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Delineation of differential temporal relations between specific eating and anxiety disorders

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ABSTRACT

This study examined the temporal sequencing of eating and anxiety disorders to delineate which anxiety disorders increase eating disorder risk and whether individuals with eating disorders are at greater risk for particular anxiety disorders. The sample was drawn from the Oregon Adolescent Depression Project. Temporal relations between specific eating and anxiety disorders were examined after controlling for relevant variables (e.g., mood disorders, other anxiety disorders) over 14 years. After excluding those with anorexia nervosa (AN) in adolescence (T1), OCD was the only T1 anxiety disorder to predict AN by age 30 (T4). No T1 anxiety disorder was associated with T4 bulimia nervosa (BN). Although T1 AN did not increase risk of any T4 anxiety disorder, T1 BN appeared to increase risk for social anxiety and panic disorders. Evidence that eating disorders may have differential relations to particular anxiety disorders could inform prevention and treatment efforts.

1. Introduction

There are high rates of comorbidity between anxiety and eating disorders. To illustrate, 55–60% of those with anorexia nervosa (AN) and 57–68% of people with bulimia nervosa (BN) have experienced an anxiety disorder (Bulik et al., 1997; Kaye et al., 2004). Relatives of those with AN also have a higher prevalence of anxiety disorders compared to relatives of controls (Strober et al., 2007). Further, eating disorders (ED) and anxiety disorders may share a genetic link (Keel et al., 2005; Kendler et al., 1995; Rowe et al., 2002; Silberg and Bulik, 2005). There may also be differential relations between particular anxiety disorders and particular ED. For instance, compared to individuals without ED, individuals with AN exhibit higher rates of overanxious disorder (OAD), separation anxiety, panic disorder, and obsessive–compulsive disorder (OCD) whereas those with BN exhibit higher rates of OAD and social anxiety disorder (SAD) (Bulik et al., 1997).

Anxiety disorders are posited to be a risk factor for ED (Bulik et al., 1997). Yet, it remains unclear whether ED increase anxiety disorder vulnerability. The identification of sequelae to ED is not trivial because although ED risk may peak in adolescence and early 20's (Heatherton et al., 1997) individuals with ED may be vulnerable to developing other types of psychopathology such as anxiety disorders.

We know of no studies directly testing whether particular anxiety disorders are in fact risk factors for ED and whether particular ED increase anxiety disorder risk. Garber and Hollon (1991) outline three criteria for causal attribution that have traditionally been recognized in psychopathology risk research. First, the proposed risk factor must be correlated with the outcome. Second, the proposed risk factor must demonstrate temporal precedence. Third, the relation between the risk factor and outcome variable must be non-spurious (i.e., not due to a third variable or set of variables).

1.1. Risk criterion 1: review of co-occurrence data

Data suggest some particular anxiety disorders appear to co-occur with specific ED. Although there is some data suggesting OCD is related to BN (e.g., Hudson et al., 2007), it has more consistently been linked to AN (Bulik et al., 1997; Deep et al., 1995; Fahy et al., 1993; Godart et al., 2003; Godart et al., 2000; Rastam et al., 1995; Thornton and Russell, 1997). Concerning SAD, although some data suggest SAD can co-occur with AN (Deep et al., 1995; Godart et al., 2003, 2000; Kaye et al., 2004; Lilenfeld et al., 1998), SAD appears more consistently related to BN. Not only does SAD tend to be comorbid with BN (Brewerton et al., 1995; Godart et al., 2000; Schwalberg et al., 1992), lifetime prevalence of SAD occurs more frequently in BN patients than AN (restrictive subtype) patients (Iwasaki et al., 2000). Among German in-patients, patients with BN (but not AN) reported higher levels of social anxiety than patients with anxiety disorders (Grabhorn et al., 2006). Sub-clinical

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social anxiety in both patients with BN and nonclinical controls are associated with higher levels of bulimic behaviors than in-patients with AN (Hinrichsen et al., 2003). Similarly, women with BN and non-treatment seeking women with high levels of thoughts, feelings, and behaviors associated with ED scored higher in public self-consciousness and social anxiety measures than women without ED-related thoughts, etc. (Striegel-Moore et al., 1993).

Data regarding generalized anxiety disorder (GAD), on the other hand, are less consistent. Although two studies found higher rates of GAD in individuals with AN than controls (Godart et al., 2003; Walters and Kendler, 1995), another found no such difference (Rastam et al., 1995). Regarding BN, although some have noted higher rates of GAD in BN subjects than controls (Garfinkel et al., 1995; Godart et al., 2003; Kendler et al., 1991; Schwalberg et al., 1992; Zaider et al., 2002), other studies have failed to replicate this finding (Hudson et al., 1987; Lilenfeld et al., 1998). Two clinical studies found no significant differences in rates of GAD between BN and AN patients (Iwasaki et al., 2000; Kaye et al., 2004).

Individuals with AN do not appear to demonstrate greater rates of panic disorder (Halmi et al., 1991; Hudson et al., 2007; Lilenfeld et al., 1998; Rastam et al., 1995). Yet panic disorder's relation to BN is less clear. Panic disorder seems to be significantly higher among those with BN compared to controls (Bushnell et al., 1994; Garfinkel et al., 1995; Godart et al., 2003; Kendler et al., 1991; Zaider et al., 2002), yet no differences were found between patients with BN compared to patients with SAD (Schwalberg et al., 1992) or between BN and AN patients (Iwasaki et al., 2000; Kaye et al., 2004).

