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The Association of an Inability to Form and Maintain Close Relationships Due to a Medical Condition with Anxiety and Depressive Disorders

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Abstract

Background—While low social support is a risk factor for mental illness, anxiety and depression's relationship with social impairment specifically resulting from a medical condition is poorly understood. We hypothesize that when a medical illness makes it difficult for people to form and maintain close relationships with others, they will be at increased risk for anxiety and depression.

Methods—Two nationally representative surveys, the National Comorbidity Survey-Replication and National Latino and Asian American Study, included 6,805 adults with at least one medical illness and information on social impairment attributed to a medical condition. The Composite International Diagnostic Interview evaluated a 12-month history of anxiety and depressive disorders.

Results—8.2% of our sample had at least moderate difficulty in forming and maintaining close relationships due to a medical condition. In bivariate analyses, younger age, Latino ethnicity, less education, worse financial status, more chronic illnesses, physical health and discomfort, and problems with mobility, home management, and self-care were associated with this social impairment. In multivariable analyses accounting for possible confounders, there was a dose-dependent relationship between social impairment and the prevalence of anxiety and depression.

Limitations—Data are cross-sectional and our analyses are therefore unable to determine cause-and-effect relationships.

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Conclusions—Among adults with one or more medical conditions, social impairment attributed to medical illness was associated with a significantly greater odds of anxiety and depression. Further clarification of this relationship could inform more targeted, personalized interventions to prevent and/or alleviate mental illness in those with chronic medical conditions.

Keywords

Epidemiology; comorbidity; community surveys; social psychiatry; social support

1. Introduction

Anxiety and depressive disorders are common and can be highly disabling. By 2030 depression is predicted to become the second leading contributor to disease burden as measured by disability-adjusted life years, behind only HIV/AIDS (Mathers and Loncar, 2006). Prevalence estimates from the 2005 to 2008 National Health and Nutrition Examination Survey data found that 20.1% of the adult United States population has at least mild depression (Shim et al., 2011). Using a psychiatric diagnostic interview of adults in the United States, the National Comorbidity Survey Replication (NCS-R) determined that the 12-month and lifetime prevalence of major depression was 6.7% and 16.6%, respectively (Kessler et al., 2005a; Kessler et al., 2005b). About half of untreated depression will persist at one year (47%) and remission is less likely in those experiencing more severe depression (Whiteford et al., 2013). Anxiety frequently co-occurs with depression with 67% of those with a current depressive disorder also experiencing an anxiety disorder (Lamers et al., 2011). NCS-R estimates the 12-month and lifetime prevalence of anxiety disorders to be 18.1% and 28.8%, respectively (Kessler et al., 2005a; Kessler et al., 2005b). Similar to depression, anxiety frequently persists with only about 1 in 5 people with generalized anxiety disorder and a little less than 1 in 2 with panic disorder achieving complete remission after about five years of follow-up (Woodman et al., 1999). The societal cost of psychiatric disorders is substantial with the direct costs of major depression in the United States estimated to be $98.9 billion in 2010 (Greenberg et al., 2015). Anxiety and depression are also associated with increased disability, decreased well-being, mortality, and suicidality (Alexopoulos, 2005; de Beurs et al., 1999; Fiske et al., 2009; Lenze et al., 2000; van Hout et al., 2004).

There are many factors associated with an increased risk for developing anxiety and/or depression such as age, marital status, financial status, education, gender, race and ethnicity, and poor social support (Holzel et al., 2011; Kessler et al., 2003; Kessler et al., 2005a; Teo et al., 2013; Vink et al., 2008). One of the most well-known risk factors is chronic medical illness (de Graaf et al., 2002; Meader et al., 2011; Vink et al., 2008). For some medical illnesses, the etiological link with psychiatric disorders is at least modestly understood. For example, a cerebrovascular ischemic event damages the brain parenchyma, potentially causing disruptions to neurocircuitry pathways that could contribute to depression (Alexopoulos, 2005). Treatments for medical conditions also may result in depression and anxiety (e.g., the use of barbiturates, corticosteroids, efavirenz, and interferon-α has been associated with inicident depression (Celano et al., 2011)). For many chronic medical

illnesses, however, the pathways by which medical illness leads to anxiety and depression are poorly characterized.

In contrast, there is an extensive literature linking poor social support (e.g., social isolation, loneliness) with anxiety and depression (Teo et al., 2013; Vink et al., 2008). Therefore, because we also know that chronic illness can worsen feelings of social isolation and loneliness (Hinojosa et al., 2011; Ohman et al., 2003), we propose that one potential pathway by which medical illnesses contribute to common mental disorders is by causing social impairment and limiting an individual's ability to participate in community, social, and civic life. For example, advanced COPD can potentially limit a person's ability to engage socially, which in turn could increase feelings of social isolation and burdensomeness and place an individual at increased risk for anxiety and depression on that basis.

