorders [13]. Further, disorder severity is associated with treatment utilization; severity of alcohol use disorder is positively associated with treatment utilization [11, 24].

In addition, *comorbidity* robustly predicts increased likelihood of treatment utilization across multiple studies [10, 13, 15, 23, 25, 26–32]. However, some anxiety and personality disorders are inversely related to SUD treatment [17], and antisocial personality disorder appears to be a barrier to treatment for anxiety disorders [31]. Given these complexities, examining the effects of comorbidity by considering pairs of individual disorders (the usual approach) may miss important information [33]. A reconceptualization of comorbidity as identified by multivariate research methods offers an emerging and empirically supported perspective [34] that may be more informative in understanding how comorbidity relates to treatment utilization.

In this perspective, the latent structure of common mental disorder comorbidity reflects two *transdiagnostic factors*: internalizing and externalizing [35–40]. This reconceptualization of comorbidity moves beyond previous pair-wise disorder comorbidity frameworks, suggesting that the observed comorbidity of common mental disorders is actually a manifestation of their shared associations with these underlying core transdiagnostic factors. The internalizing factor accounts for the observed comorbidity among common mood and anxiety disorders, while the externalizing factor accounts for that among SUDs and disorders of antisociality and impulsivity [41–50].

Transdiagnostic factor models fit observed mental disorder comorbidity data better than models reflecting *DSM*-type nosologies [46, 47] and have many favorable properties. First, they are dimensional [50–54], incorporating information about severity and subthreshold psychopathology. Second, they are stable over time and predict longitudinal disorder continuity and development [43, 49, 51, 55, 56]. Third, the factors demonstrate measurement invariance across various population sub-groups [41, 56–60] making them potentially generalizable predictors of treatment utilization across populations. They reflect additive genetic variance [61, 62], but also connect mental disorders to environmental stressors [57, 63–66]. Additionally, they account for the link between mental disorders and important outcomes [51, 64, 67–69]. These qualities make transdiagnostic factors potentially very informative constructs for better understanding the link between comorbidity and treatment utilization.

To our knowledge, only one study has applied transdiagnostic comorbidity to questions of treatment utilization, an Australian study showed treatment utilization history was more associated with the transdiagnostic internalizing factor than with unique diagnosis-specific variance [70]. This result suggests that a more comprehensive examination of the

associations between utilization of various types of treatments with both internalizing and externalizing factors could be highly informative. We therefore examined the extent to which the internalizing and externalizing latent transdiagnostic comorbidity factors were associated with utilization of various forms of treatment in a nationally representative, longitudinal sample of adults in the United States. Further, we tested the hypothesis that within-domain associations (e.g., between internalizing and anxiety disorder treatment) would be stronger than between-domain associations (e.g., between internalizing and SUD treatment). Finally, we hypothesized that transdiagnostic factors would interact in their association with treatment utilization, such that that between within-domain factors and treatment utilization would differ depending on the level of between-domain factors.

2. Method

2.1. Participants

The study used data from the two waves of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) [71]. Wave 1 ($N = 43,093$; fielded 2001–2002; 81% of those eligible) comprised a representative sample of the civilian, non-institutionalized adult United States population, with race/ethnic minority and young adults oversampled. Wave 1 participants were contacted for a second, Wave 2 interview (fielded 2004–2005). Of these, 34,653 (86.7%) agreed to participate, for a cumulative response rate of 70.2%. Of the Wave 2 sample, 58% were women, and ages ranged from 20 to over 90 years of age. Race/ethnicity was assessed through respondents' selection of census-defined categories: 70.9% White, 11.1% African-American, 11.6% Hispanic, 4.3% Asian or Pacific Islander, and 2.2% American Indian and Alaska Native. Data were weighted to be representative of the age, gender, and race/ethnic demographics of the United States based on the 2000 Census. Written informed consent was obtained following complete description of the study. The research protocol, including written informed consent procedures, received full ethical review and approval from the U.S. Census Bureau and the U.S. Office of Management and Budget.

2.2. Assessment

2.2.1. Diagnoses—*DSM-IV* lifetime diagnoses were made using the Alcohol Use Disorder and Associated Disabilities Interview Schedule – *DSM-IV* Version (AUDADIS-IV) [71–73], a structured interview designed for administration by highly trained lay interviewers. Major depression, dysthymic disorder, panic disorder with or without agoraphobia, social anxiety disorder, specific phobia, generalized anxiety disorder, and posttraumatic stress disorder were utilized as indicators of the latent internalizing factor. Alcohol, marijuana, nicotine, and any other drug SUDs (abuse or dependence), and antisocial personality disorder (ASPD), served as indicators of the latent externalizing factor.

