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Original article

Anxiety Disorders are Associated with Low Socioeconomic Status in Women but Not in Men

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A B S T R A C T

Objectives: We investigated to what extent the lifetime prevalence of anxiety disorders relates to negative economic changes, taking important lifestyle factors and unexpected life events into consideration.
Methods: We included 3,695 participants recruited in the city of Lausanne (Switzerland), from the population-based CoLaus/PsyCoLaus study. The association between anxiety disorders, lifestyle factors, and life events related to income was investigated using binary logistic regression analyses correcting for demographic and clinical confounders.
Results: Compared with men, women with anxiety disorders showed a significantly lower socioeconomic status (Mann-Whitney $U = 56{,}318$; $p < .001$) and reported a higher negative impact of substantial reduction of income (Mann-Whitney $U = 68{,}531$; $p = .024$). When performing adjusted analyses, low socioeconomic status (odd ratio, 0.87; $p = .001$) and negative impact of reduction of income (odd ratio, 1.01; $p = .004$) were associated significantly with anxiety disorders in women but not in men.
Conclusion: Our results suggest that anxiety disorders aggravate already existing gender differences in economic conditions, and that women with anxiety need additional support to attain socioeconomic security similar to that of men.
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Women are twice as likely as men to develop an anxiety disorder and the 12-month prevalence of these conditions in women is up to 12% in European countries (Catuzzi & Beck, 2014; Demyttenaere et al., 2004). Being the sixth leading cause of disability worldwide (Baxter, Vos, Scott, Ferrari, & Whiteford, 2014), anxiety disorders are associated with high socioeconomic costs in Western countries and poor quality of life for the affected individuals (Comer et al., 2011). Their strong impact on life quality is reflected in a high unemployment rate among those with the condition (Dijkstra-Kersten, Biesheuvel-Leliefeld, van der Wouden, Penninx, & van Marwijk, 2015; Waghorn & Chant, 2005), with consequences for socioeconomic situation, disease course, and general health costs. Gender differences have been observed in the prevalence, clinical presentation and personal burden of anxiety disorders (Bogetto, Venturello, Albert, Maina, & Ravizza, 1999; Turk et al., 1998; Yonkers, Bruce, Dyck, & Keller, 2003). A better understanding of the interplay between the occurrence of anxiety disorders and gender related personal socioeconomic consequences is urgently needed to better prevent affected patients from this downward spiral.

Low socioeconomic status (SES) has been associated with a greater risk of mental disorders (Cheng, Zhang, & Ding, 2015; Hudson, 2005), although research has not established a causal relationship. A decrease in household income increases

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the risk for mood and anxiety disorders (de Graaf, ten Have, Tuithof, & van Dorsselaer, 2013; Sareen, Afifi, McMillan, & Asmundson, 2011). Moreover, an increased frequency of anxiety and other mental disorders is observed in periods of economic recession (Gili, Roca, Basu, McKee, & Stuckler, 2013; Wang et al., 2010).

A large body of evidence supports the hypothesis that gender impacts the association between economic and health conditions. Women with low SES have been shown to be more susceptible to a higher frequency or negative consequences of stroke (Delbari et al., 2016), obesity (Noh, Jo, Huh, Cheon, & Kwon, 2014) and lung diseases (Pinkerton et al., 2015). Only a few studies have hitherto investigated the association between SES and anxiety disorders with partly contradictory findings. Women but not men with a history of anxiety or depression showed an increased risk of dropping out of the labor force (Rudolph & Eaton, 2016). The small number of patients exiting the labor force did not allow any further risk estimations specifically for anxiety disorders in this study. However, the longitudinally driven population-based Netherlands Mental Health Survey and Incidence Study-2 (NEMESIS-2) showed that reduction of income was significantly associated with the overall 3-year incidence of mental and mood disorders, but not of anxiety disorders (Barbaglia, ten Have, Dorsselaer, Alonso, & de Graaf, 2015). Men were at three times higher risk of developing mental disorders after job loss, whereas a reduction in household income led to a twice as high risk for psychiatric diseases in women. Overall, the extent to which gender moderates the association between worse economic conditions and anxiety disorders is not clear, because most of the studies used a history of anxiety and depression as the main outcome variable and were not investigating anxiety disorders specifically.