To evaluate this potential pathway between medical illness, social impairment, and risk for anxiety and depression, we use data from the NCS-R and National Latino and Asian American Study (NLAAS), two nationally representative surveys conducted from 2001–2003. More specifically, we aim to characterize the association that social impairment secondary to a medical condition has with a 12-month history of anxiety and/or depressive disorders. We hypothesize that anxiety and depressive disorders are more prevalent in adults endorsing social impairment that they ascribe to a medical condition and that this association persists even after accounting for the sociodemographic risk factors listed previously and other direct and indirect physical health markers. We will account for many of these risk factors listed because they may confound the relationship between medical illness and psychiatric disease (e.g., increasing age is associated with a larger medical disease burden but a lower prevalence of anxiety and depressive disorders (Fiske et al., 2009; Lenze et al., 2000)). As medical illnesses likely have multiple pathways leading to psychiatric disorders, we are including separate markers of physical health in an attempt to isolate the effect of social impairment from other potential consequences of poor physical health. Characterization of the association of social impairment attributed to a medical illness with anxiety and depression has the potential to meaningfully guide the treatment and/or prevention of anxiety and depression, which could lessen their burden on society and the millions of adults with chronic medical illnesses.

2. Methods

2.1. Participants

The NCS-R and NLAAS were two nationally-representative, cross-sectional surveys conducted from 2001–2003 of non-institutionalized adults aged 18 years and older living in the United States (the NLAAS was representative of Asian Americans and Latinos). These surveys evaluated mental illness with an expanded version of the World Mental Health Composite International Diagnostic Interview (Heeringa et al., 2004; Pennell et al., 2004). The NCS-R interviewed English speakers while the NLAAS included both English and non-English speakers (Alegria et al., 2004; Heeringa et al., 2004). For the NCS-R, 5,692 adults completed the full interview with a 70.9% response rate among primary respondents, and the NLAAS interviewed 2,554 Latinos and 2,095 Asians for a 73.2% response rate (Alegria et

al., 2015; Heeringa et al., 2004). The combined NCS-R and NLAAS sample included 10,341 participants that completed the full interview.

2.2. Social impairment

Social impairment attributed to a medical illness was evaluated with a question that was asked of participants with a chronic or recent medical condition (6,805 of the combined NCS-R and NLAAS sample had this information). When participants had more than one medical condition, a condition was selected randomly: *"Think about the month or longer in the past 12 when [(RANDOM CONDITION)] consequences were most severe. Using the 0 to 10 scale, where 0 means no interference and 10 means very severe interference, what number describes how much [(RANDOM CONDITION)] consequences interfered with each of the following activities during that time? Your ability to form and maintain close relationships with other people?"* The response anchors are None, Mild, Moderate, Severe, and Very Severe for scores of 0, 2, 5, 8, and 10, respectively (Alegria et al., 2015).

2.3. Psychiatric diagnoses

DSM-IV criteria-based algorithms determined the presence of a 12-month history of anxiety and/or depressive disorders (Alegria et al., 2015). Anxiety disorders consisted of generalized anxiety disorder, panic disorder, agoraphobia with and without panic disorder, social phobia, and posttraumatic stress disorder whereas depressive disorders included dysthymia and major depression without hierarchy. Our analyses had four groupings of 12-month psychiatric disorders: 1) anxiety disorder(s), 2) depressive disorder(s), 3) any anxiety or depressive disorder(s), and 4) comorbid anxiety and depressive disorders. These four psychiatric disorder groupings served as dependent variables in each of four separate binary logistic regression models.

2.4. Covariates

As guided by the literature, we include in our models age, gender, race and ethnicity, education, marital status, and household income to poverty ratio. Indicators of physical health included chronic illnesses (higher quartiles correspond to increased number of illnesses) and the presence of an accident, injury, or poisoning that required medical attention in the past year as well as several questions that assessed physical health and functioning within the 30 days prior to being interviewed: 1) *"How often did you experience physical discomfort, such as pain, nausea, or dizziness in the past 30 days - all the time, most of the time, some of the time, a little of the time, or none of the time?"* 2) *"Was your overall physical health during the past 30 days better, worse, or about the same as usual for you?"* 3) *"Think about the month or longer in the past 12 when [(RANDOM CONDITION)] consequences were most severe. Using the 0 to 10 scale, where 0 means no interference and 10 means very severe interference, what number describes how much [(RANDOM CONDITION)] consequences interfered with each of the following activities during that time? Your home management, like cleaning, shopping, and taking care of the (house/apartment)?"* 4) *"Was there ever a time in the past 30 days when health-related problems caused you difficulties with self care, such as washing your whole body, getting dressed, or feeding yourself?"* and 5) *"Was there ever a time in the past 30 days when health-related*

problems caused you difficulties with mobility, such as standing for long periods, moving around inside your home, or getting out of your home?"(Alegria et al., 2015).

