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Developmental Risk Factors in Generalized Anxiety Disorder and Panic Disorder

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Abstract

Background—There is a lack of clarity regarding specific risk factors discriminating generalized anxiety disorder (GAD) from panic disorder (PD).

Goal—This study investigated whether GAD and PD could be discriminated through differences in developmental etiological factors including childhood parental loss/separation, psychological disorders, and maternal and paternal attachment.

Method—Twenty people with adult generalized anxiety disorder (GAD), 20 with adult panic disorder (PD), 11 with adult comorbid GAD and PD, and 21 adult non-anxious controls completed diagnostic interviews to assess symptoms of mental disorders in adulthood and childhood. Participants also reported on parental attachment, loss, and separation.

Results—Childhood diagnoses of GAD and PD differentiated clinical groups from controls as well as from each other, suggesting greater likelihood for homotypic over heterotypic continuity. Compared to controls, specific phobia was associated with all three clinical groups, and childhood depression, social phobia, and PTSD were uniquely associated with adult GAD. Both maternal and paternal attachment also differentiated clinical groups from controls. However, higher levels of subscales reflecting maternal insecure avoidant attachment (e.g., no memory of early childhood experiences and balancing/forgiving current state of mind) emerged as more predictive of GAD relative to PD. There were no group differences in parental loss or separation.

Conclusions—These results support differentiation of GAD and PD based on developmental risk factors. Recommendations for future research and implications of the findings for understanding the etiology and symptomatology of GAD and PD are discussed.

Keywords

generalized anxiety disorder; panic disorder; comorbidity; risk factors; development; etiology

Generalized anxiety disorder (GAD) was introduced into the Diagnostic and Statistical Manual, 3rd edition (DSM-III; American Psychiatric Association, 1980) in 1980 as a

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residual category, which could be diagnosed only if no other anxiety disorders were present. With the introduction of the revised third edition (DSM-III-R; American Psychiatric Association, 1987), the residual status of GAD was dropped. Thus, individuals who met criteria for both GAD and another anxiety disorder could be diagnosed as having both disorders. Criteria were also expanded to redefine excessive and unrealistic worry as a primary symptom, and the required duration of symptoms increased from one to 6 months. In DSM-IV (American Psychiatric Association, 1994), symptoms of autonomic hyperactivity were removed based on findings that people with GAD experienced more symptoms of central nervous system hyperactivity (e.g., motor tension; Anderson, Noyes, & Crowe, 1984). In addition, the central feature of GAD was defined as excessive and uncontrollable worry about a variety of situations. The criteria have stayed the same in DSM-5 (American Psychiatric Association, 2013).

Despite its official status as a stand-alone diagnosis, there continues to be discussion of whether GAD is truly a separate disorder or instead could be combined with depression or other anxiety disorders such as panic disorder (PD). With respect to PD, this viewpoint is due to strong concurrent and sequential comorbidity between GAD and PD. For example, in epidemiological studies, PD was one of the most highly comorbid disorders with GAD, with comorbidity rates ranging from 55 to 94% (Goldenberg et al., 1996; Jacobi et al., 2004). In addition, whereas principal diagnosis of either GAD or PD substantially increased the odds of comorbidity with the other disorder, neither principal diagnosis increased the odds of comorbid major depression (Brown, Campbell, Lehman, Grisham, & Mancill, 2001). Among all anxiety disorders, only adult PD and GAD prospectively predicted each other over a 3-year period (Grant et al., 2009). Similarly, small but significant percentages of PD clients met GAD criteria before the first panic attack (Fava, Grandi, Rafanelli, & Canestrari, 1992). Some theories suggest that the high overlap is due to a common higher-order factor (i.e., negative affect) that cuts across anxiety and mood disorders (e.g., Barlow, Allen, & Choate, 2004). However, the disorders still have unique features (e.g., uncontrollable worry for GAD; unexpected panic attacks for PD). Thus, it is important to examine and clarify the extent of differentiation between these disorders.

One way to differentiate GAD and PD is to compare them on incidence and types of anxiety disorders experienced in childhood. In an early study on this topic, chronic anxiety in childhood was more likely to predict PD than GAD (Torgersen, 1986). Similarly, childhood overanxious disorder predicted adolescent PD but not GAD (Bittner et al., 2007), and in the same dataset childhood overanxious disorder predicted young adulthood GAD and PD, but was more likely to predict PD (Copeland, Shanahan, Costello, & Angold, 2009). In other data, however, adolescent GAD was more likely to predict subsequent GAD than PD and vice versa one year later (Ferdinand, Dieleman, Ormel, & Verhulst, 2007). Similarly, in a study on homotypic continuity within disorders, 83.3% of cases of PD and 88.9% of cases of GAD diagnosed after age 21 had been previously diagnosed at either ages 11, 13, 15, or 18 (Newman et al., 1996). Likewise, in juvenile offenders first diagnosed at ages 15–21, there were high rates of the same disorder at age 26 (93.3% GAD and 90.4% PD; Kim-Cohen et al., 2003).

Nonetheless, these studies had several limitations. For example, Torgerson (1986) failed to provide an operational definition for chronic anxiety, which may have incorporated any childhood anxiety disorder. Two of these studies used different DSM criteria for the diagnosis of children and adolescents (DSM-III), young adults (DSM-III-R) and adults (DSM-IV) (Bittner et al., 2007; Copeland et al., 2009). In addition, Ferdinand et al. (2007) used a self-report diagnostic measure with only a one-year assessment interval. Also, many of the above studies did not assess childhood GAD but only overanxious disorder, and studies have found little overlap between the criteria of the two disorders (e.g., Costello, Egger, & Angold, 2005). Furthermore, Newman et al. (1996) used DSM-III-R criteria and neither Newman et al. nor Kim-Cohen computed % of prior diagnoses of PD when assessing GAD or of GAD when assessing PD.

