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Admixture analysis of the diagnostic subtypes of social anxiety disorder: Implications for the DSM-V

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ABSTRACT

Background and objectives: Much controversy exists regarding diagnostic subtypes of social anxiety disorder (SAD). The present study used admixture analysis to examine whether individuals with generalized and nongeneralized SAD belong to the same or different populations of origin. This can inform diagnostic subtyping of SAD in the forthcoming DSM-V.

Methods: Treatment-seeking individuals with generalized SAD ($n = 154$) and nongeneralized SAD ($n = 48$) completed a battery of questionnaires. Based on participants' responses to the Liebowitz Social Anxiety Scale (LSAS), we estimated log likelihood and chi-square goodness-of-fit for models with 1, 2, 3, or 4 populations of origin, and compared models using forward stepwise estimation and maximum likelihood ratio tests.

Results: Admixture analyses suggested that the two diagnostic subtypes of SAD belong to the same underlying population of origin. In addition, observable differences in depression, general anxiety, and comorbidity were no longer significant when controlling for social anxiety severity.

Limitations: Our sample was recruited in the U.S. and was a treatment-seeking sample. Future studies should examine whether our results generalize to different cultures, and community samples.

Conclusions: Support for qualitative differences between SAD subtypes was not found. Rather, our findings support the notion that the diagnostic subtypes of SAD differ quantitatively, and that SAD exists on a continuum of severity. This finding informs diagnostic subtyping of SAD in the forthcoming DSM-V.

1. Introduction

Individuals with social anxiety disorder (SAD) fear and avoid diverse social situations. The DSM-IV instructs clinicians to assign a "generalized" subtype of SAD if "fears include most social situations" (APA, 1994, p. 417). Although the DSM does not define the residual category of SAD, many researchers and clinicians have referred to individuals who do not fulfill the criterion above as belonging to the "nongeneralized" or "specific" subtype (e.g., Heimberg, Holt, Schneier, Spitzer, & Liebowitz, 1993; Hofmann, Newman, Ehlers, & Roth, 1995; Hook & Valentiner, 2002). As the DSM definition does not set clear quantitative criteria, several operational definitions for SAD subtypes have been suggested (for a review see Hofmann, Heinrichs, & Moscovitch, 2004). Consistent with previous reviews (Blöte, Kint, Miers, & Westenberg, 2009; Hofmann et al., 2004; Hook & Valentiner, 2002) as well as the DSM definition, we will distinguish between individuals who have fears pertaining to most social situations (generalized subtype) and the residual subgroup of individuals who fear fewer situations (nongeneralized subtype).

Much controversy exists regarding the nature of the difference between the two diagnostic subtypes of SAD. Some researchers view these subtypes as representing different points on a continuum of social anxiety severity (Hofmann, 2000; Rapee, 1995; Rapee & Spence, 2004; Stein, Torgrud, & Walker, 2000; Vriends, Becker, Meyer, Michael, & Margraf, 2007). In contrast, others have argued for qualitative differences between the subtypes and view them as distinct disorders that are associated with differences in diagnostic comorbidity, etiology, and the type of feared situations (Carter & Wu, 2010; Hook & Valentiner, 2002; Knappe et al., 2011).

The empirical evidence regarding the quantitative and qualitative views of SAD subtypes is equivocal. Some studies reported

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differences in the demographic profile of individuals with generalized and nongeneralized SAD (Brown, Heimberg, & Juster, 1995; Heimberg, Hope, Dodge, & Becker, 1990; Levin et al., 1993), whereas other studies found no such differences (Herbert, Hope, & Bellack, 1992; Hofmann & Roth, 1996; Holt, Heimberg, & Hope, 1992; Mannuzza et al., 1995; McNeil et al., 1995). Similarly, some authors found that individuals with generalized SAD have more comorbid disorders compared to individuals with nongeneralized SAD (Holt et al., 1992; Mannuzza et al., 1995; Turner, Beidel, & Townsley, 1992), whereas another study reported that these differences disappeared after controlling for the number of feared situations (El-Gabalawy, Cox, Clara, & Mackenzie, 2010). It has further been reported that the generalized subtype is associated more with fear of interpersonal situations, whereas the nongeneralized subtype is associated more with fear of performance situations (Cox, Clara, Sareen, & Stein, 2008; Stemberger Turner, Beidel, & Calhoun, 1995). However, other studies did not find the type of social fears to differentiate between the two subtypes (e.g., Stein et al., 2000), supporting a dimensional structure (Furmark, Tillfors, Stattin, Ekselius, & Fredrikson, 2000; Kollman, Brown, Liverant, & Hofmann, 2006). Finally, some studies found the generalized subtype to be less responsive to treatment compared to the nongeneralized subtype (Brown et al., 1995), whereas others found it to be more responsive (Marom, Gilboa-Schechtman, Aderka, Weizman, & Hermesh, 2009) and still others have found no differences (Stein, Stein, Goodwin, Kumar, & Hunter, 2001; for a comprehensive review, see Hofmann et al., 2004).