2.5. Statistical analyses

Bivariate analyses evaluated the association that social impairment attributed to a medical condition has with sociodemographics and direct and indirect markers of physical health. Consistent with recommendations for analyzing complex survey data analyses (National Center for Health Statistics, 2013), we used the Rao-Scott chi-square test to characterize the association social impairment has with these variables. We also estimated a series of separate binary logistic regression models with anxiety and depressive disorders (described above) serving as our dependent variables. The initial set of logistic regression analyses had social impairment as the only independent variable. To address potential confounding, the final set of regression analyses included the sociodemographic covariates introduced previously and, in an effort to isolate the effect of social impairment attributed to a medical condition from additional sequelae of poor physical health, included other markers of physical health. Sensitivity analyses were conducted with the full logistic regression models using a social life impairment variable derived as follows: *"Think about the month or longer in the past 12 when [(RANDOM CONDITION)] consequences were most severe. Using the 0 to 10 scale, where 0 means no interference and 10 means very severe interference, what number describes how much [(RANDOM CONDITION)] consequences interfered with each of the following activities during that time? Your social life?"* Social life impairment was subsequently divided into None, Mild, Moderate, and Severe/Very Severe groupings. Our data analyses were conducted with SAS 9.3 (SAS Institute, Inc., Cary, NC). Population-weighted estimates were calculated using SAS survey procedures that accounted for sampling design and nonresponse. Of the 6,805 CPES participants with information on social impairment attributed to a medical condition, 6,706 participants had complete information on the covariates and were subsequently included in our adjusted logistic regression analyses.

3. Results

3.1. Descriptive statistics

Table 1 shows the CPES participant characteristics based on the extent to which they endorsed having a varying degree of ability to form and maintain close relationships with others secondary to a medical illness. Of the 6,805 CPES participants with information on social impairment due to a medical condition, 8.2% endorsed having at least moderate relationship difficulties. Those endorsing at least moderate social impairment were more likely ($p<0.05$) to be less than 60 years old; of Latino ethnicity; less formally educated; and in the lowest quartile of income to needs ratio (Table 1). Participants with at least moderate social impairment also had recent changes in their physical health, more physical discomfort, and increased difficulty with home management and mobility. Those with severe or very severe social impairment had more chronic medical conditions and self-care difficulties (Table 1).

Table 2 shows the prevalence of a 12-month history of anxiety and depressive disorders across (medical illness-conditional) social impairment severity level. Anxiety and depressive disorders were much more prevalent among participants with social impairment and there was a dose-dependent relationship as each worsening level of social impairment was associated with increased levels of anxiety and/or depression. For example, comorbid 12-month anxiety and depressive disorders had a prevalence of 4.0%, 8.2%, 16.7%, and 23.9% in no, mild, moderate, and severe/very severe social impairment groupings (Table 2).

3.2. Regression analyses

Table 3 shows the unadjusted and adjusted logistic regression analyses. In the unadjusted logistic regression analyses, compared to no social impairment, participants with severe/very severe social impairment attributed to health problems had a seven-fold increased odds of having a 12-month history of anxiety and depressive disorders (OR=7.48; 95% CI: 4.64–12.07). In the logistic regression analyses that accounted for possible sociodemographic confounders and other markers of physical health, the association between social impairment attributed to a medical illness with anxiety and depression was somewhat attenuated, but endured. For example, in the unadjusted regression analysis, those with severe/very severe social impairment had an over four-fold increased odds of having a 12-month history of an anxiety or depressive disorder (OR=4.40; 95% CI: 3.24–5.97) compared to a three-fold increased odds in the adjusted model (OR=2.94; 95% CI: 2.12–4.08). In both the unadjusted and adjusted logistic regression analyses, there was a dose-dependent relationship between social impairment grouping and the prevelance of anxiety and/or depressive disorders (Table 3).

3.3. Sensitivity analyses

The adjusted logistic regression models using impairment in social life as the primary independent variable showed evidence of a dose-dependent effect on a 12-month history of anxiety and/or depression. Although the association was attenuated relative to the prior social impairment level variable, the severe/very severe impairment in social life grouping (compared to those with no social life impairment) had an odds ratio of: 1.93 (95% CI: 1.21–3.07) for 12-month anxiety disorders, 2.14 (95% CI: 1.21–3.80) for 12-month depressive disorders, 1.70 (95% CI: 1.01–2.88) for either a 12-month anxiety or depressive disorder, and 3.45 (95% CI: 1.98–6.00) for both a 12-month anxiety and depressive disorder (see Supplemental Table 1).