Another means to differentiate GAD from PD is to compare them on childhood adversity. Both DSM-III and DSM-III-R PD were associated with early maternal separation and/or parental divorce compared to controls (Bandelow et al., 2002; Tweed, Schoenbach, George, & Blazer, 1989). These relationships were not found with other anxiety disorders including GAD in one of these studies (Tweed et al., 1989). In other data, however, both DSM-III-R PD and GAD were associated with father's death in childhood (Kessler, Davis, & Kendler, 1997). To complicate the picture further, most studies using DSM-IV criteria examined anxiety disorders more broadly with inconsistent results. Whereas parental loss/separation was significantly associated with anxiety disorders in some studies (Canetti et al., 2000), others found only partial support (Cohen et al., 2006) or lack of support for the association (Green et al., 2010). In the few studies that focused on specific anxiety disorders, parental death/separation in childhood did not predict adolescent GAD/OAD (Shanahan, Copeland, Costello, & Angold, 2008), and parental divorce was not associated with adult GAD or PD (Spinoven et al., 2010). However, Shanahan and colleagues (2008) did not assess PD and used diagnostic status at age 16 as an outcome. Therefore, replication using adulthood diagnoses is warranted. In addition, Spinoven and colleagues (2010) only assessed parental divorce, but not parental death. There is preliminary evidence for specificity in the association between anxiety diagnosis and types of parental loss, with DSM-III-R GAD associated with parental separation and DSM-III-R PD associated with parental death (e.g., Kendler, Neale, Kessler, Heath, & Eaves, 1992).

Insecure attachment in childhood is an additional putative risk factor for developing anxiety disorders. Bowlby (1973) theorized that when parents are either inconsistently responsive or consistently unresponsive to children's distress, children develop insecure attachment as a precursor for anxiety disorders. Insecure attachment includes avoidant (distancing from caregivers), anxious-ambivalent (clinging to caregivers excessively and displaying anger upon rejection), and disorganized (exhibiting inconsistent attachment behaviors) styles. Relative to controls, Both GAD and PD were separately found to be associated with insecure attachment styles (Cassidy, Lichtenstein-Phelps, Sibrava, Thomas, & Borkovec, 2009; Muris, Mayer, & Meesters, 2000). However, when compared directly, whereas both ambivalent and avoidant attachment predicted PD, only ambivalent attachment predicted GAD (Muris, Meesters, van Melick, & Zwambag, 2001). In another study, disorganized attachment was associated with PD, but not GAD (Brumariu & Kerns, 2010b). However, both latter studies used child or adolescent samples (10-14 years old) and relied on self-

report questionnaires to assess anxiety symptoms. It remains an empirical question whether the patterns of specificity generalize to an adult clinical sample.

Other limitations of past attachment studies are that most of them focused on children's relationships with mothers, ignoring fathers' role (for a review, see Brumariu & Kerns, 2010a). Data show that maternal variables are not more important in predicting developmental outcomes than father variables. Fathers appear to make unique contributions to children's emotional development independent of mothers' influence (Grossmann, Grossmann, Fremmer-Bombik, Kindler, & Scheuerer-Englisch, 2002). Some studies also found that children's relationship with fathers may have greater predictive power in determining long-term mental health outcomes relative to relationship with mothers (Summers, Forehand, Armistead, & Tannenbaum, 1998). Thus, there is a need to examine individuals' attachment to both parents.

The present study addressed methodological limitations of previous studies. We compared young adults with GAD and PD on adult and child diagnoses using DSM-IV criteria to extend previous studies relying on earlier diagnostic criteria as well as those that failed to compare the two disorders directly. In addition, both current and past diagnoses in adulthood were assessed to address sequential comorbidity. Structured clinical interviews, the gold-standard diagnostic tool, were used to ensure validity of diagnoses. We also assessed childhood risk factors including parental death/separation and attachment. The study sample included non-anxious controls and a comorbid GAD-PD group in addition to GAD and PD groups to parse out etiological factors associated with GAD and PD more precisely. In addition, a dimensional measure of childhood attachment assessed for both mother and father figures to examine potential differences in their effects. We predicted that these variables would distinguish adult GAD and PD.

Method

Participants

Seventy-two undergraduate students were recruited: 20 (19 female) who met DSM-IV criteria for past or present GAD in adulthood (since age 18), 20 (15 female) with past or present adult PD, 11 (9 female) with past or present adult GAD and PD, and 21 (16 female) without any adult diagnoses.

In forming the adult GAD and PD groups, we did not exclude participants who had experienced some adult symptoms of the other disorder. However, neither group contained participants with adult subthreshold symptoms (defined as all but 1 symptom). Ages ranged from 18 to 41 years with a mean of 21 years ($SD = 3.56$). Sixty of the 72 participants (83.3%) defined themselves as Caucasian, six (8.4%) as Asian-American, five (6.9%) as African-American, and one (1.4%) as Hispanic/Latin-American. Fisher's exact tests showed no differences between the four groups on the distribution of gender and ethnicity. An ANOVA also revealed no group differences in age.

Measures

The GAD-Q-IV (Newman et al., 2002) is a 9-item self-report scale based on DSM-IV criteria for GAD. It has high internal consistency ($\alpha = .94$), convergent and divergent validity, and moderate 2-week -retest reliability (Newman et al., 2002). Kappa agreement between the GAD-Q-IV and a structured diagnostic interview reached .67 (Newman et al., 2002). It can be scored either continuously or categorically based on DSM-IV criteria. Categorical scoring was used for initial selection of participants in this study (Newman et al., 2002).

