Published in final edited form as:

J Anxiety Disord. 2009 December ; 23(8): 1165–1169. doi:10.1016/j.janxdis.2009.07.022.

Psychosocial predictors of the onset of anxiety disorders in women: Results from a prospective 3-year longitudinal study

Amanda W. Calkins¹, Michael W. Otto¹, Lee S. Cohen², Claudio N. Soares³, Alison F. Vitonis⁴, Bridget A. Hearon¹, and Bernard L. Harlow⁵

¹ Boston University

² Massachusetts General Hospital

³ McMaster University

⁴ Brigham and Womens Hospital

⁵ University of Minnesota

Abstract

In a prospective, longitudinal, population-based study of 643 women participating in the *Harvard Study of Moods and Cycles* we examined whether psychosocial variables predicted a new or recurrent onset of an anxiety disorder. Presence of anxiety disorders was assessed every six months over three years via structured clinical interviews. Among individuals who had a new episode of anxiety, we confirmed previous findings that history of anxiety, increased anxiety sensitivity (the fear of anxiety related sensations), and increased neuroticism were significant predictors. We also found trend level support for assertiveness as a predictor of anxiety onset. However, of these variables, only history of anxiety and anxiety sensitivity provided unique prediction. We did not find evidence for negative life events as a predictor of onset of anxiety either alone or in interaction with other variables in a diathesis-stress model. These findings from a prospective longitudinal study are discussed in relation to the potential role of such predictors in primary or relapse prevention efforts.

Women experience a high lifetime rate of anxiety disorders, with approximately 30.5% of women compared to 19.2% of men meeting diagnostic criteria based on epidemiologic studies (Alexander, Dennerstein, Kotz, & Richardson, 2007). Although much is known about state correlates of anxiety disorders, only few studies have examined the prospective emergence of anxiety disorders in population-based or clinical cohorts. It is these prospective studies that provide evidence supporting a causal role for these (risk) factors, rather than simply reflecting the impact of the anxiety disorder itself.

One potential risk factor for emergence of anxiety disorders is stress. For example, in a prospective study individuals exposed to high psychological job demands (excessive workload, extreme time pressures) were twice as likely to develop generalized anxiety disorder compared to those with low job demands (Melchior et al., 2007). Also, in a longitudinal prospective study, stress was a prospective predictor of first onset panic attacks among white collar workers

© 2009 Elsevier Ltd. All rights reserved.

Corresponding Author: Amanda W. Calkins Boston University 648 Beacon Street, 5th Floor Boston, MA 02215 617-353-9610 617-353-9609 [fax] calkins@bu.edu.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

(Watanabe, Nakao, Tokuyama & Takeda, 2005). Circumstantial evidence for the role of stress in maintaining or worsening anxiety disorders is provided by a cross-sectional study showing a link between negative life events and higher scores on the State-Trait Anxiety Inventory in college women, (Herrington, Matheny, Curlette, McCarthy, & Penick (2005). Furthermore, in panic disorder, life stress was associated with greater symptom severity (Lteif & Mavissakalian, 1995) and poorer long term outcome in cross-sectional treatment studies (Wade, Monroe, & Michelson, 1993). Additional circumstantial evidence for association of stress, greater symptom severity, and mediation of anxiety has been found in cross sectional studies of obsessive compulsive disorder, generalized anxiety disorder and social anxiety disorder (Rachman, 1997; Chorpita & Barlow, 1998; Kashdan & Steger, 2006).

In addition to possible direct effects of stress, there also is support for a diathesis-stress model involving the interaction of life stress and psychosocial risk factors. The diathesis-stress model suggests that psychopathology results from the interaction of risk factors in combination with precipitating circumstances, such as negative life events. Researchers have examined the effects of separate interactions between stress and neuroticism, assertiveness, and anxiety sensitivity. For example, Zvolensky, Kotov, Antipova, and Schmidt (2004) examined the main and interaction effects of anxiety sensitivity (the fear and preoccupation with anxiety related sensations) and exposure to negative events in predicting panic symptoms. The combination of high levels of exposure to aversive events in interaction with high anxiety sensitivity predicted panic attacks and agoraphobic avoidance. These data are consistent with the role of anxiety sensitivity in prospectively predicting the onset of panic attacks in cadets undergoing the stress of basic training (Schmidt, Lerew, & Jackson 1997).