4. Discussion

4.1. Findings in relation to existing literature

Our hypothesis that a 12-month history of anxiety and depressive disorders was more prevalent in those endorsing social impairment secondary to a medical illness was supported by the bivariate and multivariable analyses. Social impairment (more specifically, difficulty to form and maintain close relationships with others) attributed to a medical illness had a strong connection to anxiety and depression with nearly half of those endorsing severe or very severe social impairment having a 12-month history of an anxiety or depressive disorder. These estimates of anxiety and depression are much higher than levels present in

the general population (Kessler et al., 2005b). Additionally, nearly 1 in 4 of those with the worst level of social impairment had a 12-month history of both an anxiety and depressive disorder, much higher than the 1 in 25 estimate for the non-socially impaired group. This is indirect evidence that anxiety and depression may be more intense in this socially impaired group because, when anxiety and depressive disorders co-occur, they are often more severe (Lamers et al., 2011; Schoevers et al., 2003).

In an effort to isolate the effect of social impairment attributed to a medical condition as well as to further characterize participants with differing levels of social impairment, sociodemographic and other indicators of physical health were examined. Our findings suggest that, among those with a medical condition, younger age, less education, and financial limitations could increase a person's susceptibility towards having more severe social impairment secondary to a medical problem. For example (and somewhat counter-intuitively as older adults typically have higher levels of medical comorbidity), older adults comprised 27.3% of those with no social impairment due to a medical condition, but only 17.2% of the sample with severe or very severe social impairment. This is an intriguing finding and it is unclear if older adults are better able to compensate for their medical illnesses and/or potentially have different expectations with regards to their ability to socialize. In our analyses, there was also an association between the severity of physical health and functioning problems with the level of social impairment attributed to a medical condition. In particular, a large proportion of those with the worst level of social impairment reported mobility difficulties and had severe or very severe difficulty with managing home care tasks such as cleaning or shopping. Accounting for these sociodemographic variables and additional direct and indirect markers of physical health in multivariable analyses reduced, but did not negate the association that social impairment attributed to a medical illness had with anxiety and depressive disorders. There was a consistent dose-dependent relationship between the severity of the social impairment and the prevalence of anxiety and depression. This suggests that, in a population of adults with one or more medical conditions, social impairment attributed to a medical condition may have a considerable impact on a person's mental health. Indeed, strokes can result in social isolation (Hinojosa et al., 2011) as well as markedly elevated levels of depression (Robinson, 2003). It seems highly plausible that the well-established link between medical illness and mental illness (Meader et al., 2011; Vink et al., 2008) is driven in part by the social sequelae of these medical illnesses.

4.2. Limitations

Our study has several limitations. Our primary independent variable – an inability to form and maintain close relationships with others due to a medical illness – was based on a single self-reported question and may have been inconsistently interpreted across study participants, leading to increased heterogeneity among those responding to this question. Also, this question was based on a condition that was randomly selected from those that the participant endorsed, which increases the risk for misclassifying participants who had a highly impairing medical condition but were instead asked about how a less impairing condition affected them. In general, however, markers of poor physical health were associated with more severe social impairment suggesting that this potential

misclassification bias had a relatively minor impact on our analyses and findings. Additionally, we conducted sensitivity analyses using another marker of social impairment (impairment in “social life”), which were largely congruent with our primary analyses and showed that the association between social impairment due to a medical condition and increased anxiety and/or depressive disorders persisted. It also unclear if there is a differential effect based on whether the medical conditions are chronic or acute in nature, which could have important implications for future interventions. Furthermore, there is some concern for selection bias as the non-response rate was almost 30% and it is possible that responders and non-responders may have systematically differed in ways that could influence our findings (e.g., perhaps responders are more socially isolated and more likely to be homebound than non-responders). Another limitation is that this study is based on cross-sectional data and our analyses are unable to determine cause-and-effect relationships and relationships that may be non-linear or circular (Kendler, 2008). More specifically, not only may social impairment contribute to anxiety and depression, but anxiety and depression could in turn worsen a person’s ability to participate in social activities. For example, anxiety (e.g., agoraphobia) can make it difficult for a person to leave his home and depression often involves anhedonia which can result in increased isolation. We also did not evaluate mediation specifically, but rather examined the strength of the association of social impairment with anxiety and depression net of other factors. Another methodologic issue to consider is that non-mental health professionals conducted the interviews, which could lead to inaccuracies in psychiatric disorder prevalence estimates. For 12-month anxiety and mood disorders, however, the Composite International Diagnostic Interview estimates are generally unbiased when compared to the gold standard clinician-administered Structured Clinical Interview for the DSM-IV (Haro et al., 2006).