The PDSR (Newman, Holmes, Zuellig, Kachin, & Behar, 2006) is a 22-item self-report questionnaire based on DSM-IV criteria for panic disorder. The measure has high internal consistency ($\alpha = .96$), good retest reliability as well as discriminant and convergent validity (Newman et al., 2006). Kappa agreement between the PDSR and a structured interview was .93, supporting validity of the measure (Newman et al., 2006). In the current study, categorical scoring was used for initial selection of participants requiring them to meet DSM-IV criteria.

The Household Composition in Childhood questionnaire was created to assess presence of mother and father figures during childhood. Attachment figures were defined as a “parent, step or foster parent, grandparent, or other adult who took care of you and lived with you for some time before age 18.” Participants were asked to name their female and male attachment figures before age 18 and report whether they had sufficient contact (at least 6 months) with them between ages 3 and 12 and to complete a questionnaire assessing their relationship. They also indicated if there was a time before age 18 when they did not have at least one male or female attachment figure living with them, and if so, to explain the circumstances. This measure was not used as a selection device, but as a means to assess familial loss through death or separation.

Current, past adulthood, and childhood mental disorders were assessed using two structured clinical interviews based on DSM-IV criteria: the Anxiety Disorders Interview Schedule-IV Lifetime Version (ADIS-IV-L; Di Nardo, Brown, & Barlow, 1994) and a modified version of the Anxiety Disorders Interview Schedule, IV, for Children, Parent Version (ADIS-IV-C/P; Silverman & Albano, 1996). The ADIS-IV-L assessed current and past DSM-IV disorders in adults since age 18. It has good to excellent levels of inter-rater reliability (Brown, Di Nardo, Lehman, & Campbell, 2001).

The ADIS-IV-C/P is viewed as the “premier instrument” for assessing anxiety in childhood and adolescence (e.g., Stallings & March, 1995). Inter-rater and retest reliabilities were high for both the child and parent versions (Lyneham, Abbott, & Rapee, 2007; Silverman, Saavedra, & Pina, 2001). For the purpose of this study, modules on the ADIS-IV-C/P were revised to address “you” (the subject) instead of “your child” to ask participants to report on symptoms they experienced before the age of 18. This modified parent interview was employed because its questions are geared toward child expression of symptoms. Such an investigator-based approach has been suggested as a means to increase reliability of retrospective reports by providing explicit recognition cues (Brewin et al., 1993). All interviews using the ADIS-IV-L and ADIS-IV-C/P were audiotaped, and later a separate

blind assessor rescored a randomly selected subsample of 31 participants (43% of the sample). Inter-rater reliability for both adult and child GAD and PD diagnoses was high with kappa values ranging from .71 to 1.

The Perception of Adult Attachment Questionnaire (PAAQ; Lichtenstein & Cassidy, 1991) is a 60-item measure rated on a 5-point Likert scale from “strongly disagree” to “strongly agree.” It assesses two aspects of attachment: perception of early childhood experiences with a primary caregiver (usually mother) and current state of mind with respect to attachment. Perceptions of childhood relationships with a caretaker are assessed on three dimensional scales: rejection/neglect, being loved, and role-reversal/enmeshment. Current state of mind is assessed on five scales: vulnerable, balancing-forgiving, angry, dismissing/derogating, and lacking in memory. The PAAQ items were drawn from the Adult Attachment Interview (AAI; George, Kaplan, & Main, 1985/1996), considered the gold standard assessment of adult attachment, and PAAQ subscales showed significant correlations with AAI subscales (Lichtenstein & Cassidy, 1991). The PAAQ subscales map onto the two-dimensional model of insecure attachment in adults (Brennan & Shaver, 1998). Dismissing/derogating and lacking in memory subscales map onto avoidant attachment whereas angry, vulnerable, and role-reversal/enmeshment map onto anxious-ambivalent attachment. The scales were shown to have good retest reliability ($r = .64-.86$; Lichtenstein & Cassidy, 1991) and high internal consistency with alpha coefficients ranging from .62 (dismissive) to .90 (no memory) in a college student sample. We adapted the PAAQ to create separate versions for father and mother.

Procedure

This study was approved by the IRB, and all participants consented to participate. Participants were recruited from introductory and advanced psychology classes at a rural state university for extra credit. As part of a mass screening, those from introductory classes completed the GAD-Q-IV, PDSR, Household Composition Questionnaire, and a questionnaire asking about interest in being referred for free psychotherapy. Those from advanced psychology classes completed the same screening measures verbally via phone screen. They were invited to participate if they met criteria for GAD on the GAD-Q-IV, met criteria for PD on the PDSR, or did not meet criteria for either. To be recruited for clinical groups, participants were also required to be interested in being assessed for an anxiety disorder with the potential of being referred for free treatment. Those who agreed to participate were interviewed by a trained doctoral student using the ADIS-IV-L and the modified ADIS-IV-C/P. The interview took place in a private room. Current or past adult ADIS-IV-L diagnoses of PD and GAD since the age of 18 were used to assign participants to one of four groups (GAD, PD, comorbid GAD-PD, and non-disordered controls). PD and agoraphobia were coded as separate disorders to be consistent with DSM-5 criteria. Participants returned to the lab approximately a week after the interview to complete the PAAQ. Participants were debriefed and received class credit for participation.

Results

Data-Analytic Approach

Missing Data. One person in the mixed GAD-PD group had missing data for the PAAQ. In addition, two people in the GAD group and one person in the control group did not complete the father version of the PAAQ due to absence of a father figure. One participant in the control group did not complete the mother version of the questionnaire due to absence of a mother figure. This led to 2.8% of missing data for the mother version of the PAAQ and 5.6% of missing data for the father version of the PAAQ.