Anxiety sensitivity also appears to be an independent predictor of anxiety, (particularly panic disorder), onset and maintenance (Ehlers, 1995; McNally, 2002; Schmidt, Lerew, & Jackson, 1997, Schmidt, Zvolensky, & Maner, 2006). Anxiety sensitivity, along with degree of avoidance was a predictor of relapse among patients examined in a prospective naturalistic follow-up study. Anxiety sensitivity also predicted first panic attacks among healthy individuals and those with simple phobias. Attention to anxiety sensitivity as a risk factor is also encouraged by evidence that it is modifiable in accordance with secondary prevention efforts (see Gardenswartz & Craske, 2001). Anxiety sensitivity has been shown to be predictive of anxiety disorder onset in a non-clinical population. For example, Schmidt, Zvolensky and Maner (2006) found anxiety sensitivity to predict the incidence of anxiety disorder diagnoses (social anxiety disorder, panic disorder, generalized anxiety disorder, and specific phobias).

In addition to anxiety sensitivity, several other psychosocial predictors have been linked to anxiety. Assertiveness has been repeatedly linked, in cross sectional studies, to anxiety severity in both clinical and non-clinical populations (Chambless, Hunter, & Jackson, 1982; Moreno-Jimenez, Rodriguez-Munoz, Moreno, & Garrosa, 2007; Reiter et al., 1991). Decreased assertiveness may be a common interpersonal challenge faced by people with anxiety as well as a contributor to greater distress when faced by interpersonal issues, and hence serve as a diathesis for more severe anxiety. Additional circumstantial support for a diathesis-stress interaction is provided by cross-sectional studies showing poorer anxiety and health outcomes among those with both high stress and low assertiveness (Moreno-Jimenez, Rodrigues-Munoz, Mereno & Garrosa, 2007). For example, in response to negative stressful events, those who were low on a measure of assertiveness showed increased social anxiety as compared to those high in assertiveness (Riso, Perez, Roldan & Ferrer, 1988).

Patients with anxiety disorders also show more neuroticism than healthy subjects (Carrera et al., 2006; Weinstock & Whisman, 2006), and several longitudinal studies have shown that high neuroticism is correlated with subsequent anxiety and depression (Gershuny & Sher, 1998;

Jorm et al., 2000), including in interaction with traumatic stress (e.g., Schnurr, Friedman, & Rosenberg, 1993), which supports a diathesis-stress model of anxiety.

In addition to these psychosocial predictors, a history of anxiety disorders is associated with risk of anxiety recurrence. Longitudinal studies have found that anxiety disorders are insidious, with a chronic clinical course, low rates of recovery, and relatively high probabilities of recurrence (.39-.58) (Brown & Barlow, 1995; Yonkers, Bruce Dyck, & Keller, 2003; Bruce et al., 2005); hence past anxiety is an effective predictor of future anxiety.

In the current study, we used participants from the Harvard Study of Moods and Cycles (Harlow et al., 1999, 2002) a prospective longitudinal study examining women in the age range of 36 to 45 years, to examine the psychosocial predictors of a new or recurrent onset of anxiety in women. More specifically, for the purpose of predicting onset of anxiety episodes we investigated the role of stressful (negative) life events considered alone and in interaction with three psychosocial variables of interest: anxiety sensitivity, assertiveness, and neuroticism. For this study we excluded women with a history of depression, as previous research has tied depression with several of the psychosocial variables of interest (Ball, Otto, Pollack, Uccello & Rosenbaum, 1995; Otto, Pollack, Fava, Uccello & Rosenbaum, 1995; Otto et al., 1997; Jain, Blais, Otto, Hirshfeld & Sachs, 1999).

We hypothesize that those who have high anxiety sensitivity would be more likely to have an onset of anxiety as previously demonstrated in research on panic and other anxiety disorders. Additionally we hypothesize that low assertiveness as well as high levels of neuroticism will predict higher rates of anxiety onset. Lastly we hypothesize that negative life events will moderate these relationships.

Method

Participants

Participants in the *Harvard Study of Moods and Cycles* were derived from a population-based cross-sectional sample of women between the ages of 36 and 45 ($M=40$), selected from seven Boston metropolitan area communities using Massachusetts Town Books (annual publications that list residents by name, age, and address according to voter precincts). After two mailings and a follow-up telephone call, 4,164 women (72%) completed screening questionnaires. From these women, two target cohorts were selected for the parent study – those with and without a life time history of depression. For the current study, only those without a lifetime history of depression were examined. From the potential sample, a total of 643 never-depressed women with no anxiety at baseline was selected for the study and only these individuals completed in-person diagnostic evaluations; these participants were followed longitudinally for 3 years following their initial assessment. This epidemiologically derived cohort was assessed every 6 months using a structured clinical interview to derive diagnoses occurring since the last assessment (for methodological details see Harlow et al., 2002).