4.3. Clinical implications

Research to date has primarily focused on characterizing the effect that poor social support has on physical and mental health. Among those with underlying physical illness, our finding that difficulty forming and maintaining close relationships with others due to a medical condition was associated with increased anxiety and depression is consistent with the potential for a more complicated process. A process by which poor physical health may contribute to social impairment, which in turn may result in increased anxiety and depression. Tens of millions of people in the United States live with a severe disability (National Council on Disability, 2009), and more research is needed to evaluate the specific mechanisms of these relationships that subsequently could inform interventions to reduce the impact of anxiety and depression that result in part from physical illness and its associated social disability, and thereby interrupt this cycle. If such mechanisms are elucidated, it is encouraging to recognize that social impairment is a potentially modifiable treatment target and interventions to improve social support are increasingly well-studied (Dickens et al., 2011). Some of these interventions have included home visits, intergenerational social activities, educational programs, and group support (Dickens et al., 2011). In our study population, those younger than 60 years who had multiple medical comorbidities and experienced mobility difficulties were at an elevated risk for also having anxiety and/or depressive disorders. This subpopulation may thereby be a high yield group to include in future longitudinal research and interventional efforts. For example, social

interventions could potentially improve a person's ability to maintain close interpersonal connections, which could optimize assistance received with regards to self and home care and result in less anxiety and depression and potentially improved physical health and lower health care costs.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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References

Alegria, M.; Jackson, JS.; Kessler, RC.; Takeuchi, D. Collaborative Psychiatric Epidemiology Surveys (CPES), 2001–2003 [United States]. ICPSR20240-v6. Ann Arbor, MI: Interuniversity Consortium for Political and Social Research; 2015.

Alegria M, Takeuchi D, Canino G, Duan N, Shrout P, Meng XL, Vega W, Zane N, Vila D, Woo M, Vera M, Guarnaccia P, Aguilar-Gaxiola S, Sue S, Escobar J, Lin KM, Gong F. Considering context, place and culture: the National Latino and Asian American Study. Int. J. Methods Psychiatr. Res. 2004; 13:208–220. [PubMed: 15719529]

Alexopoulos GS. Depression in the elderly. Lancet. 2005; 365:1961–1970. [PubMed: 15936426]

Celano CM, Freudenreich O, Fernandez-Robles C, Stern TA, Caro MA, Huffman JC. Depressogenic effects of medications: a review. Dialogues Clin. Neurosci. 2011; 13:109– 125. [PubMed: 21485751]

de Beurs E, Beekman AT, van Balkom AJ, Deeg DJ, van Dyck R, van Tilburg W. Consequences of anxiety in older persons: its effect on disability, well-being and use of health services. Psychol. Med. 1999; 29:583–593. [PubMed: 10405079]

de Graaf R, Bijl RV, Smit F, Vollebergh WA, Spijker J. Risk factors for 12-month comorbidity of mood, anxiety, and substance use disorders: findings from the Netherlands Mental Health Survey and Incidence Study. Am. J. Psychiatry. 2002; 159:620–629. [PubMed: 11925301]

Dickens AP, Richards SH, Greaves CJ, Campbell JL. Interventions targeting social isolation in older people: a systematic review. BMC Public Health. 2011; 11:647. [PubMed: 21843337]

Fiske A, Wetherell JL, Gatz M. Depression in older adults. Annu. Rev. Clin. Psychol. 2009; 5:363–389. [PubMed: 19327033]

Greenberg PE, Fournier A, Sisitsky T, Pike CT, Kessler RC. The economic burden of adults with major depressive disorder in the United States (2005 and 2010). J. Clin. Psychiatry. 2015; 76:155–162. [PubMed: 25742202]

Haro JM, Arbabzadeh-Bouchez S, Brugha TS, de Girolamo G, Guyer ME, Jin R, Lepine JP, Mazzi F, Reneses B, Vilagut G, Sampson NA, Kessler RC. Concordance of the Composite International Diagnostic Interview Version 3.0 (CIDI 3.0) with standardized clinical assessments in the WHO World Mental Health surveys. Int. J. Methods Psychiatr. Res. 2006; 15:167–180. [PubMed: 17266013]

Heeringa SG, Wagner J, Torres M, Duan N, Adams T, Berglund P. Sample designs and sampling methods for the Collaborative Psychiatric Epidemiology Studies (CPES). Int. J. Methods Psychiatr. Res. 2004; 13:221–240. [PubMed: 15719530]

Hinojosa R, Haun J, Hinojosa MS, Rittman M. Social isolation poststroke: relationship between race/ethnicity, depression, and functional independence. Top. Stroke Rehabil. 2011; 18:79–86. [PubMed: 21371987]

Holzel L, Harter M, Reese C, Kriston L. Risk factors for chronic depression--a systematic review. J. Affect. Disord. 2011; 129:1–13. [PubMed: 20488546]

Kendler KS. Explanatory models for psychiatric illness. Am. J. Psychiatry. 2008; 165:695–702. [PubMed: 18483135]

Kessler RC, Berglund P, Demler O, Jin R, Koretz D, Merikangas KR, Rush AJ, Walters EE, Wang PS. The epidemiology of major depressive disorder: results from the National Comorbidity Survey Replication (NCS-R). JAMA. 2003; 289:3095–3105. [PubMed: 12813115]

Kessler RC, Berglund P, Demler O, Jin R, Merikangas KR, Walters EE. Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. Arch. Gen. Psychiatry. 2005a; 62:593–602. [PubMed: 15939837]