Little's Missing Completely at Random (MCAR) test (Little, 1988) was used to examine randomness in missing data, and was not significant [$\chi^2(64) = 63.56, p = .49$], indicating MCAR. When the MCAR assumption is met and a small portion of data are missing, a single imputation using the expectation-maximization (EM) method provides unbiased parameter estimates and enhances statistical power of analyses (Enders, 2001). Based on the recommendation of Enders (2001), missing data were imputed using the EM method in SPSS 22.

Data Analytic Strategy. We used Fisher's exact tests to determine group differences in comorbidity, adulthood and childhood disorders, and parental loss and separation. Initially all 4 groups were compared. Only when group differences were significant, we conducted follow-up pairwise bonferroni corrections to protect for family-wise error rates (adjusted $\alpha = .05/6 = .008$). In addition, transition probabilities based on the Markov model (Fergusson, Horwood, & Lynskey, 1995) were examined to determine changes from childhood GAD/PD to adulthood GAD/PD. Multinomial logistic regressions compared how well attachment variables (PAAQ subscales) predicted group membership (GAD, PD, mixed GAD-PD, controls). In order to examine differences between each group, multinomial logistic regressions were run with 3 different reference groups (GAD group, PD group, and Mixed GAD-PD group).

Comorbidity in Adulthood

There were significant group differences in comorbidity with the following disorders: social anxiety disorder, depression, agoraphobia, and specific phobia. The GAD group showed a higher prevalence rate of depression (55%) and social anxiety (45%) compared to controls (0%), $ps < .001$. The PD group also had a higher rate of depression (40%) than controls (0%), $p = .001$. In the mixed group, rates of depression (100%), social anxiety disorder (45.5%), agoraphobia (54.5%), and specific phobia (45.5%) were higher than in controls (0%), $ps < .01$. The mixed GAD-PD group also had a higher frequency of depression (100%) than the PD group (40%) and a higher frequency of agoraphobia (54.5%) than the GAD group (0%), $ps = .001$.

Childhood Psychopathology

Table 1 provides rates of childhood diagnoses for those with GAD, PD, mixed GAD and PD, and controls. Although childhood diagnoses were defined as any diagnoses occurring before age 18, mean age of onset ranged from 5.29 (separation anxiety disorder; $SD = 1.98$) to

13.90 (major depressive disorder; $SD = 2.85$) across all childhood disorders. Individuals with adult GAD were more likely to have had childhood GAD compared to those with adult PD ($p < .001$) and controls ($p < .001$). Similarly, those with adult PD were more likely to have had childhood PD compared to those with adult GAD ($p = .001$) and controls ($p = .001$). The mixed adult GAD-PD group was also more likely to have had childhood PD than the adult GAD group ($p < .001$) and controls ($p < .001$) and more likely to have had childhood GAD than the adult PD group ($p = .005$) and controls ($p < .001$). However, the mixed group did not differ from the GAD group in frequency of childhood GAD ($p = .61$) or from the adult PD group in frequency of childhood PD ($p = .27$).

Given the Fisher's exact test results supporting homotypic continuity, transition probabilities from childhood GAD/PD to adulthood GAD/PD were examined (Table 2). There was evidence for high stability in GAD/PD diagnoses from childhood to adulthood (probability of .89 to 1.00). At the same time, there was low, but non-zero probability (17 to 27%) that non-cases of childhood GAD/PD turned into adulthood GAD/PD. Overall, the transition probabilities supported homotypic continuity in both GAD and PD.

The groups also differed on rates of childhood agoraphobia ($p = .001$), depression ($p < .001$), dysthymia ($p = .007$), social phobia ($p = .002$), specific phobia ($p = .001$), PTSD ($p = .003$), and school phobia ($p = .03$). Compared to controls, all three adult clinical groups reported more childhood specific phobia (GAD group: $p = .003$; PD group: $p = .003$; mixed GAD-PD group: $p = .002$). Also contrasted with controls, the adult GAD group had higher rates of childhood depression ($p < .001$), dysthymia ($p = .003$), social phobia ($p = .006$), and PTSD ($p = .001$). The adult mixed GAD-PD group reported higher rates of childhood depression ($p = .001$), social phobia ($p < .001$), and school phobia ($p = .008$) than controls. No differences were found on rates of childhood obsessive-compulsive disorder ($p = .16$), separation anxiety disorder ($p = .28$), selective mutism (no statistics computed due to non-occurrence across groups), hypochondriasis ($p = .71$), and somatization disorder ($p = .71$; see Table 1).

Parental Loss/Separation

In the control group, one participant (5%) reported getting separated from his mother at an early age when he moved away with his father, and another (5%) reported that he never knew his father. In the GAD group, one person never knew her father (5%), and another participant's father died when she was a child (5%). There were no differences between groups in maternal ($p = 1.00$) and paternal death or separation ($p = .49$).

Childhood Attachment

Results of multinomial logistic regressions are summarized in Table 3. Based on the likelihood ratio chi-square tests, models significantly improved fit compared to the empty or intercept-only model, $\chi^2(24) = 40.13$, $p = .002$ for mother variables; $\chi^2(24) = 50.25$, $p < .001$ for father variables. Based on pseudo R^2 statistics which provide estimates of the percentage of the criterion explained by the model, the mother attachment variables accounted for 44 to 47% of the variance in predicting diagnostic status (Cox and Snell = .44, Nagelkerke = .47) whereas father variables explained 53 to 57% of the variance, (Cox and Snell = .53, Nagelkerke = .57).