Measures

The Structured Clinical Interview for the Diagnostic Statistical Manual for Mental Disorders [SCID; Spitzer, Williams, Gibbon, & First, 1992] is a widely used semi-structured diagnostic interview designed to assess both current and past psychopathology which was administered every 6 months. The SCID was used to assess anxiety (specific phobias were not assessed as they may be distinct from other types of anxiety) and affective disorders, alcohol and substance abuse and dependence, as well as somatization, eating disorders and psychotic disorders.

The Anxiety Sensitivity Index [ASI; Peterson & Reiss, 1992] is a 16-item self-report questionnaire that assesses fears of anxiety sensations, it was administered at baseline. Each

item is rated on a five-point Likert scale, and the total of these items serves as the primary score. It has been shown to have good reliability and validity in adult samples (Peterson & Reiss, 1992).

The NEO Five-Factor Inventory [NEO-FFI; Costa, & McCrae, 1985] is a widely used 60 item self-report measure of the Five Factor Model of personality: Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness to Experience administered at baseline. It has been shown to have good reliability and validity in adult samples. Items are scored from 0-4. In the current study, only the neuroticism scale was administered.

The Life Experience Survey [LES; Sarason, Johnson & Siegel, 1978] is a 57-item scale used to assess the occurrence and impact of various life events. Participants report whether they experienced any of a list of 57 events in the past 6 months and rate the impact of these events at the time of occurrence according to a 7-point scale. The LES was administered every 6 months during the study via packets sent by mail.

The Rathus Assertiveness Schedule [RAS; Rathus & Nevid, 1977] is a 30-item measure of assertiveness. Each item is assessed on a 6 point Likert scale from -3 (very poor) to +3 (very good appropriate). By adding positive and negative scores separately and subtracting the sums from each other, the total score of the inventory can be calculated. The RAS was administered at baseline.

Data Analysis

Cox proportional hazard survival analyses were used to examine the relationship between the variables of interest and the onset or recurrence of anxiety disorders. We examined both an age-adjusted model and a multivariate model to examine the hierarchical nature of these psychosocial variables. A survival analysis, excluding those with an onset of panic disorder, was used to examine whether anxiety sensitivity and the additional psychosocial variables would predict anxiety disorder diagnoses other than panic disorder. Finally, an additional survival analysis was run including, psychosocial variables and a stress interaction to examine the diathesis-stress prediction.

Results

Of the 643 women with no history of depression, 29 (4.5%) reported a new onset (35%) or recurrence (65%) of anxiety during the 3 year study. Recurrence was defined by meeting criteria for a disorder after being free of the disorder at baseline, among individuals with a past history of the disorder as determined by SCID interview. Anxiety disorders included in the analyses were panic disorder (N=9), social anxiety (N=9), generalized anxiety (N=7), agoraphobia (N=3) and posttraumatic stress disorder (N=1).

Main Effects

Using an age-adjusted survival analysis, we found that history of anxiety ($HR (6.51, 30.1) = 14.0, p < .0001$), anxiety sensitivity ($HR (1.06, 1.15) = 1.1, p < .0001$), and neuroticism ($HR (1.04, 1.13) = 1.1, p < .001$) were all significant predictors of a new onset of an anxiety disorder. Additionally we found trend level support for low assertiveness as a predictor of anxiety onset ($HR = .98 (0.97, 1.00), p = .07$). Negative life events was not a significant predictor of anxiety onset ($HR = 1.06 (0.86, 1.32), p = .57$). Using the multivariate model, only history of an anxiety disorder and anxiety sensitivity remained significant independent predictors ($HR = 8.04 (3.20, 20.2), p < .0001$; $HR = 1.06 (1.01, 1.11), p < .05$; respectively). Assertiveness remained a trend level independent predictor of onset of anxiety ($HR = .98 (0.96, 1.00), p = .07$). Neuroticism, and negative life events were not significant independent predictors in the multivariate model.

($HR = 1.02$ (0.97, 1.07), $p = .48$; $HR = 0.85$ (0.62, 1.17), $p = .31$; respectively) indicating redundant prediction with the other variables (see Table 1).