Across multiple samples, diagnostic reliabilities of the AUDADIS-IV ranged from good to excellent for *DSM-IV* alcohol and drug disorders ($\kappa = 0.60$ – 0.91) and from fair to excellent for mood and anxiety disorders ($\kappa = 0.40$ – 0.77) [72, 73, 75]. The AUDADIS-IV demonstrates as good or better test-retest estimates than other structured interviews [76] and has the benefit of assessing clinically significant distress and impairment after each

syndrome is fully characterized [75]. AUDADIS-IV diagnoses also demonstrate high correspondence to clinician re-evaluations, illustrating the validity of the measure [77, 78].

2.2.2. Treatment utilization—The current study utilized data from those participants who were asked about treatment utilization for mood, anxiety, and SUDs. This information was collected at both Waves 1 and 2. As done previously [22, 79], treatment utilization responses from Waves 1 and 2 were combined to produce a single lifetime treatment utilization variable for each treatment modality among Wave 2 participants.

For mood and anxiety disorders, treatment utilization was assessed with questions on outpatient, inpatient, emergency room, and prescribed medication treatment. Participants who endorsed a sufficient number of criteria to receive a diagnosis of each disorder were asked whether they utilized treatment for it; being asked about treatment did not necessitate the diagnosis of a specific disorder, because endorsement of significant distress or impairment was not required to be asked treatment utilization questions.

Participants who reported having ever used alcohol or drugs were questioned about alcohol or drug treatment utilization, respectively. Treatment utilization for SUDs was assessed with questions on participation in inpatient and/or outpatient services, use of family or other social services, and use of rehabilitation programs. As was the case with mood and anxiety treatment questions, responses to substance use treatment questions did not require meeting SUD criteria. Altogether, participants could be asked no treatment utilization questions one form of treatment, or multiple forms of treatment.

2.3. Statistical Analyses

All analyses were conducted in Mplus [80]. Different groups of participants were administered questions about various treatment utilization modalities, yielding different analytic samples for each form of treatment utilization (*ns* given in Table 1); individuals who endorsed multiple disorders were included in more than one treatment utilization analysis. Seven treatment utilization subsamples were defined, reflecting being asked about treatment utilization for: (a) low mood, (b) anxiety, (c) any emotional problem (i.e., mood and/or anxiety), (d) alcohol, (e) drug, (f) substance use (i.e., alcohol and/or drug use), and (g) any treatment (i.e., a combination of all the possible treatment types). We conducted analyses separately within the seven subsamples of individuals asked about each type of treatment utilization. Within each subsample, we parameterized a well-fitting internalizing-externalizing latent factor comorbidity model (fit indices of models across subsamples were: CFI = 0.96–0.98, TLI = 0.95–0.97, RMSEA = 0.02–0.03; Figure 1)—with mood and anxiety disorders serving as indicators for internalizing and ASPD and SUDs serving as indicators for externalizing—which previous studies have documented provides excellent fit to these data [51, 81, 82]. We then used the internalizing and externalizing factors as predictors, in a logistic regression framework, of the dichotomous treatment utilization variable relevant to that subsample (e.g., mood disorder treatment utilization in the subsample of individuals screened into the mood disorder treatment questions). Using logistic regression models we examined the associations between internalizing and externalizing—both separately and simultaneously—and treatment utilization. We then explored potential moderating effects of

one transdiagnostic factor on the other by examining the association between the interaction of internalizing and externalizing and treatment utilization. All models were adjusted for age, gender, race/ethnicity, education, income, marital status, urban versus rural dwelling, and current insurance status. All analyses applied the weights reflecting the complex design features for Wave 2 of the NESARC, treated diagnoses as categorical for simplicity and ease of interpretation, used a robust maximum likelihood estimator (MLR), allowed factors to correlate, and parameterized the means and variances of latent factors to zero and one, respectively.

3. Results

Treatment utilization rates for each treatment modality within each subsample are presented in Table 1. Table 2 presents the results of the adjusted logistic regressions, with odds ratios (ORs) reflecting the change in the odds of utilizing treatment for a specific disorder category given a unit increase in the transdiagnostic factors (internalizing and/or externalizing). Because the factors had variances of unity, these ORs are interpreted as the predicted change in odds of utilizing treatment given a one standard deviation increase in the transdiagnostic factor.

