



Latent comorbid depression and anxiety symptoms across sex and race/ethnic subgroupings in a national epidemiologic study

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ABSTRACT

The heterogeneity of mood and anxiety disorders has been widely documented and epidemiologic studies have found different prevalence rates for psychiatric disorders across subgroups (i.e. sex and race/ethnic). The current study compares the latent class structure across sex and race/ethnic groups to determine group differences in these latent class configurations. This study utilized data from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), a nationally representative sample from the United States (N = 43,093). First, latent class analyses (LCAs) were used to assess subtypes of symptoms of depression and anxiety that characterize a latent class structure for the population represented by NESARC. Second, group LCAs were conducted across sex and race/ethnicity to compare the latent class structure across these groups. The results suggest a 7-class model is the best fit for the population as well as for the male, non-Hispanic White, and Black subgroups. Females fit best an 11-class model, Hispanics a 5-class model and Asian and American Indian subgroups a 4-class model. These results indicate that subgroups of sex and race/ethnicity do not share the same latent construct for symptoms of anxiety and depression. Understanding the variability in the presentation of comorbid mood and anxiety across subgroups has the potential to inform person-centered approaches to care as well as targeted and multicultural interventions to improve population health.

1. Introduction

Mood and anxiety disorders are among the leading mental health disorders worldwide. The World Health Organization (WHO) World Mental Health Surveys estimate the 12-month prevalence for anxiety and mood disorders in the United States (US) to be 18.2 and 9.6 percent, respectively (Demeyttenaere et al., 2004). Lifetime comorbidity between any mood disorder and generalized anxiety disorder has been found globally to be high (63%) (Kessler et al., 2005). Nevertheless, international epidemiologic studies have found vastly different prevalence rates for psychiatric disorders (Andrade et al., 2003; Ryder and Chentsova-Dutton, 2012; Weissman et al., 1996) and US national epidemiological surveys have found that the prevalence of mood and anxiety disorders vary by sex and race/ethnicity (Martin, 2003; Merikangas et al., 2010; Pigott, 2003; Riolo et al., 2005). While considerable attention has been given to identifying the prevalence of mental disorders internationally and across subpopulations, we are unaware of studies that have examined the subtypes of depression and anxiety symptomatology across sex and race/ethnic groups. Thus, one cannot be certain of the validity in the comparison of prevalence rates

across these groups.

The heterogeneity of mood and anxiety disorders has been widely documented and there have been significant advances in the pursuit of diagnostic characteristics of these disorders (Au et al., 2013; Baumeister and Gordon, 2012; Blom et al., 2014; Contractor et al., 2015; Nandi et al., 2009; Rodgers et al., 2014; Unick et al., 2009). For example, depression has been conceptualized to have two distinct forms, analytic and introjective depressions, which correspond to differences in phenomenology and symptoms (Reis and Grenyer, 2002). Similarly, previous studies have found that among youth who manifest depression or anxiety, they are likely to experience a comorbid condition rather than depression or anxiety alone (Ferdinand et al., 2005; van Lang et al., 2006). Moreover, the composition of presenting symptoms for each disorder as well as for comorbid conditions vary widely across subgroups (i.e., gender, race/ethnic groups). In addition to identifying the different groupings of symptoms, examining the severity and specificity of these symptoms helps to clarify the nature of depression and anxiety disorders and in turn inform approaches to treatment (Watson, 2009). Identifying the patterns in presentation can inform approaches to prevention and disease detection as well as further our understanding of

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disease trajectory, risk of reoccurrence, and treatment responses. In this vein, cultural syndromes, such as *ataque de nervios* (i.e., attack of nerves), reported amongst Hispanic individuals, consist of symptoms across different diagnostic categories and benefit from culturally sensitive interventions (Dura-Vila and Hodes, 2012; Lizardi et al., 2009). Similarly, *Chinese somatization* has been coined to represent the differences in the manifestation of depressive symptoms among Chinese as compared to a more Western experience of psychological distress (Ryder and Chentsova-Dutton, 2012). Regarding sex, differences in the prevalence of depression and anxiety between men and women are well-documented, however the literature offers competing explanations for the determinants of the differences in prevalence and manifestation (Altemus et al., 2014; Hill and Needham, 2013; Kwon et al., 2012; Maeng and Milad, 2015). Given the heterogeneity in how these disorders present across subpopulations including their comorbid prevalence, there is clinical value in identifying patterns in mood and anxiety symptoms across gender and race/ethnic groups (Carragher et al., 2009; Blom et al., 2014).