In a second age-adjusted survival analysis excluding participants with an onset of panic disorder, we found that history of anxiety (HR (4.66, 31.0) = 12.0, $p = .0001$), anxiety sensitivity (HR (1.05, 1.16) = 1.10, $p < .001$), neuroticism (HR (1.02, 1.14) = 1.08, $p = .01$), and assertiveness (HR (0.95, 0.99) = .97, $p = .01$), were all significant predictors of a new onset of an anxiety disorder. Negative life events was not a significant predictor of anxiety onset (HR (0.65, 1.30) = 0.92, $p = 0.63$). Using the multivariate model, history of an anxiety disorder, anxiety sensitivity, and assertiveness remained significant independent predictors ($HR = 8.35$ (2.63, 26.5), $p < .001$; $HR = 1.06$ (1.00, 1.12), $p < .05$; $HR = 0.97$ (0.94, 0.99), $p < .01$, respectively). Neuroticism, and negative life events were not significant independent predictors in the multivariate model ($HR = 1.02$ (0.96, 1.08), $p = .49$; $HR = 0.77$ (0.50, 1.19), $p = .24$; respectively) indicating redundant prediction with the other variables (see Table 2).

Interactions with Stress

Although negative life events score alone was not a predictor of the onset of an anxiety disorder, we also examined the interaction between stress and each of our variables of interest: anxiety sensitivity, assertiveness or neuroticism. Interaction between stress and these variables was represented as a product term and was examined in individual multiple regression equations that also included the main effect components of the interaction. In no case was the interaction significant ($HR = 0.75$ (0.48, 1.17), $p = 0.20$; $HR = 0.99$ (0.97, 1.02), $p = 0.70$; $HR = 0.99$ (0.96, 1.02), $p = 0.37$; $HR = 1.01$ (0.99, 1.02), $p = 0.40$).

Discussion

Consistent with previous studies indicating a chronic and waxing and waning course for anxiety disorders (e.g., Bruce et al., 2005; Brown & Barlow, 1995), we found that history of an anxiety disorder predicted recurrence in this community sample of women. Moreover, we found that anxiety sensitivity and neuroticism were prospective predictors of anxiety disorder onset/recurrence. We did not find support for negative life events as a predictor of anxiety onset or recurrence either alone or in interaction with potential risk factors as indicated by previous studies (e.g., Melchior et al., 2007; Wade et al., 1993; Watanabe et al., 2005).

This large prospective study predicted onset or recurrence of anxiety disorders over 3 years in a population of women that were older (mean age of 40) than the average age of onset for anxiety disorders (adolescence to early adulthood). Nonetheless, 34% of the episodes occurred among women who had never had an anxiety diagnosis. These data support the important role psychosocial variables can have in prospectively identifying individuals at risk for onset of an anxiety disorder. In addition, although anxiety sensitivity is particularly linked with the core fears of panic disorder (McNally, 2002, Taylor, Koch, & McNally, 1992), we found that its predictive significance extended to the onset/recurrence of other anxiety disorders as well. Also, although anxiety sensitivity shares variance with neuroticism, anxiety sensitivity was shown in the current study to be a statistically more important predictor. Anxiety sensitivity, which assesses the tendency to respond to anxiety symptoms fearfully, has been shown to be distinct from trait anxiety (responding to stress fearfully) (McNally, 1989). Hence, the more powerful prediction offered by anxiety sensitivity may be related to the specificity of the construct as compared to the more general construct of neuroticism.

In addition to the statistically significant predictors, we did find trend level support for the role of assertiveness in anxiety disorder onset/recurrence. This finding became significant when removing those who developed a panic disorder diagnosis from the analysis. This is likely due to assertiveness being more closely linked to social anxiety disorder and generalized anxiety

disorder rather than panic disorder. To our knowledge, no previous study has examined low assertiveness as a prospective predictor of an anxiety disorder, but assertiveness has been found to be important in predicting depression comorbidity among panic patients. Our finding indicating that assertiveness may play a role in other disorder onset encourages its further consideration in prospective studies, particularly those that examine individuals in the years of greater risk for onset of new disorders (e.g., late teens and 20s).