Kessler RC, Chiu WT, Demler O, Merikangas KR, Walters EE. Prevalence, severity, and comorbidity of 12-month DSM-IV disorders in the National Comorbidity Survey Replication. Arch. Gen. Psychiatry. 2005b; 62:617–627. [PubMed: 15939839]

Lamers F, van Oppen P, Comijs HC, Smit JH, Spinhoven P, van Balkom AJ, Nolen WA, Zitman FG, Beekman AT, Penninx BW. Comorbidity patterns of anxiety and depressive disorders in a large cohort study: the Netherlands Study of Depression and Anxiety (NESDA). J. Clin. Psychiatry. 2011; 72:341–348. [PubMed: 21294994]

Lenze EJ, Mulsant BH, Shear MK, Schulberg HC, Dew MA, Begley AE, Pollock BG, Reynolds CF III. Comorbid anxiety disorders in depressed elderly patients. Am. J. Psychiatry. 2000; 157:722–728. [PubMed: 10784464]

Mathers CD, Loncar D. Projections of global mortality and burden of disease from 2002 to 2030. PLoS Med. 2006; 3:e442. [PubMed: 17132052]

Meader N, Mitchell AJ, Chew-Graham C, Goldberg D, Rizzo M, Bird V, Kessler D, Packham J, Haddad M, Pilling S. Case identification of depression in patients with chronic physical health problems: a diagnostic accuracy meta-analysis of 113 studies. Br. J. Gen. Pract. 2011; 61:e808–e820. [PubMed: 22137418]

National Center for Health Statistics. Continuous NHANES web tutorial. Atlanta, GA: National Center for Health Statistics, Centers for Disease Control and Prevention; 2013.

National Council on Disability. The current state of health care for people with disabilities. Washington, DC: 2009. p. 1-454.

Ohman M, Soderberg S, Lundman B. Hovering between suffering and enduring: the meaning of living with serious chronic illness. Qual. Health. Res. 2003; 13:528–542. [PubMed: 12703414]

Pennell BE, Bowers A, Carr D, Chardoul S, Cheung GQ, Dinkelmann K, Gebler N, Hansen SE, Pennell S, Torres M. The development and implementation of the National Comorbidity Survey Replication, the National Survey of American Life, and the National Latino and Asian American Survey. Int. J. Methods Psychiatr. Res. 2004; 13:241–269. [PubMed: 15719531]

Robinson RG. Poststroke depression: prevalence, diagnosis, treatment, and disease progression. Biol. Psychiatry. 2003; 54:376–387. [PubMed: 12893112]

Schoevers RA, Beekman AT, Deeg DJ, Jonker C, van Tilburg W. Comorbidity and risk-patterns of depression, generalised anxiety disorder and mixed anxiety-depression in later life: results from the AMSTEL study. Int. J. Geriatr. Psychiatry. 2003; 18:994–1001. [PubMed: 14618550]

Shim RS, Baltrus P, Ye J, Rust G. Prevalence, treatment, and control of depressive symptoms in the United States: results from the National Health and Nutrition Examination Survey (NHANES), 2005–2008. J. Am. Board Fam. Med. 2011; 24:33–38. [PubMed: 21209342]

Teo AR, Choi H, Valenstein M. Social relationships and depression: ten-year followup from a nationally representative study. PLoS One. 2013; 8:e62396. [PubMed: 23646128]

van Hout HPJ, Beekman ATF, De Beurs E, Comijs H, Van Marwijk H, De Haan M, van Tilburg W, Deeg DJH. Anxiety and the risk of death in older men and women. Br. J. Psychiatry. 2004; 185:399–404. [PubMed: 15516548]

Vink D, Aartsen MJ, Schoevers RA. Risk factors for anxiety and depression in the elderly: a review. J. Affect. Disord. 2008; 106:29–44. [PubMed: 17707515]

Whiteford HA, Harris MG, McKeon G, Baxter A, Pennell C, Barendregt JJ, Wang J. Estimating remission from untreated major depression: a systematic review and meta-analysis. Psychol. Med. 2013; 43:1569–1585. [PubMed: 22883473]

Woodman CL, Noyes R Jr, Black DW, Schlosser S, Yagla SJ. A 5-year follow-up study of generalized anxiety disorder and panic disorder. J. Nerv. Ment. Dis. 1999; 187:3–9. [PubMed: 9952247]

Highlights

- 8.2% had at least moderate social impairment due to a medical condition.
- 1 in 4 adults with the worst level of social impairment had anxiety and depression.
- Social impairment has a dose-dependent relationship with anxiety and depression.
- Our findings are relevant to the millions of adults with chronic medical illnesses.

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TABLE 1

Participant sociodemographic characteristics and markers of physical health stratified by level of social impairment attributed to a medical condition (N=6,805).