Beside economic conditions, other environmental factors have been suggested to be associated with anxiety disorders. A large body of evidence supports a putatively bidirectional association between anxiety and smoking (Breslau, Kilbey, & Andreski, 1991; Cosci, Knuts, Abrams, Griez, & Schruers, 2010), alcohol consumption (Bellos et al., 2016), low physical activity (Herring, O'Connor, & Dishman, 2010; Wegner et al., 2014) and living conditions (Kessler, Walters, & Forthofer, 1998; Pankiewicz, Majkowicz, & Krzykowski, 2012). Animal studies suggest sex related differences in these associations as shown for nicotine-induced anxiolytic effects that are especially abundant in female mice (Cheeta, Irvine, Tucci, Sandhu, & File, 2001; Elliott, Faraday, Phillips, & Grunberg, 2004). Women with anxiety disorders face a greater risk of becoming smokers than do men with anxiety disorders (Kandel, Hu, Griesler, & Schaffran, 2007). Conversely, men are more likely to consume alcohol to relieve symptoms of anxiety disorders (Vesga-Lopez et al., 2008; Xu et al., 2012).

Given the evidence of associations between economic conditions, lifestyle factors, and anxiety disorders and the current gap in understanding how sex affects these associations, we intended to scrutinize specifically the extent to which gender moderates the relationship between lifestyle factors, life events related to negative economic changes, and the lifetime prevalence of anxiety disorders. We performed our study in a well-characterized population-based cohort of Switzerland, which included individuals showing important anxiety subtypes, such as generalized anxiety disorder (GAD), panic disorder (PD), agoraphobia, social phobia, posttraumatic stress disorder (PTSD), and obsessive-compulsive disorder (OCD).

Methods

Study participants

The study included data from CoLaus|PsyCoLaus (Firmann et al., 2008; Preisig et al., 2009), a cohort study designed to investigate mental disorders and cardiovascular risk factors/cardiovascular diseases in the general population. Between 2003 and 2006, 6,733 residents (CoLaus) aged between 35 and 75 years were randomly selected from the civil register of Lausanne (Switzerland). In the frame of this study, anthropometric measures as well as DNA and plasma samples were collected for the investigation of genetic polymorphisms and biomarkers associated with cardiovascular risk factors (Firmann et al., 2008). In a second step, 67% of the participants of CoLaus aged between 35 and 66 years ($n = 5{,}535$) agreed to participate in the psychiatric evaluation (PsyCoLaus). A total of 3,719 individuals (92% were Caucasians) underwent both the somatic/cardiovascular and psychiatric examinations (Preisig et al., 2009). The PsyCoLaus sample (47% men) showed a similar gender distribution as the general population in the same age range (Preisig et al., 2009). Although the youngest 5-year band of the cohort was underrepresented and the oldest 5-year band overrepresented, participants of PsyCoLaus (mean age, 50.9 years; standard deviation, 8.8) and individuals who refused to participate revealed comparable scores on the General Health Questionnaire (Goldberg, 1972), French translation (Bettschart & Bolognini, 1996), a self-rating instrument completed at the somatic examination. Participants with missing assessment of anxiety disorders were excluded ($n = 21$). Four participants were excluded because of missing data for body mass index (BMI; $n = 1$) or lifestyle factors ($n = 3$), leaving a final sample of 3,695 participants considered in our analyses.

In the current investigation, participants with a lifetime history of anxiety (GAD, PD, agoraphobia, social phobia, PTSD, or OCD) were included in our study and compared with controls. Participants were defined as controls if they did not have a lifetime history of GAD, PD, agoraphobia, social phobia, PTSD, or OCD.

The CoLaus and PsyCoLaus studies were approved by the Institutional Ethics Committee of the University of Lausanne. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments. Informed written consent was obtained from all participants.

Assessment of Clinical Data in PsyCoLaus

Diagnostic information was elicited using the validated French translation (Leboyer et al., 1995) of the Diagnostic Interview for Genetic Studies (DIGS; Nurnberger et al., 1994) and the diagnostic assignment was performed according to the fourth edition of the *Diagnostic and Statistical Manual of Mental Disorders*. The French translation of the DIGS revealed excellent interrater reliability in terms of kappa and Yule's Y coefficients for major mood, and psychotic and substance use disorders, although the 6-week test–retest reliability was slightly lower (Berney, Preisig, Matthey, Ferrero, & Fenton, 2002; Preisig, Fenton, Matthey, Berney, & Ferrero, 1999).

For the assessment of PTSD and GAD the DIGS was completed with the sections of the French version (Leboyer et al., 1991) of the Schedule for Affective Disorders and Schizophrenia—Lifetime

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