There are several limitations to the current study that are important to note. First, while the study sample comes from a large prospective longitudinal study, it is restricted to women; it is possible that men and women may differ on the degree to which psychosocial factors affect risk for an onset of an anxiety disorder. Second, the sample was intentionally restricted to those without a history of depression in order to rule out the putative confounding effect introduced by history of depression. Accordingly, our results need to be examined independently in those with a history of depression. Third, the relatively low rate of occurrence of anxiety disorders in our older cohort did not allow us to assess the specificity of predictors to certain anxiety diagnoses other than the role of anxiety sensitivity outside of panic disorder. Fourth, in examining the role of a diathesis-stress model in predicting anxiety onset, the Life Experience Survey (Sarason, Johnson & Siegel, 1978) was the only measure used. However, prospective research has shown that measures of daily hassles may be better predictors of psychological symptoms than major life events (Monroe, 1983). This may have contributed to the unexpected lack of support for a diathesis-stress model in the current study. Low power is an unlikely explanation for studies of this kind. For example, we had adequate (i.e., $>.80$) power to detect a hazard ratio of 1.7 for any 1 standard deviation variation in a potential risk factor variable. As such, we are unlikely to have missed any large main or interactive effects evident for this sample due to power limitations alone.

Our study documented the ongoing risk for relapse for individuals with a history of anxiety disorders. More importantly, we found that anxiety sensitivity was a unique predictor of anxiety disorder onset/recurrence independent of a history of anxiety. This has potential relevance in relation to relapse prevention and/or secondary prevention efforts, given evidence of successful intervention with this risk factor (Gardenswartz & Craske, 2001). One implication of these results is that the prevention programs for panic disorder originally developed and tested in a sample of college students at high risk could have a broader application (Gardenswartz & Craske, 2001). Such early identification and prevention programs have the potential to reduce the dramatic economic and social burden associated with anxiety disorders (Dupont et al., 1998).

References

- Alexander JL, Dennerstein L, Kotz K, Richardson G. Women, anxiety and mood: A review of nomenclature, comorbidity and epidemiology. *Expert Review of Neurotherapeutics* 2007;7:45–58. [PubMed: 17187496]
- Ball SG, Otto MW, Pollack MH, Rosenbaum JF. Predicting prospective episodes of depression in patients with panic disorder: a longitudinal study. *J. Consult. Clin. Psychol* 1994;62:359–365. [PubMed: 8201074]
- Brown TA, Barlow DH. Long-term outcome in cognitive-behavioral treatment of panic disorder: Clinical predictors and alternative strategies for assessment. *Journal of Consulting Psychology* 1995;63(5): 754–765.
- Bruce SE, Yonkers KA, Otto MW, Eisen JL, Weisberg RB, Pagano M, Shea MT, Keller MB. A 12-year prospective study of, generalized anxiety disorder, social phobia and panic disorder: Psychiatric comorbidity as predictors of recovery and recurrence. *American Journal of Psychiatry* 2005;162:1179–1187. [PubMed: 15930067]