In both mother and father, elevation on the dismissive scale which measures tendency to minimize the impact of childhood relationship with a caretaker predicted increased odds of having GAD compared to no disorder. Also, higher scores on no memories of childhood experiences for both mother and father predicted higher odds of having mixed GAD-PD or no disorder than PD. For mothers, higher scores on the no memory and balancing/forgiving attitudes scales also predicted an increased likelihood of having GAD compared to PD. Taken together, these results suggest that for both mother and father, scores on PAAQ subscales that mapped onto avoidant attachment were higher in the GAD group than in the PD or control groups and lower in the PD group than in the mixed, GAD, or control groups.

Lower scores on the love from father scale and higher scores on the anger toward father scale increased odds of having GAD, PD, or mixed GAD-PD relative to no disorder. Elevation on the rejection from father scale also predicted greater odds of PD than mixed GAD-PD and/or controls. Elevation on the vulnerability toward father scale predicted greater odds of mixed GAD-PD than GAD and/or controls. At the same time, higher scores on the vulnerability toward mother scale predicted a greater likelihood of having GAD alone than mixed GAD-PD. In addition, higher scores on the enmeshment/role-reversal scale for mothers predicted greater odds of mixed GAD-PD compared to GAD and controls. Taken together, these results suggest that for both mother and father models, elevations on PAAQ subscales related to anxious-ambivalent attachment were associated with all three disorder groups. Specifically, whereas love and anger scales toward father differentiated all clinical groups from controls, the rejection from father scale differentiated PD from the mixed group and controls, vulnerability toward father and enmeshment/role reversal toward mother scales differentiated mixed GAD/PD from GAD and controls, and the vulnerability toward mother subscale differentiated GAD from the mixed group.

Discussion

The goal of this study was to compare people with DSM-IV adult GAD and PD on etiological risk factors including childhood psychopathology, parental attachment, and parental death/separation. All three clinical groups were differentiated from controls and from each other based on frequencies of childhood GAD and PD. Those with adult PD and mixed GAD-PD were more likely to have had childhood PD than those with adult GAD and controls. Similarly, those with adult GAD and mixed GAD-PD were more likely to have had childhood GAD than those with adult PD and controls, suggesting specificity between the two disorders and evidence for strict homotypic continuity. Transition probabilities from childhood GAD/PD to adulthood GAD/PD showed a similar pattern, with most of childhood GAD/PD cases transitioning to the same disorder in adulthood. Most prior studies collapsed across individual anxiety disorders and examined broad homotypic continuity, but there has been preliminary support for strict homotypic continuity in GAD and PD (e.g., Copeland et al., 2009). Based on current findings, prior diagnoses of GAD and PD may be the strongest predictor of developing the disorders later.

Our data also suggested broad homotypic continuity. Childhood specific phobia was associated with adult GAD, PD, and mixed GAD-PD, differentiating them from controls. In addition, the GAD and mixed GAD-PD groups were differentiated from controls by

childhood social phobia. GAD was also differentiated from controls on childhood PTSD whereas mixed GAD-PD was differentiated on school phobia. This is consistent with previous findings of broad homotypic relationships between child and adult anxiety disorders (Bittner et al., 2007; Kim-Cohen et al., 2003; Pine, Cohen, Gurley, Brook, & Ma, 1998). Approximately half of adults diagnosed with an anxiety disorder have been diagnosed with a prior disorder, most often an anxiety disorder, before the age of 15 years (Gregory et al., 2007). In the current sample, 94% of participants in clinical groups (GAD, PD, and mixed GAD-PD) had at least one childhood diagnosis, and 90% of them had at least one childhood diagnosis of an anxiety disorder.

Another noteworthy finding was the relation between adult GAD and childhood depressive disorders. The GAD and mixed GAD-PD groups were differentiated from controls by childhood depression, and the GAD group was also differentiated from controls by childhood dysthymia. These associations were not present for the PD group, but this result is in line with previous findings of heterotypic continuity between childhood depression and adult GAD (e.g., Copeland et al., 2009; Pine et al., 1998). Such specificity is illuminating because despite much research on heterotypic continuity between depression and anxiety, there have been few studies on the relationship between depression and more than one specific anxiety disorder. In studies that collapsed across different anxiety disorders, anxiety and depression have tended to predict each other from childhood to adulthood (e.g., Moffitt et al., 2007). Given that childhood depression was associated with adult GAD, but not adult PD in the current study, it is possible that previously identified heterotypic relations with depression are more relevant to certain anxiety disorders than others. This is also consistent with greater shared genetic vulnerability to depression in GAD than in PD or specific phobia (Kendler et al., 1995). Such shared genetic vulnerability corresponds to the interpretation of heterotypic continuity as a general disease process manifesting in different forms over time. Further research is needed to replicate the current findings with a larger sample and prospective design to test whether heterotypic continuity with childhood depression is unique to adult GAD.

GAD and PD also had distinct and shared patterns of parental attachment. GAD and mixed GAD-PD were differentiated from PD by higher levels of avoidant attachment styles. For example, both groups had greater difficulty recalling childhood memories of caregiver relationships than the PD group, indicating stronger defense against attachment-related memories (Fraley, Garner, & Shaver, 2000; van IJzendoorn, 1995). Avoidant individuals engage in preemptive defense to minimize encoding and attention to attachment-related memories (Fraley et al., 2000), and this effect does not generalize to autobiographical memories unrelated to attachment experiences (Bakermans-Kranenburg & Van IJzendoorn, 1993). It is noteworthy that the PD group reported greater access to attachment memories relative to controls, GAD, and mixed groups. These results suggest potential excessive attention to attachment-related memories in PD.