1.1. The current study

This study expands upon the current literature that aims to assess the heterogeneity of mood and anxiety symptoms. Unlike a variable-centered approach (i.e., regression or factor analyses) which examines the statistical relations among variables, a person-centered approach (i.e., latent class analysis) explores the relationships among individuals. Research questions that aim to understand the etiology and manifestation of psychiatric disorders necessitate a person-centered approach in order to identify discrete subgroups of symptoms within a population (Collins and Lanza, 2010; Muthén and Muthén, 2000). In this study, we first use an exploratory latent class analysis (LCA) to identify the heterogeneity of comorbid mood and anxiety symptomatology for a nationally representative adult sample (Goodman, 1974; Lazarsfeld and Henry, 1968). Second, building off recent studies assessing the predictive function of socio-demographic risk factors, we compare the latent class structure across sex and race/ethnic groups to determine group differences in these latent class configurations (Clogg and Goodman, 1985; Contractor et al., 2015). Considering the literature to date, which highlights important differences in the prevalence of mood and anxiety disorders as well as the comorbidity of symptoms across sex and ethnic groups, we expect to find differences in subtypes of depression and anxiety symptoms across these groups.

2. Method

2.1. Sample

This study uses the 2001–2002 Wave of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), conducted by the National Institute on Alcohol Abuse and Alcoholism (NIAAA; Grant et al., 2003). The NESARC is a nationally representative survey of civilian and noninstitutionalized adults (18 years and older) living in the US, including the District of Columbia, Alaska, and Hawaii. Participant ($n = 43,093$) data were obtained in face-to-face interviews. Blacks and Hispanics were oversampled, as were individuals between 18 and 24 years old. Weighted data were adjusted to be representative of the US population based on the 2000 US Census. All additional NESARC methodology, are presented in Grant et al. (2005).

2.2. Participants

Participants were on average 46.40 years old ($SD = 18.18$). The

majority (57.0%) were female, White (56.9%), born in the United States (82.7%), with less than a college degree (68.0%) and personal incomes less than \$49,999 (67.2%). In addition, 19.1% were Black, 19.3% Hispanic or Latino, 1.6% Native American and 3.1% Asian.

2.3. Measures

The NESARC questionnaire includes items that assess mood and anxiety disorders according to criteria set forth by the DSM-IV (NIH, 2006). Respondents answer Yes/No/Unknown. Reliability and validity of the measures used in the NESARC are discussed elsewhere (Grant et al., 2005). In this study, we analyzed 25 items representing symptom criteria for Major Depressive Disorder, Dysthymic Disorder, Generalized Anxiety Disorder, and Panic Disorder. Sample items include having a sad or depressed mood for long periods of time, being easily startled, and having difficulties with day-to-day activities. All items are listed in Fig. 1, Table 3 (a-b), and 5 (a-c).

2.4. Analytical methodology

Latent class analyses (LCA) with Maximum Likelihood estimation were used to assess latent subgroups of symptoms of depression and anxiety that characterize the population represented by the NESARC study. Group latent class analyses were conducted across sex and race/ethnic groups (non-Hispanic White, Black, Hispanic, Asian-American and Native Americans) to compare the latent class structure across these groups (Clogg and Goodman, 1985; Gelfand and Dey, 1994). The Bayesian Information Criterion (BIC), and sample size adjusted Bayesian Information Criterion (SSABIC) were used to determine the number of classes that constituted the best fitting models, given their demonstrated high power and reliability, especially with large samples (Nylund et al., 2007a; Tein et al., 2013). We also report the Consistent Akaike Information Criterion (CAIC; Bozdogan, 1987). In addition, the relative entropy index, and model interpretability were considered in cases where the information criteria highlighted multiple potential solutions as conventionally done in the literature (Nylund et al., 2007a,b). Model selection was based on the number of classes that minimized the information criteria, provided a high entropy index and had conceptual interpretation (Celeux and Soromenho, 1996; Contractor et al., 2017; Nylund et al., 2007a,b).

Measurement invariance (MI) across groups was assessed via two approaches, to determine if the same subgroups of symptoms were evident across sex and ethnicity (Byrne et al., 1989; Jöreskog, 1971; McCutcheon, 1987; McCutcheon and Hagenars, 1997; Meredith, 1993). First, we compared latent class solutions across various nested models: a full sample model and a series of models where some group parameters are set to zero. Second, we conducted Likelihood Ratio tests on the difference of the G^2 statistics between a grouped model where the item response probabilities were set to equal across groups, and a grouped model where the item response probabilities were free to vary across groups (Kankaras et al., 2010). A significant test statistic indicates that the larger model with freely estimated item response probabilities yields a better fit than the restricted model, providing evidence against measurement invariance.

Missing values for descriptive variables (i.e., sex, age, ethnicity, etc) were less than 1% and were imputed using assignment and hot deck approaches by NIAAA prior to making the data available for researchers (Grant et al., 2003). Missing data (i.e., “Unknown”) for the 25 dichotomous items analyzed via LCA were less than 0.5% for all items, with the exception of depressed mood and anhedonia, which had 1.9 and 2.2% missing, respectively. This level of missingness is considered inconsequential and (Bennett, 2001) and these values were placed in the

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