Sample Characteristics	Social Impairment[a]								p value[b]
	No N = 5,095		Mild N = 882		Moderate N = 508		Severe, Very Severe N = 320		
	%	SE	%	SE	%	SE	%	SE	
Age, years									
18–29	19.1	1.1	17.5	1.5	13.5	2.2	19.5	4.3	0.003
30–44	24.5	1.0	31.8	2.3	33.9	3.2	29.2	3.8	
45–59	29.0	1.1	28.0	2.5	31.6	3.3	34.1	3.0	
≥60	27.3	1.3	22.8	3.1	21.0	2.9	17.2	3.0	
Gender									0.977
Female	55.2	1.3	56.1	2.5	55.4	3.6	56.9	5.1	
Race and ethnicity									<0.001
African American	10.0	1.0	10.6	2.6	13.0	2.2	12.1	3.2	
Asian	3.2	0.3	5.5	0.7	6.9	1.0	3.4	0.8	
non-Latino White	77.0	1.5	67.4	3.5	59.7	3.4	60.8	4.5	
Latino	7.9	0.7	12.9	1.4	18.0	2.4	16.8	2.9	
Other	2.0	0.3	3.5	1.3	2.5	0.9	6.9	2.0	
Education, years									<0.001
0–11	16.3	0.9	23.2	2.0	26.9	2.6	37.9	4.3	
12	30.7	1.1	32.1	2.7	35.7	3.7	32.2	4.8	
13–15	28.7	0.8	24.7	2.0	21.9	2.6	21.1	2.3	
≥16	24.3	1.1	20.1	2.7	15.5	2.2	8.9	2.5	
Marital status									0.115
Married/Cohabiting	59.3	1.4	53.7	3.0	58.0	3.7	54.6	4.3	
Divorced/Separated/Widowed	21.9	1.1	25.2	2.6	28.9	2.9	27.8	5.3	
Never Married	18.8	1.1	21.1	1.9	13.1	2.9	17.6	3.7	
Income to needs ratio									<0.001

Sample Characteristics	Social Impairment[a]								p value[b]
	No N = 5,095		Mild N = 882		Moderate N = 508		Severe, Very Severe N = 320		
	%	SE	%	SE	%	SE	%	SE	
<25 Percentile	19.8	1.2	27.1	2.7	37.7	3.5	35.9	4.0	
25–50 Percentile	27.8	1.0	26.8	2.2	26.8	3.2	30.7	4.4	
50–75 Percentile	24.0	1.1	23.0	3.1	15.8	2.2	19.2	3.1	
75–100 Percentile	28.4	1.4	23.1	2.4	19.7	2.7	14.1	3.0	
Chronic Illness[c]									<0.001
<25 Percentile	27.9	1.1	22.5	2.5	22.7	2.7	19.8	5.0	
25–50 Percentile	26.8	1.2	29.0	2.8	28.3	3.9	18.5	3.2	
50–75 Percentile	21.3	0.8	18.7	3.2	18.8	3.2	14.9	2.3	
75–100 Percentile	24.1	0.8	29.8	2.9	30.2	3.4	46.8	4.6	
Accident, injury, or poisoning in past 12 months[d]									0.204
Yes	12.3	0.8	12.1	2.6	13.4	2.2	20.1	3.5	
Physical health, past 30 days[e]									<0.001
Better	12.4	0.6	13.0	1.4	20.4	2.6	20.3	3.1	
Worse	9.7	0.5	13.2	1.7	17.3	2.9	17.7	3.5	
About the same	77.9	0.8	73.8	1.4	62.3	3.3	62.0	2.3	
Physical discomfort, past 30 days[f]									<0.001
All	4.5	0.3	6.5	1.6	11.0	1.9	19.1	4.0	
Most	5.6	0.5	5.9	1.1	12.1	2.1	13.4	3.1	
Some	14.4	0.7	22.7	2.2	26.4	3.2	22.9	4.1	
A little	28.5	0.8	29.6	2.4	24.2	3.6	19.5	3.1	
None	47.0	1.1	35.2	2.5	26.3	3.1	25.1	3.0	
Problems with home management[g]									<0.001
No	64.9	1.1	10.5	2.2	6.0	1.5	6.7	1.8	
Mild	17.6	0.8	46.4	2.8	11.0	2.0	2.4	0.9	
Moderate	11.5	0.6	33.5	2.2	52.3	3.0	10.6	1.9	
Severe, Very Severe	5.9	0.5	9.6	1.6	30.7	2.5	80.2	2.6	

Sample Characteristics	Social Impairment[a]								p value[b]
	No N = 5,095		Mild N = 882		Moderate N = 508		Severe, Very Severe N = 320		
	%	SE	%	SE	%	SE	%	SE	
Mobility difficulty, past 30 days[h]									<0.001
Yes	19.8	0.8	31.6	1.8	36.6	3.0	46.9	4.1	
Self-care difficulty, past 30 days[i]									<0.001
Yes	4.1	0.5	10.2	1.2	9.9	2.0	18.6	2.4	

Note: SE: standard error.