- Carrera M, et al. Personality traits in early phases of panic disorder: Implications on the presence of agoraphobia, clinical severity and short-term outcome. *Acta Psychiatr Scand* 2006;114(6):417–425. [PubMed: 17087790]
- Chambless DL, Hunter K, Jackson A. Social anxiety and assertiveness: A comparison of the correlations in phobic and college student samples. *Behavior Research and Therapy* 1982;20(4):403–404.
- Chorpita BF, Barlow DH. The development of anxiety: The role of control in the early environment. *Psychological Bulletin* 1998;124(1):3–21. [PubMed: 9670819]
- Cohen S, Sherrod DR, Clark MS. Social skills and the stress-protective role of social support. *Journal of Personality & Social Psychology* 1986;50:963–973. [PubMed: 3486973]
- Costa, PT., Jr.; McCrae, RR. The NEO personality inventory manual. Psychological Assessment Resources; Odessa, FL: 1985.
- DeLongis A, Folkman S, Lazarus RS. The impact of daily stress on health and mood: Psychological and social resources as mediators. *Journal of Personality & Social Psychology* 1988;54:486–495. [PubMed: 3361420]
- Dupont RL, Rice DP, Miller LS, Shiraki SS, Rowland CR, Harwood HJ. Economic costs of anxiety disorders. *Anxiety* 1998;2:167–172. [PubMed: 9160618]
- Ehlers A. A 1-year prospective study of panic attacks: Clinical course and factors associated with maintenance. *J Abnorm Psychol* 1995;104:164–172. [PubMed: 7897040]
- Gardenswartz CA, Craske MG. Prevention of panic disorder. *Behavior Therapy* 2001;32:725–737.
- Gershuny BS, Sher KJ. The relation between personality and anxiety: Findings from a 3-year prospective study. *Journal of Abnormal Psychology* 1998;107:252–262. [PubMed: 9604554]
- Harlow BL, Cohen LS, Otto MW, Spiegelman D, Cramer DW. Prevalence and predictors of depressive symptoms in older premenopausal women: The Harvard Study of Moods and Cycles. *Arch Gen Psychiatry* 1999;56(5):418–424. [PubMed: 10232296]
- Harlow BL, Cohen LS, Otto M, Spiegelman D, Cramer DW. Demographic, family, and occupational characteristics associated with Major Depression: The Harvard Study of Moods and Cycles. *Acta Psychiatr Scand* 2002;105:209–217. [PubMed: 11939975]
- Herrington AN, Matheny KB, Curlette WL, McCarthy CJ, Jeffrey P. Lifestyles, coping resources, and negative life events as predictors of emotional distress in university women. *Journal of Individual Psychology* 2005;61:343–364.
- Jain U, Blais MA, Otto MW, Hirshfeld DR, Sachs GS. Five-factor personality traits in patient with seasonal depression: Treatment effects and comparisons with bipolar patients. *Journal of Affective Disorders* 1999;55:51–54. [PubMed: 10512606]
- Jorm AF, Christensen H, Henderson AS, Jacomb PA, Korten AE, Rodgers B. Predicting anxiety and depression from personality: Is there a synergistic effect of neuroticism and extraversion? *J Abnorm Psychol* 2000;109:145–149. [PubMed: 10740946]
- Kashdan TB, Steger MF. Expanding the topography of social anxiety. *Psychological Science* 2006;17:120–128. [PubMed: 16466419]
- Lteif NG, Mavissakalian MR. Life events and panic disorder / agoraphobia. *Comprehensive Psychiatry* 1995;36(2):118–122. [PubMed: 7758297]
- McNally RJ. Is anxiety sensitivity distinguishable from trait anxiety? Reply to Lilienfeld, Jacob, and Turner. *Journal of Abnormal Psychology* 1989;98(2)
- McNally RJ. Anxiety sensitivity and panic disorder. *Biological Psychiatry* 2002;52(10):938–946. [PubMed: 12437935]
- Melchoir M, et al. Work stress precipitates depression and anxiety in young, working women and men. *Psychological Medicine* 2007;37(8):1119–1129. [PubMed: 17407618]
- Monroe SM. Major and minor life events as predictors of psychological distress: Further issues and findings. *J Behav Med* 1983;6:189–205. [PubMed: 6620372]
- Moreno-Jimenez B, Rodriguez-Munoz A, Moreno Y, Garrosa E. The moderating role of assertiveness and social anxiety in workplace bullying : Two empirical studies. *Psychology in Spain* 2007;11:85–94.