A complicating issue in the interpretation of the results from the SAD subtype literature is that finding differences between subtypes can be consistent with either a qualitative or a quantitative view. For instance, individuals with the generalized subtype have been found to report fewer positive thoughts and more negative thoughts during an interpersonal task compared to individuals with the nongeneralized subtype (Beazley, Glass, Chambless, & Arnkoff, 2001). This may be due to either qualitatively distinct cognitive processes or quantitatively greater social anxiety severity. In order to effectively juxtapose the two views, it is imperative to control for social anxiety severity and examine whether differences remain (e.g., El-Gabalawy et al., 2010). A qualitative distinction is likely if differences remain after accounting for severity of social anxiety. Alternatively, differences that are in the reverse direction assumed by the quantitative view (e.g., individuals with nongeneralized SAD endorsing a certain social fear to a greater extent compared to individuals with generalized SAD) would also provide support for a qualitative view (Hook & Valentiner, 2002).

In the present study, we used a novel statistical technique to examine SAD subtypes in a large treatment-seeking population. Specifically, we used admixture analysis, which examines whether a sample distribution is likely derived from one or more normally distributed populations of origin (Delorme et al., 2005; Kolenikov, 2001). Admixture analysis has advantages compared to both cluster analysis and taxonomic analysis. Cluster analysis is a non-inferential technique that examines groups of individuals on the sample level. In contrast, admixture is an inferential technique that examines groups on the population level. Taxonomic analysis examines whether latent structures are more likely taxonic or dimensional by generating simulated sample data that is compared to real data (Meehl, 1999). In contrast, admixture provides the means and standard deviations of the population distributions that are most likely to generate the data (Kolenikov, 2001).

In the context of SAD, admixture can determine if social anxiety symptoms among individuals with the generalized and nongeneralized subtypes are the product of a single population of origin, thus supporting the quantitative view, or the product of two or more populations of origin, thus supporting the qualitative view. A single population of origin is inconsistent with the qualitative view as it posits that the subtypes are two distinct disorders. To our knowledge, this is the first study to examine SAD subtypes using admixture analyses. We also examined whether the observed differences between the subtypes can be accounted for by levels of social anxiety (supporting the quantitative view) or if differences remain after controlling for social anxiety (supporting the qualitative view). Finally, we examined whether individuals with the nongeneralized subtype would endorse certain social fears to a greater degree than individuals with the generalized subtype as some studies suggest (Cox et al., 2008; Hook & Valentiner, 2002; Stemberger et al., 1995).

2. Material and methods

2.1. Participants

The sample included 202 individuals with SAD who sought treatment at the Center for Anxiety and Related Disorders in Boston (CARD). In order to determine whether the existing DSM subtype recommendations were useful, patients were categorized into subcategories consistent with DSM guidelines. Specifically, when diagnosing generalized vs. specific SAD, the number of feared situations, the domains of fears (e.g., interpersonal, performance), and the domains in which the fears result in clinical levels of impairment were taken into account. Of the total sample, 154 (76.2%) were diagnosed with the generalized subtype and 48 (23.8%) were diagnosed with the nongeneralized subtype. Diagnoses of SAD subtypes were based on a structured clinical interview without reference to self-report questionnaires. Table 1 presents

Table 1
Demographic and pre-treatment clinical measures.

	Generalized subtype ($n = 154$)	Nongeneralized subtype ($n = 48$)	Statistic	p
Gender				
Male	83 (53.9%)	27 (56.3%)	$\chi^2_{(1)} = 0.08$	0.78
Female	71 (46.1%)	21 (43.7%)		
Age (in years)	31.7 (10.2)	32.7 (8.7)	$F_{(1, 200)} = 0.36$	0.55
Marital Status				
Single	100 (64.9%)	25 (52.1%)	$\chi^2_{(4)} = 8.61$	0.07
Married	33 (21.4%)	20 (41.7%)		
Divorced	6 (3.9%)	1 (2.1%)		
Separated	5 (3.2%)	0 (0.0%)		
Other	8 (5.2%)	2 (4.1%)		
Missing	2 (1.3%)	0 (0.0%)		
Religion				
None	52 (33.8%)	12 (25.0%)	$\chi^2_{(3)} = 3.77$	0.29
Christian	77 (50.0%)	23 (47.9%)		
Jewish	8 (5.2%)	6 (12.5%)		
Other	7 (4.5%)	2 (4.2%)		
Missing	10 (6.5%)	5 (10.4%)		
Education				
Less than high school	49 (31.8%)	7 (14.5%)	$\chi^2_{(4)} = 7.69$	0.10
High school	10 (6.5%)	2 (4.2%)		
Associates degree	63 (40.9%)	29 (60.4%)		
Bachelors degree	30 (19.5%)	9 (18.8%)		
Graduate degree	1 (0.6%)	0 (0.0%)		
Missing	1 (0.6%)	1 (2.1%)		
LSAS	45.7 (17.1)	78.0 (21.6)	$F_{(1, 200)} = 89.8$	<0.001
BDI	12.4 (8.7)	5.8 (4.5)	$F_{(1, 103)} = 13.2$	<0.001[a]
STAI-T	55.7 (10.2)	45.2 (10.5)	$F_{(1, 185)} = 33.9$	<0.001[a]
Comorbidity	118 (76.6%)	22 (45.8%)	$\chi^2_{(1)} = 16.31$	<0.001[a]

Note. LSAS = Liebowitz Social Anxiety scale; BDI = Beck Depression Inventory; STAI-T = State-Trait Anxiety Inventory, Trait Subscale.

[a] Becomes non-significant when controlling for LSAS scores ($F_{(1, 103)} = 2.2$, $p = 0.14$, *n.s.*; $F_{(1,184)} = 2.8$, $p = 0.10$, *n.s.*; Wald statistic = 2.2, $df = 1$, $p = 0.14$, *n.s.*, for BDI, STAI-T, and comorbidity respectively).