[a] Presence of social impairment was determined by this question: *"Think about the month or longer in the past 12 when [(RANDOM CONDITION)] consequences were most severe. Using the 0 to 10 scale, where 0 means no interference and 10 means very severe interference, what number describes how much [(RANDOM CONDITION)] consequences interfered with each of the following activities during that time? Your ability to form and maintain close relationships with other people?"* The response anchors are None, Mild, Moderate, Severe, and Very Severe for scores of 0, 2, 5, 8, and 10, respectively.

[b] p values determined by the Rao-Scott chi-square test; degrees of freedom = (Number of Independent Variable Categories − 1)*(Number of Dependent Variable Categories − 1).

There are missing data with the number of participants equaling: [c] 6,753;

[d] 6,804;

[e] 6,799;

[f] 6,801;

[g] 6,775;

[h] 6,798;

[i] 6,797.

TABLE 2

Participant 12-month history of anxiety and depressive disorders stratified by social impairment status (N = 6,805).

Sample Characteristics	Social Impairment[a]								p value[b]
	No N = 5,095		Mild N = 882		Moderate N = 508		Severe, Very Severe N = 320		
	%	SE	%	SE	%	SE	%	SE	
12-month anxiety disorder									<0.001
Yes	12.7	0.5	18.1	1.8	33.5	3.6	41.1	3.3	
12-month depressive disorder									<0.001
Yes	8.3	0.4	14.1	1.3	21.9	3.1	30.1	4.6	
Any 12-month anxiety or depressive disorder									<0.001
Yes	17.0	0.6	24.0	2.0	38.7	4.0	47.3	3.6	
Comorbid 12-month anxiety and depressive disorder									<0.001
Yes	4.0	0.3	8.2	1.1	16.7	2.8	23.9	4.0	

Note: SE: standard error.

[a] Presence of social impairment was determined by this question: *"Think about the month or longer in the past 12 when [(RANDOM CONDITION)] consequences were most severe. Using the 0 to 10 scale, where 0 means no interference and 10 means very severe interference, what number describes how much [(RANDOM CONDITION)] consequences interfered with each of the following activities during that time? Your ability to form and maintain close relationships with other people?"* The response anchors are None, Mild, Moderate, Severe, and Very Severe for scores of 0, 2, 5, 8, and 10, respectively.

[b] p values determined by the Rao-Scott chi-square test; degrees of freedom = (Number of Independent Variable Categories − 1)*(Number of Dependent Variable Categories − 1).

TABLE 3

Unadjusted (N=6,805) and adjusted (N = 6,706) logistic regression analyses of the association of social impairment with a 12-month history of anxiety and depressive disorders.

	Anxiety		Depression		Any Anxiety or Depression		Comorbid Anxiety and Depression	
	Odds Ratio	95% Confidence Interval[a]	Odds Ratio	95% Confidence Interval[a]	Odds Ratio	95% Confidence Interval[a]	Odds Ratio	95% Confidence Interval[a]
Social Impairment,[b] unadjusted								
Mild	1.52	1.20–1.92	1.82	1.44–2.30	1.54	1.25–1.91	2.14	1.53–3.00
Moderate	3.46	2.49–4.81	3.11	2.20–4.40	3.09	2.21–4.32	4.80	3.21–7.16
Severe, Very Severe	4.79	3.53–6.49	4.77	3.04–7.49	4.40	3.24–5.97	7.48	4.64–12.07
Social Impairment,[b] adjusted[c]								
Mild	1.31	1.07–1.61	1.49	1.17–1.90	1.32	1.07–1.63	1.68	1.21–2.34
Moderate	3.03	2.14–4.28	2.09	1.41–3.10	2.43	1.71–3.47	3.69	2.38–5.73
Severe, Very Severe	3.18	2.23–4.53	2.97	1.72–5.12	2.94	2.12–4.08	4.52	2.49–8.20

[a] Intervals based on 95% Wald confidence limits.

[b] Presence of social impairment was determined by this question: *"Think about the month or longer in the past 12 when [(RANDOM CONDITION)] consequences were most severe. Using the 0 to 10 scale, where 0 means no interference and 10 means very severe interference, what number describes how much [(RANDOM CONDITION)] consequences interfered with each of the following activities during that time? Your ability to form and maintain close relationships with other people?"* The response anchors are None, Mild, Moderate, Severe, and Very Severe for scores of 0, 2, 5, 8, and 10, respectively. Reference group is no social impairment.

[c] The adjusted logistic regression analyses included: Age group, gender, race and ethnicity, education, marital status, income to needs ratio, chronic illness, accident/injury/poisoning in past 12 months, physical health past 30 days, physical discomfort past 30 days, home management problems, mobility difficulty, and problems with self-care. There were some missing participants in these analyses and total participants numbered 6,706.