When transdiagnostic factors were used separately as predictors, all forms of treatment were significantly positively associated with internalizing and externalizing ($p < .05$). Within-domain associations (internalizing's relationship with mood or anxiety treatment) were larger than between-domain association (externalizing's relationship with mood or anxiety treatment), though transdiagnostic factors were still significantly associated with between-domain treatment utilization. Overall, a one standard deviation increase in internalizing was associated with 36 times the odds of utilizing any sort of treatment, and externalizing with 10 times the odds of utilizing any treatment.

When internalizing and externalizing were included simultaneously, all within-domain associations remained significant; all between-domain associations were reduced, many to non-significance. In this simultaneous predictor model, externalizing was associated with *reduced* odds of utilizing anxiety or emotional disorder (mood/anxiety) treatment, and was not significantly related to mood treatment. When examining the associations with utilization of any treatment, while both internalizing and externalizing remained significant, only internalizing showed a notably large effect (OR = 24.10). In this combined model, the original association of the externalizing factor with treatment (OR = 10.28) was reduced to 1.92 when internalizing was held constant.

In a final set of models, we included internalizing, externalizing, and their interaction as predictors. This interaction term was significant ($p < .05$) for alcohol, any substance, emotional, and any treatment utilization outcomes; the OR for the interaction was negative, indicating that increases in the level of one transdiagnostic factor attenuated the other factor's association with treatment utilization. To clarify the nature of this interaction, we decomposed the interaction, calculating odds ratios for the within-domain transdiagnostic factor at three levels of the between-domain transdiagnostic factor (one standard deviation below the mean, at the mean, and above the mean). Odds ratios, given in Table 3, thus

indicate predicted increase in odds associated with a one-unit change in the within-domain transdiagnostic factor across levels of the between-domain factor. For instance, for alcohol treatment, a one-standard deviation increase in externalizing was associated with 10.39 times the odds of utilizing treatment when internalizing was one standard deviation below its mean, 8.43 times when internalizing was at its mean, and 6.84 when internalizing was one standard deviation above its mean.

4. Discussion

We examined how multivariate comorbidity levels of common mental disorders related to treatment utilization. To our knowledge, there has been only one attempt to integrate treatment utilization research with findings from latent transdiagnostic comorbidity research [70]. Treatment utilization studies typically focus on individual disorders or on limited (e.g., pair-wise) comorbidity patterns while controlling for presence of other disorders [17, 25, 31, 32]. To these ends, we applied a well-supported latent transdiagnostic factor model to understand how multivariate comorbidity was associated with utilization of treatments for various types of disorders.

Our findings indicate that higher transdiagnostic comorbidity levels were generally associated with increased odds of treatment utilization, regardless of whether or not the comorbidity level was congruent with the type of disorder (internalizing/externalizing) for which treatment was received. This finding is consistent with previous research indicating that the presence of a comorbid disorder is associated with greater treatment utilization [10, 13, 15, 23, 27, 30–32, 70]. A likely explanation for this finding is that comorbidity patterns for various types of disorders are themselves related, reflected in the correlation between latent internalizing and externalizing transdiagnostic factors [36]. In other words, the higher an individual's overall transdiagnostic comorbidity level, the greater the likelihood that they will seek treatment services.

Our results further reveal important nuances in the above relationship. Within-domain multivariate comorbidity level was more strongly associated with related treatment types than between-domain comorbidity level. Further, when modeled *simultaneously*, within-domain multivariate comorbidity level was consistently associated with greater odds of utilizing treatment for that domain, but the association of between-domain multivariate comorbidity level with treatment utilization varied; it is striking that externalizing was associated with significantly decreased odds of anxiety (and any emotional disorder) treatment utilization when controlling for internalizing. This finding partially contradicts previous findings in the NESARC indicating that there was no statistically significant association between SUDs and treatment for GAD, social anxiety, panic disorder, or specific phobia in adjusted models [31]. This highlights the additional information that can be conferred by transdiagnostic comorbidity approaches and within- and between-domain comorbidity considerations.

We clarified these patterns further with a full moderation model, where internalizing and externalizing were allowed to interact. To our knowledge, this is the first time in the literature that latent transdiagnostic comorbidity factors have been allowed to interact in the

prediction of any variable. In four of our seven treatment types, this interaction was significant and, in all four cases, antagonistic in nature. As the between-domain factor increased, the magnitude of the association between the within-domain factor and treatment utilization was attenuated. The extent of this attenuation was marked. In the case of utilizing any treatment (where we defined internalizing as the within-domain factor, given the majority of treatments utilized were for mood and anxiety disorders), a one-standard deviation increase in internalizing was associated with around 137 times the odds of utilizing treatment when externalizing was one standard deviation below the mean; at one standard deviation above the mean, the same increase in internalizing was associated with only 13 times the odds of utilizing treatment. Higher externalizing similarly reduced the association between internalizing and utilizing emotional disorder treatment, while higher internalizing reduced the association between externalizing and utilizing treatment for alcohol and for any SUD.