1.2. Risk criterion 2: review of temporal relations evidence

Little prospective work has examined the temporal sequencing of specific ED and anxiety disorders, with the majority of work in this area relying on retrospective accounts of age of onset. Regarding the contention that some anxiety disorders may increase ED risk, among patients with both AN and OCD, mean age of onset of OCD tends to be earlier than that of AN (Bulik et al., 1997; Kaye et al., 2004; Thornton and Russell, 1997), although some reports found similar age of onset of OCD and AN among patients with both disorders (Fahy et al., 1993; Godart et al., 2003). Higher social anxiety predicted higher bulimic behaviors over a 7-month period (Gilbert and Meyer, 2005). SAD age of onset tends to predate age of onset for both AN and BN among patients with SAD and an ED (Deep et al., 1995; Godart et al., 2003, 2000; Schwalberg et al., 1992). GAD was associated with increased risk for onset of ED 10 months later (Zaider et al., 2002) and GAD onset occurred prior to BN onset among patients with GAD and BN (Schwalberg et al., 1992).

Concerning the hypothesis that ED may increase anxiety disorder vulnerability, our group found that individuals with ED (AN and BN grouped together) had an elevated rate of nonaffective disorders (e.g., anxiety disorders, substance use disorders, conduct disorder) compared with a no disorder group 6 years later (Lewinsohn et al., 2000). Regarding particular anxiety disorders, panic disorder onset tends to follow that of both BN and AN (Bulik et al., 1997; Godart et al., 2003; Venturello et al., 2002). Yet, bulimia did not predict subsequent GAD or panic disorder 10 months later in an adolescent sample (Zaider et al., 2002).

Taken together, these data suggest differential temporal patterns based on type of anxiety disorder and type of ED under investigation. Specifically, these data indicate that: (1) OCD onset may predate AN onset, (2) SAD onset may predate AN and BN onset, and (3) GAD may predate BN onset among patients with co-occurring anxiety and eating disorders. Further, these data suggest AN and BN onset may predate panic disorder onset.

1.3. Risk criterion 3: review of non-spuriousness evidence

Less work has examined the non-spurious criterion regarding the link between particular anxiety disorders and specific ED. When accounting for comorbidity among the anxiety disorders, the risk for AN was significantly higher among those with OAD and OCD, whereas the risk for BN was significantly increased among those with OAD and SAD (Bulik et al., 1997). After controlling for other anxiety disorders and depression, PTSD and SAD remained significantly related to disordered eating among a sample of patients from an anxiety disorders clinic (Becker et al., 2004). When controlling for the effects of depression, the strength of observed prospective relations between baseline anxiety disorders and ED 10 months later was reduced (Zaider et al., 2002). However, Zaider and colleagues only examined the temporal relations between GAD, panic disorder, and bulimia. Further work is necessary to examine temporal relations between specific ED and anxiety disorders controlling for comorbidity between eating, anxiety, and mood disorders (Hudson et al., 2007; Kessler et al., 2005b; Lewinsohn et al., 2000; Walters and Kendler, 1995). Further, given sex differences in anxiety disorders (Lewinsohn et al., 1998) and ED rates (Hudson et al., 2007; Lewinsohn et al., 2000), it is also important to rule-out sex as a possible "third variable" that may account for the observed relations between anxiety disorders and ED. Yet, very few studies account for this variable (Hudson et al., 2007; Zaider et al., 2002).

1.4. Summary

Thus, when considered individually, results from the extant literature paint a somewhat unclear picture of whether particular anxiety disorders are associated with greater ED risk and vice versa. Yet when considered in concert, these studies begin to suggest the following. In regards to OCD, data suggest that OCD (1) is related to AN and BN, (2) tends to onset prior to AN onset in comorbid individuals, and (3) remains only significantly related to AN (not BN) in multivariate analyses. In regard to SAD, data suggest that SAD (1) is related to BN (but not necessarily AN), (2) onsets prior to BN in comorbid individuals, and (3) remains only significantly related to BN (not AN) in multivariate analyses. Concerning panic disorder, prior work suggests that panic disorder (1) is related to BN but not AN and (2) onsets following BN onset in comorbid individuals. GAD does not seem to be especially associated with either AN or BN.

However, knowledge of these relations is limited in several respects. First, little prospective work has been done, with the vast majority of studies relying on retrospective accounts of age on onset (Bulik et al., 1997; Deep et al., 1995; Fahy et al., 1993; Godart et al., 2003; Kaye et al., 2004; Thornton and Russell, 1997; Venturello et al., 2002). Second, many rely on DSM-III or III-R diagnoses (Bulik et al., 1997; Deep et al., 1995; Fahy et al., 1993; Rastam et al., 1995; Schwalberg et al., 1992; Thornton and Russell, 1997). Third, although some studies accounted for comorbidity among the anxiety disorders and between anxiety disorders and mood disorders (Becker et al., 2004; Bulik et al., 1997), most do not (Fahy et al., 1993; Godart et al., 2003; Kaye et al., 2004; Thornton and Russell, 1997). This strategy is problematic given the high rates of co-occurrence among depression with anxiety disorders (Kessler et al., 2005b) and ED (Hudson et al., 2007).

1.5. The present study

The overarching aim of the present study was to build upon prior work by further elucidating the temporal relations between specific ED and anxiety disorders using data from the Oregon Adolescent Depression Project (OADP; Goodwin et al., 2005, 2004;