Another PAAQ subscale that differentiated GAD from PD was balancing/forgiving attitudes toward mother (e.g., “Neither my mother nor myself are perfect but somehow we made it through my childhood”), with the GAD group scoring higher than the PD group. Balancing/forgiving attitudes are indicative of secure attachment, which allows an individual to

produce a coherent attachment narrative that incorporates both negative and positive experiences. However, when contextualized with elevated avoidant attachment styles in the GAD group, higher scores on balancing/forgiving attitudes may yield a different picture. Given that the GAD group showed a tendency to dismiss the importance of early attachment experiences, balancing/forgiving attitudes may be another attempt to minimize or “shrug off” the impact of early negative attachment experiences. Although seemingly beneficial, balancing/forgiving can also lead to distancing oneself from the current influence of attachment experiences.

Although avoidant attachment differentiated GAD and mixed GAD-PD from PD, all clinical groups were associated with anxious-ambivalent attachment. For instance, preoccupation with memories of attachment figures in those with PD relative to controls has been theorized as a characteristic of anxious-ambivalent attachment (van IJzendoorn, 1995). In addition, excessive negative emotions (e.g., anger) toward caretakers differentiated the PD, GAD, and mixed groups from controls. Also, higher inappropriate dependence and fear of rejection (e.g., vulnerability, enmeshment) associated with fathers differentiated mixed GAD-PD from GAD and controls. At the same time, higher inappropriate dependence on mother differentiated GAD from mixed GAD-PD. In a previous study (Cassidy et al., 2009), when compared to controls, the same three scales (anger, vulnerability, and enmeshment) were uniquely associated with GAD without comorbid PD.

These results indicate that GAD is associated with not only avoidant, but also anxious-ambivalent attachment whereas PD is associated only with anxious-ambivalent attachment. Several studies have supported the link between GAD and both avoidant and anxious-ambivalent attachment. Worry, the core symptom of GAD, was associated with both avoidant and anxious-ambivalent attachment in children (Brown & Whiteside, 2008), and GAD symptom severity differentiated avoidant and anxious-ambivalent attachment from secure attachment in adolescents (Muris et al., 2000). Currently, there is no conclusive evidence on which of the two insecure attachment styles is more predictive of the development of GAD. A longitudinal study found that about twice as many infants who had anxious-ambivalent attachment developed GAD in late adolescence compared to infants who were securely or avoidantly attached (Warren, Huston, Egeland, & Sroufe, 1997). In another dataset, avoidant attachment was more strongly associated with new onset of GAD in adults compared to ambivalent attachment, which was more predictive of the onset of depression or social anxiety disorder (Bifulco et al., 2006). One possible explanation for inconsistent findings is that there exist subgroups within GAD who identify with distinct insecure attachment styles. When GAD patients with different interpersonal styles (e.g., intrusive or nonassertive) were compared, there was a trend for group differences in dimensions of parental attachment (Przeworski et al., 2011).

There has also been support for an association between PD and both avoidant and anxious-ambivalent attachment, but the evidence is less compelling. Compared to those with secure attachment, both children and preadolescents with either avoidant or anxious-ambivalent attachment styles reported higher PD symptoms (Muris et al., 2000; Muris et al., 2001). However, these two studies used non-clinical samples. Only one study with a clinical sample found that avoidant and anxious-ambivalent attachment was higher in those with PD or PD

and agoraphobia, than in non-anxious controls (Manicavasagar, Silove, Marnane, & Wagner, 2009).

In recent meta-analyses insecure attachment was found to be a non-specific risk factor, predicting both internalizing and externalizing symptoms in children (Fearon, Bakermans-Kranenburg, Van IJzendoorn, Lapsley, & Roisman, 2010; Groh, Roisman, van IJzendoorn, Bakermans-Kranenburg, & Fearon, 2012). Nonetheless, these studies did not examine the relationship between attachment styles and specific disorders. The few studies that examined specific disorders found that insecure attachment might be more strongly associated with GAD than other disorders including PD (Kendler, Myers, & Prescott, 2000; Silove, Parker, Hadzi Pavlovic, Manicavasagar, & Blaszczyński, 1991). The current study also showed that GAD and mixed GAD-PD groups exhibited more insecure-avoidant parental attachment than the PD group. Despite the preliminary nature of the findings, future studies should examine whether avoidant attachment, especially difficulty accessing attachment memories and dismissive attitudes, is more relevant to GAD than PD.

These results also indicated a difference in the effects of maternal and paternal variables in differentiating clinical groups from controls. Overall, paternal attachment differentiated clinical groups, especially the PD group, from controls better than maternal attachment. At the same time, paternal ambivalent attachment played a stronger role for all disorders whereas maternal avoidant attachment was strongest in GAD. The different pattern of results highlights the value of examining paternal and maternal variables separately. Stronger effects of father variables in clinical groups also indicate that relationship with father might play a more decisive role in the etiology of adult anxiety disorders, consistent with a review of the literature (Bögels & Phares, 2008). The differential results with mother versus father variables also have implications for prior inconsistent findings. Some studies have found a greater association between maladaptive parenting and GAD compared to PD (e.g., Silove et al., 1991) whereas others have found worse childhood relationship with parents in PD than in GAD (e.g., Noyes et al., 1992). In the current study, insecure attachment with mother was more strongly associated with GAD and mixed GAD-PD than PD. It is possible that previous discrepant findings were due to examining parental influences globally, which could have obscured the contribution of respective parents.