Thus, our findings stand in contrast to previous research suggesting that the higher the comorbidity level, the more likely an individual is to utilize treatment. These findings suggest that, in some cases, the higher the transdiagnostic comorbidity level, the lower the odds of accessing treatment services. So, while greater comorbidity is often assumed to increase one's likelihood of accessing treatment, these results underscore (a) the importance of characterizing the specific patterns of this comorbidity and (b) how greater rates might either increase or reduce the odds of accessing treatment. This more nuanced approach supports the notion that transdiagnostic comorbidity factors are generally associated with utilizing treatment, and extends the literature by determining how the breadth and types of transdiagnostic factors modeled affect these associations.

4.1. Implications

Despite their effectiveness, interventions remain strikingly underutilized. For instance, Mojtabai and colleagues [13] found that of the 32% of persons who perceive a need for treatment, 19% actually seek it, and only 8% access treatment from trained mental health professionals. Thus, understanding the facilitators of, and barriers to, utilizing treatments is a major public health concern. While previous research has suggested that comorbidity may play an important role in treatment utilization, our results indicate that multivariate comorbidity patterns' impacts may be both positive and negative in individuals receiving care. For example, individuals who experience anxiety-related psychopathology, as well as higher levels of traits related with externalizing may experience psychological barriers to utilizing anxiety treatment. Further, individuals with higher levels of externalizing are more apt to use a variety of substances, suggesting potential self-medication with substances rather than seeking formal treatment. Clinicians should emphasize that these substance use behaviors can be replaced with effective and healthier alternatives, such as psychopharmacological agents or psychotherapeutic interventions, which do not have the negative potential effects of substance use.

In terms of SUD treatment, increased levels of mood and anxiety psychopathology may serve a demotivating role for treatment utilization. If these individuals are using substances to self-medicate for mood or anxiety symptoms, they may believe that seeking substance use

treatment would leave them without a coping mechanism for their psychopathology. This further highlights the need to engage substance use patients with empirically supported treatments for psychopathology, reducing a potential barrier to utilization of substance treatment.

Re-envisioning psychopathology and SUDs from a transdiagnostic standpoint offers the potential to streamline and improve assessment and case-conceptualization [83], potentially impacting treatment utilization. Based on the findings of the current study, being able to distinguish two individuals presenting with similar internalizing levels, but differing on externalizing levels, would have important ramifications for conceptualizing treatment—and for consideration of externalizing-related barriers to treatment (and vice versa). Furthermore, to increase treatment for internalizing disorders, treatment aimed at the latent externalizing liability might be a necessary precursor for some individuals to enhance motivation and compliance.

That the effects of common psychotherapeutic and psychopharmacological interventions appear to transcend diagnostic boundaries [9, 84–89] suggests that transdiagnostic factors themselves can both inform the nature of treatment utilization and serve as primary targets of interventions. Indeed, evidence points to this transdiagnostic variance as predictive of treatment utilization [70]. The non-specific treatment gains associated with many common interventions appear largely to reflect treatment effects at this level [90], leading to an increased focus on the development of interventions that specifically target transdiagnostic factors [85, 86]. Our findings extend this literature by noting that transdiagnostic factors themselves are associated with who will utilize treatment, thereby re-emphasizing the importance of these factors as treatment foci. As such, our findings highlight that transdiagnostic factors, and multivariate comorbidity, can be used to understand who will utilize treatment, as well as can act as targets of treatment themselves.

4.2. Limitations

This study has several limitations. First, our approach utilized retrospective lifetime data, which may be subject to recall biases. However, empirical evidence suggests that even when such reports are biased, they typically reflect underestimates rather than overestimates [91], somewhat reducing this concern. Second, causal claims cannot be made from our data, given its cross-sectional nature. Third, we utilized a diagnostic instrument that was fully structured, with data collected by lay interviewers rather than clinicians. However, using clinicians as interviewers in large-scale national surveys is not feasible, and the diagnostic interview has generally good reliability and validity when used by lay interviewers. Fourth, the results of the current investigation only shed light on how transdiagnostic factor levels are associated with the odds of accessing various treatment services versus not. The current study did not assess how individuals' perceptions of need for treatment associated with these variables. While the association between barriers to SUD and subsequent treatment-seeking behavior has been reported [92], the NESARC did not assess perception of treatment need or barriers for mood/anxiety disorders. Because a large proportion of individuals who perceive a need for treatment never actually access such services [13], future research should examine how transdiagnostic comorbidity factors are associated with the perceptions of need for

treatment and how transdiagnostic comorbidity levels may interact with need for treatment in predicting who utilizes treatment.

