

## A twin study of generalized anxiety disorder symptoms, panic disorder symptoms and post-traumatic stress disorder in men

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### Abstract

Generalized anxiety disorder (GAD), panic disorder (PD) and post-traumatic stress disorder (PTSD) often co-occur. We investigated whether and to what degree genetic and environmental contributions overlap among symptoms of GAD, symptoms of PD and PTSD. Subjects were 3327 monozygotic and dizygotic male–male twin pair members of the Vietnam Era Twin Registry who participated in a 1992 telephone administration of the Diagnostic Interview Schedule Version 3 Revised (DIS3R). Genetic model fitting was performed to estimate the magnitude of genetic and environmental contributions to the lifetime co-occurrence of GAD symptoms, PD symptoms and PTSD. The liability for GAD symptoms was due to a 37.9% additive genetic contribution common to PD symptoms and PTSD. Liability for PD symptoms was due to a 20.7% additive genetic contribution common to GAD symptoms and

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PTSD, and a 20.1% additive genetic influence specific to PD symptoms. Additive genetic influences common to symptoms of GAD and PD accounted for 21.3% of the genetic variance in PTSD. Additive genetic influences specific to PTSD accounted for 13.6% of the genetic variance in PTSD. Remaining variance for all three disorders was due to unique environmental factors both common and specific to each phenotype. These results suggest that these disorders each have etiologically distinct components and also have significant genetic and unique environmental contributions in common. © 2001 Elsevier Science Ireland Ltd. All rights reserved.

*Keywords:* Twin study; Anxiety disorder; Panic disorder; Post-traumatic stress

## 1. Introduction

Generalized anxiety disorder (GAD), panic disorder (PD) and post-traumatic stress disorder (PTSD) are all classified as anxiety disorders in the Diagnostic and Statistical Manual of Mental Disorders, third edition, revised (DSM-III-R) (American Psychiatric Association, 1987). The characteristic features of these three anxiety disorders are symptoms of anxiety and avoidance behavior. In GAD and PD, anxiety is usually the predominant symptom. GAD is characterized by excessive and persistent anxiety and worry, while PD is characterized by spontaneous and sudden onset of a discrete period of intense apprehension, terror and discomfort. PTSD is unique among anxiety disorders because its diagnosis requires exposure to a traumatic event outside the range of usual human experience. It is characterized by re-experiencing the traumatic event, accompanied by symptoms of increased arousal and by avoidance of stimuli associated with the trauma.

GAD and PD often co-occur with PTSD. Helzer et al. (1987) in the Epidemiologic Catchment Area study of psychiatric disorders in the general population, Breslau et al. (1991) in a study of traumatic events and post-traumatic stress disorder in an urban population of young adults, and Kessler et al. (1995) in the National Comorbidity Survey all found an increase in risk of GAD and PD among men and women with PTSD.

Evidence to date suggests that liability to GAD (Andrews et al., 1990; Kendler et al., 1992; Skre et al., 1993), PD (Crowe et al., 1983; Crowe, 1985; Martin et al., 1988; Skre et al., 1993; Torgersen, 1983; Weissman, 1993; Kendler et al., 1995) and PTSD (Davidson et al., 1985, 1989; Skre et al.,

1993; True et al., 1993; Comings et al., 1996; Reich et al., 1996) has a genetic component. Scherrer et al. (2000) in a previous study of Vietnam Era Twin (VET) Registry twins found that the risk for symptoms of GAD and symptoms of PD is partly due to a common genetic influence. PTSD has been found to be more prevalent among co-twins of probands with anxiety disorders, suggesting potential for a common genetic influence (Skre et al., 1993), but the degree to which genetic and shared environmental contributions to GAD symptoms and PD symptoms are common to vulnerability for PTSD is not known. Understanding the degree to which genetic and shared environmental factors influence these phenotypes may help explain the greater than chance lifetime co-occurrence of GAD, PD and PTSD.

We analyzed telephone interview data collected from members of the Vietnam Era Twin (VET) Registry in a multivariate genetic model to estimate the genetic and environmental factors which influence the lifetime co-occurrence of GAD symptoms, PD symptoms and PTSD. In addition, the magnitudes of common and disorder-specific genetic and environmental factors were estimated. Because DSM-IV diagnoses were not available at the time of data collection, our present analyses use DSM-III-R criteria.

## 2. Methods

### 2.1. Participants

The VET Registry consists of 7375 male/male twin pairs born between 1939 and 1955 in which both siblings served on active military duty during

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