The current findings have several clinical implications. First, it is possible that identification of developmental risk factors may facilitate prevention of adult GAD and PD. Given childhood GAD/PD's association with later same diagnoses in adulthood, these disorders should be targeted for early assessment and intervention. In addition, history of childhood anxiety may lead to different symptom presentations within adult GAD/PD. One study (Pollack, Otto, Sabatino, & Majcher, 1996) found that adult PD patients with childhood anxiety had higher rates of comorbid anxiety and depressive disorders and greater avoidance than those without childhood anxiety although both groups did not differ in treatment response. The current finding of maternal avoidant attachment differentiating GAD and PD is also noteworthy because avoidant attachment has been shown to predict poor treatment outcome (Horowitz, Rosenberg, & Bartholomew, 1993) and treatment-interfering behaviors such as not seeking or complying with treatment and rejecting treatment providers (e.g., Dozier, 1990). This may explain the fewer number of patients who remain improved after

treatment in GAD than PD (Westen & Morrison, 2001). Treatment outcome for GAD may improve with inclusion of interventions focusing on interpersonal and emotional processing, which have been shown to enhance outcome for avoidantly attached individuals with GAD (Newman, Castonguay, Jacobson, & Moore, 2015).

Although transdiagnostic approaches to diagnosis and treatment emphasize common underlying vulnerabilities shared across psychological disorders, our findings of strict homotypic continuity and distinctions between GAD and PD suggest that specific anxiety disorders should not necessarily be conceptualized as the same taxonomic constructs. Most transdiagnostic treatment protocols include disorder-specific elements such as tailoring exposure based on specific fear cues. Relatedly, others have noted (e.g., Rector, Man, & Lerman, 2014) that transdiagnostic approaches are complementary rather than contrasting to disorder-specific assessment and treatment. Our findings provide additional evidence that it is still important to examine and clarify diagnostic differentiation between highly comorbid disorders such as GAD and panic disorder.

It is important to note several study limitations. Childhood psychopathology and attachment to parents were assessed through retrospective reports. There is a concern that retrospection can lead to inaccurate or biased reports. Nonetheless, empirical evidence supports the validity and reliability of retrospective reports of childhood experiences in clinical samples (Brewin, Andrews, & Gotlib, 1993). When assessed over a 5-year period, retrospective reports of childhood experiences demonstrated moderate to high cross-time reliability (Yancura & Aldwin, 2009). In addition, memories of early experiences with parents were highly stable over time and mood-independent. This effect was replicated in a community sample as well as in individuals with social phobia (Gerlsma, Kramer, Scholing, & Emmelkamp, 1994) or depression (Gerlsma, Das, & Emmelkamp, 1993). In both clinical samples, retrospective reports on relationship with parents remained consistent over time despite significant improvements in anxiety and depressive symptoms. Such findings indicate that it is unlikely that participants' current symptomatology biased their reports. In addition, to assess childhood psychopathology, the current study employed structured diagnostic interviews with questions geared toward child expression of symptoms. Such an investigator-based approach was suggested to increase reliability of retrospective reports by providing explicit recognition cues (Brewin et al., 1993).

Another limitation is that DSM-IV criteria was used in diagnosing adult and child disorders rather than DSM-5 criteria. However, it is worth noting that diagnostic criteria for GAD did not change from DSM-IV to DSM-5. In DSM-5, panic disorder was decoupled from agoraphobia, and to be consistent with this change in criteria, panic disorder and agoraphobia were coded as separate diagnoses. In addition, diagnostic criteria for childhood disorders except PTSD and OCD have remained the same except that selective mutism and separation anxiety disorder can be diagnosed in adults according to DSM-5.

The current study recruited from an undergraduate population in a rural area, and the sample consisted of mostly females and Caucasians. However, it is notable that clinical groups were recruited based on their interest in seeking treatment. Comorbidity in the clinical groups was also similar to what has been found in other studies (Kessler et al., 2005), suggesting that

our undergraduate sample was comparable to other clinical samples. In addition, female overrepresentation in the current sample was consistent with higher prevalence rates of anxiety disorders and treatment-seeking behaviors in females than males in the general population (Kessler et al., 1994). Although we recruited from a sample of young adults, the average age of onset for childhood disorders ranged from elementary school to early teen years. This indicates that despite the use of a young adult sample, childhood disorders assessed in the current study are likely to represent separate episodes of disorders, not confounded with participants' adult diagnoses. The current study also had a modest sample size which could have limited statistical power, especially in post hoc analyses. Thus, the current findings on childhood psychopathology and parental variables should be considered preliminary in nature, and warrant replication and extension with larger and more diverse samples.

In summary, the present study found that adult GAD and PD could be differentiated based on childhood psychopathology and parental attachment. Strict homotypic continuity was supported with both childhood GAD and PD predicting adult GAD and PD respectively. Adult GAD was also differentiated from controls by history of childhood depression, social anxiety disorder, and PTSD, which was not the case for adult PD. In addition, whereas anxious-ambivalent attachment to father was associated with both disorders, both maternal avoidant attachment and balancing/forgiving appeared to be a stronger risk factor for the development of GAD than PD.

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Highlights

- Compared young adults with generalized anxiety disorder (GAD), panic disorder (PD), comorbid PD and GAD and nonanxious controls on developmental etiological factors
- 72 participants in one of these 4 groups completed diagnostic interviews assessing both adult and childhood disorders and completed measures of childhood parental loss/separation, parenting behavior, and adult attachment.
- Childhood diagnoses of GAD and PD differentiated clinical groups from controls as well as from each other, suggesting greater likelihood for homotypic over heterotypic continuity.
- Specific phobia emerged as a shared risk factor for all three clinical groups, and childhood depression, social phobia, and PTSD were uniquely associated with adult GAD compared to adult PD
- Both maternal and paternal rearing behaviors and attachment also differentiated clinical groups from controls and from each other.