5. Conclusion

Although effective interventions exist for many common mood, anxiety and SUDs, they remain highly underutilized. In this novel study of the associations among multivariate comorbidity factors and treatment utilization, internalizing and externalizing transdiagnostic factors were significantly positively associated with treatment utilization. While multivariate comorbidity was generally associated with increased odds of treatment, these associations differed in an antagonistic interaction for various types of treatments. Our findings provide a nuanced understanding of the relationship between comorbidity and treatment utilization that would not have been found if disorders had only been considered in pairs, adding to a growing literature highlighting the importance of considering psychiatric disorders, SUDs, and comorbidity within a broader, dimensional, multivariate framework of psychopathology.

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Figure 1.

Transdiagnostic comorbidity factors predicting treatment utilization.

Note: Arrows connecting diagnoses to transdiagnostic factors represent factor loadings; arrows connecting transdiagnostic factors to the treatment utilization outcome represent regressions; the curved arrow between transdiagnostic factors represents correlation; and short arrows pointing to diagnostic and treatment indicators represent residuals. PTSD: posttraumatic stress disorder; MDD: major depressive disorder; Dysth: dysthymic disorder; GAD: generalized anxiety disorder; Panic: panic disorder; Social: social anxiety disorder; Spec: specific phobia; ASPD: antisocial personality disorder; Alc: alcohol abuse/dependence; Nic: nicotine abuse/dependence; Marij: marijuana abuse/dependence; Drug: other drug abuse/dependence. Covariates are not depicted.

Table 1

Percentages of participants asked about and reporting utilization of various forms of treatment

Type of Treatment	<i>n</i> of sample screened into treatment utilization questions	% of subsample utilizing treatment
Any Mood	9,639	59.1
Any Anxiety	23,712	18.3
Any Mood/Anxiety	24,856	30.0
Alcohol	29,993	5.8
Drug	8,863	8.6
Any Substance	30,182	7.2
Any Treatment	31,128	26.7

Note: See main text for description of screening criteria to be asked about each form of treatment utilization.

Table 2

Odds ratios (and 95% confidence intervals) of treatment types predicted by internalizing and externalizing transdiagnostic factors.

Predictors	Type of Treatment				
	Mood	Anxiety	Any Mood/Anxiety	Alcohol	Drug
Individual Predictor Models					
INT only	2.77 (2.47, 3.10)	12.80 (10.57, 15.50)	44.54 (34.43, 61.16)	2.89 (2.62, 3.20)	2.58 (2.21, 3.01)
EXT only	1.55 (1.42, 1.69)	2.68 (2.44, 2.94)	4.18 (3.55, 4.92)	7.89 (6.89, 9.03)	5.10 (4.02, 6.47)
Multiple Predictors Model					
INT	2.67 (2.37, 3.02)	16.73 (12.94, 21.62)	60.11 (39.69, 91.03)	1.07 (0.94, 1.22)	1.45 (1.21, 1.74)
EXT	1.07 (0.98, 1.17)	0.73 (0.64, 0.83)	0.76 (0.66, 0.87)	7.56 (6.51, 8.78)	4.12 (3.25, 5.21)

Note: INT: internalizing. EXT: externalizing. All models include covariates of: age, gender, ethnicity, education, income, marital status, urban versus rural dwelling, and current insurance status. Individual predictor models included INT or EXT, while the multiple predictors model included both INT and EXT simultaneously.

Table 3

Odds ratios of treatment utilization given a one-standard deviation increase in the within-domain transdiagnostic factor at varying levels of the between-domain moderator.

	INT Level					
	Any Mood/Anxiety Treatment	Any Treatment	Alcohol Treatment	Substance Treatment		
	-1	0	1	-1	0	1
INT	314.51	168.85	90.65	136.87	42.56	13.24
EXT	-	-	-	-	-	-
				10.39	8.43	6.84
				11.36	9.57	8.07

Note: INT: internalizing. EXT: externalizing. Odds ratios represent the change in odds associated with a one-standard deviation increase in one transdiagnostic factor across three levels of the other factor: one standard deviation below the mean, at the mean, and one standard deviation above the mean. Any mood/anxiety treatment and any treatment were predicted by internalizing across three levels of externalizing; alcohol treatment and substance treatment were predicted by externalizing across three levels of internalizing. All models include covariates of: age, gender, ethnicity, education, income, marital status, urban versus rural dwelling, and current insurance status.