- Otto MW, Pollack MH, Fava M, Uccello R, Rosenbaum JF. Elevated anxiety sensitivity index scores in patients with major depression: Correlates and changes with antidepressant treatment. *Journal of Anxiety Disorders* 1995;9:117–123.
- Otto MW, et al. Life event, mood, and cognitive predictors of perceived stress before and after treatment for major depression. *Cognitive Therapy and Research* 1997;21(4):409–420.
- Peterson, RA.; Reiss, S. *Anxiety Sensitivity Index Revised Test Manual*. International Diagnostic Systems; Palos Heights, IL: 1992.
- Rachman SJ. A cognitive theory of obsessions. *Behaviour Research and Therapy* 1997;35:793–802. [PubMed: 9299799]
- Rathus AS, Nevid JS. Concurrent validity of the 30-item assertiveness schedule with a psychiatric population. *Behav Ther* 1977;8:393–397.
- Reiter SR, Otto MW, Pollack MH, Rosenbaum JF. Major depression in panic disorder patients with comorbid social phobia. *Journal of Affective Disorders* 1991;19:171–177. [PubMed: 1918660]
- Riso W, Perez GM, Roldan L, Ferrer A. Differences in social anxiety, irrational beliefs, and personality variables in subjects with high and low assertiveness scores (in both negative and positive situations). *Revista Latinoamericana de Psicología* 1988;20:391–400.
- Sarason I, Johnson J, Siegel J. Assessing the impact of life changes: Development of the Life Experiences Survey. *Journal of Consulting and Clinical Psychology* 1978;46(5):932–946. [PubMed: 701572]
- Schmidt NB, Lerew DR, Jackson RJ. The role of anxiety sensitivity in the pathogenesis of panic: Prospective evaluation of spontaneous panic attacks during acute stress. *Journal of Abnormal Psychology* 1997;106:355–364. [PubMed: 9241937]
- Schmidt NB, Zvolensky MJ, Maner JK. Anxiety Sensitivity: Prospective prediction of panic attacks and Axis I Pathology. *Journal of Psychiatric Research* 2006;40(8):691–699. [PubMed: 16956622]
- Schnurr PP, Friedman MJ, Rosenberg SD. Premilitary MMPI scores as predictors of combat-related PTSD symptoms. *Am J Psychiatry* 1993;150:479–483. [PubMed: 8434666]
- Spitzer RL, Williams JB, Gibbon M, First MB. The structured clinical interview for DSM-III-R (SCID). I: History, rationale, and description. *Arch Gen Psychiatry* 1992;49:624–629. [PubMed: 1637252]
- Taylor S, Koch WJ, McNally RJ. How does anxiety sensitivity vary across the anxiety disorders? *Journal of Anxiety Disorders* 1992;6(3):249–259.
- Wade SL, Monroe SM, Michelson LK. Chronic life stress and treatment outcome in agoraphobia with panic attacks. *American Journal of Psychiatry* 1993;150:1491–1495. [PubMed: 8379552]
- Watanabe A, Nakao K, Tokuyama M, Takeda M. Prediction first episode of panic attack among white-collar workers. *Psychiatry and Clinical Neurosciences* 2005;59:199–126.
- Weinstock LM, Whisman MA. Neuroticism as a common feature of the depressive and anxiety disorders: A Test of the revised integrative hierarchical model in a national sample. *Journal of Abnormal Psychology* 2006;115:68–74. [PubMed: 16492097]
- Yonkers KA, Bruce SE, Dyck IR, Keller MB. Chronicity, relapse, and illness – Course of panic disorder, social phobia, and generalized anxiety disorder: Findings in men and women from 8 years of follow-up. *Depression and Anxiety* 2003;17:173–179. [PubMed: 12768651]
- Zvolensky MJ, Kotov R, Antipova RK, Schmidt NB. Diathesis stress model for panic-related distress: A test in a Russian epidemiological sample. *Behaviour Research and Therapy* 2004;43(4):521–532. [PubMed: 15701361]

Table 1

Association between scores and new or recurrent onset of an anxiety disorder over the 3-year longitudinal study period.

	Age adjusted models		Multivariate model [*]	
	HR (95% CI)	p-value	HR (95% CI)	p-value
History of anxiety disorder	14.0 (6.51, 30.1)	<0.0001	8.04 (3.20, 20.2)	<0.0001
Negative life events score	1.06 (0.86, 1.32)	0.57	0.85 (0.62, 1.17)	0.31
ASI score	1.10 (1.06, 1.15)	<0.0001	1.06 (1.01, 1.11)	0.02
Neuroticism score	1.08 (1.04, 1.13)	0.0004	1.02 (0.97, 1.07)	0.48
RAS score	0.98 (0.97, 1.00)	0.07	0.98 (0.96, 1.00)	0.07

Note: ASI: Anxiety Sensitivity Index; RAS: Rathus Assertiveness Schedule;

* Adjusted for age and all other variables listed.

Table 2

Association between scores and new onset of anxiety over follow-up, excluding women with panic disorder.

	Age adjusted models		Multivariate model [*]	
	HR (95% CI)	p-value	HR (95% CI)	p-value
History of anxiety disorder	12.0 (4.66, 31.0)	<0.0001	8.35 (2.63, 26.5)	0.0003
Negative life events score	0.92 (0.65, 1.30)	0.63	0.77 (0.50, 1.19)	0.24
ASI score	1.10 (1.05, 1.16)	0.0002	1.06 (1.00, 1.12)	0.04
Neuroticism score	1.08 (1.02, 1.14)	0.01	1.02 (0.96, 1.08)	0.49
RAS score	0.97 (0.95, 0.99)	0.01	0.97 (0.94, 0.99)	0.008

Note: ASI: Anxiety Sensitivity Index; RAS: Rathus Assertiveness Schedule;

^{*} Adjusted for age and all other variables listed.