Table 1

Presence of Childhood Disorders as a Function of Group

Childhood Disorder	Adulthood Diagnostic Status			
	GAD (n = 20)	PD (n = 20)	Mixed (n = 11)	Control (n = 21)
GAD	15 (75%) ^{1,2}	3 (15%)	8 (73%) ^{1,2}	0 (0%)
PD	0 (0%)	9 (45%) ^{1,3}	7 (64%) ^{1,3}	0 (0%)
Major Depressive Disorder	10 (50%) ¹	5 (25%)	7 (64%) ¹	0 (0%)
Agoraphobia	0 (0%)	3 (15%)	4 (36%)	0 (0%)
Social Phobia	8 (40%) ¹	6 (30%)	7 (64%) ¹	1 (5%)
Specific Phobia	9 (45%) ¹	9 (45%) ¹	7 (64%) ¹	1 (5%)
Posttraumatic Stress Disorder	8 (40%) ¹	2 (10%)	3 (27%)	0 (0%)
Dysthymia	7 (35%) ¹	2 (10%)	3 (27%)	0 (0%)
School Phobia	4 (20%)	3 (15%)	6 (55%) ¹	2 (10%)
Obsessive-Compulsive Disorder	3 (15%)	1 (5%)	0 (0%)	0 (0%)
Separation Anxiety Disorder	3 (15%)	3 (15%)	1 (10%)	0 (0%)
Selective Mutism	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Hypochondriasis	0 (0%)	1 (5%)	0 (0%)	0 (0%)
Somatization Disorder	0 (0%)	1 (5%)	0 (0%)	0 (0%)

Note. GAD = generalized anxiety disorder, PD = panic disorder, mixed = both GAD and PD, Control = nondisordered participants.

¹ depicts significant differences from the control group;

² depicts significant differences from the PD group;

³ depicts significant differences from the GAD group

All pairwise comparisons marked with a superscript are significant after applying Bonferroni correction ($p < .008$).

Table 2
Observed Transition Probabilities from Childhood GAD/PD to Adulthood GAD/PD

		Case	Noncase
		Adulthood GAD	
Childhood GAD	Case	.885	.115
	Noncase	.174	.826
		Adulthood PD	
Childhood PD	Case	1.00	0.00
	Noncase	.268	.732

Note. Each probability is the probability of having adulthood GAD/PD conditional on the probability of having childhood GAD/PD.

Table 3

Multinomial Logistic Regression Analyses Using PAAQ Subscales

	Controls vs. GAD ¹			Controls vs. PD ²			Controls vs. Mixed ³			PD vs. GAD ²			Mixed vs. GAD ¹			Mixed vs. PD ²		
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI		
Mother Predictors																		
enmeshment	.57	.16–2.00	.49	.14–1.65	.12	.03–.62	.85	.28–2.53	4.66	1.06–20.48	3.94	.90–17.16						
vulnerability	.31	.08–1.16	.84	.25–2.80	1.35	.29–6.32	2.76	.81–9.42	.23	.05–1.03	.63	.15–2.56						
rejection	.38	.14–1.03	.45	.16–1.23	.47	.15–1.52	1.19	.54–2.59	.80	.30–2.14	.95	.35–2.58						
loved	1.26	.68–2.33	1.28	.69–2.38	1.21	.57–2.56	1.02	.58–1.79	1.04	.51–2.10	1.06	.52–2.14						
no memory	1.09	.41–2.93	3.00	1.14–7.89	.97	.31–3.04	2.75	1.08–7.02	1.13	.40–3.18	3.10	.99–9.68						
anger	1.07	.33–3.46	.49	.17–1.46	.52	.13–2.04	.46	.17–1.24	2.06	.57–7.49	.95	.28–3.27						
balancing	.24	.04–3.46	1.63	.35–7.53	.49	.06–3.80	6.85	1.37–34.14	.48	.07–3.44	3.31	.45–24.48						
dismissive	.19	.05–.79	.32	.08–1.22	.31	.06–1.76	1.64	.47–5.75	.62	.12–3.13	1.01	.20–5.19						
Father Predictors																		
enmeshment	.82	.11–5.96	3.54	.49–25.52	1.94	.22–17.47	4.33	.96–19.50	.42	.08–2.38	1.83	.36–9.33						
vulnerability	.42	.09–1.95	.26	.06–1.14	.10	.02–.66	.62	.21–1.79	4.17	1.01–17.29	2.57	.73–9.05						
rejection	.72	.32–1.62	.23	.07–.72	.11	.03–.41	1.39	.62–3.13	1.49	.58–3.79	2.07	.79–5.38						
loved	2.44	1.20–4.95	2.44	1.21–4.89	2.94	1.33–6.49	1.00	.59–1.70	.83	.44–1.57	.83	.44–1.55						
no memory	1.48	.50–4.42	3.34	1.10–10.15	1.09	.32–3.71	2.25	.93–5.49	1.36	.53–3.49	3.06	1.08–8.63						
anger	.07	.01–.41	.16	.03–.93	.12	.02–.82	2.40	.72–8.01	.56	.15–2.14	1.34	.36–5.00						
balancing	.26	.05–1.37	.23	.05–1.14	.17	.03–1.16	.87	.21–3.69	1.55	.28–8.49	1.35	.24–7.75						
dismissive	.16	.03–.94	.22	.03–1.37	.35	.05–2.78	.73	.17–3.16	.61	.12–3.15	.45	.08–2.38						

Note. PAAQ = Perceptions of Adult Attachment Questionnaire.

¹GAD as a reference group;²PD as a reference group;³Mixed GAD-PD as a reference group.Results in bold indicate $p < .05$.