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Anxious? Depressed? You might be suffering from capitalism: contradictory class locations and the prevalence of depression and anxiety in the USA

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Abstract Despite a well-established social gradient for many mental disorders, there is evidence that individuals near the middle of the social hierarchy suffer higher rates of depression and anxiety than those at the top or bottom. Although prevailing indicators of socioeconomic status (SES) cannot detect or easily explain such patterns, relational theories of social class, which emphasise political-economic processes and dimensions of power, might. We test whether the relational construct of contradictory class location, which embodies aspects of both ownership and labour, can explain this nonlinear pattern. Data on full-time workers from the National Epidemiologic Survey on Alcohol and Related Conditions (n = 21859) show that occupants of contradictory class locations have higher prevalence and odds of depression and anxiety than occupants of non-contradictory class locations. These findings suggest that the effects of class relations on depression and anxiety extend beyond those of SES, pointing to under-studied mechanisms in social epidemiology, for example, domination and exploitation.

Keywords: social class, epidemiology, mental health and illness, social determinants of health

Introduction

Social disadvantage is associated with a higher risk of most adverse mental health outcomes (Dohrenwend 1990, Dohrenwend and Dohrenwend 1969, Faris and Dunham 1988, Hollingshead and Redlich 1953, Muntaner *et al.* 2013). Indeed, it has been firmly established that there are disparities in both mental and physical health across traditional measures of socioeconomic status (SES) such as income, educational attainment and other indicators of social rank (Lynch and Kaplan 2000, Muntaner *et al.* 2013). These measures capture – and their theoretical underpinnings predict – an inverse linear, gradational relationship between SES and physical and mental illness (Mackenbach *et al.* 1997, Marmot and Smith *et al.* 1991). There is evidence, however, that individuals towards the middle of social hierarchies may actually suffer higher rates of internalising affective disorders, such as depression and anxiety, than those at either

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the top or the bottom (Muntaner *et al.* 1998, 2003, Wohlfarth 1997). Such patterns are neither detected nor easily explained using standard approaches.

Using traditional measures of SES, research since at least the 1930s has consistently documented the finding that mental illnesses are more common among those with lower levels of income, education and occupational prestige than in those with higher levels of these indicators (Dohrenwend and Dohrenwend 1969, Faris and Dunham 1988, Hollingshead and Redlich 1953, Kessler and Cleary 1980, Link *et al.* 1993). Studies such as Whitehall I and II have generated important insights about the social production and distribution of health disparities by establishing social gradients in physical and mental health (Marmot *et al.* 1991, Marmot and Brunner 2005, Stansfeld *et al.* 1995, 1998). Early on, these studies identified an unexplained residual social gradient after accounting for standard risk factors (Marmot *et al.* 1978) and this motivated considerable scholarship and debate on potential additional causes and mechanisms that do not operate through the pathway of behaviourally mediated proximal risk factors. These generative insights prompted substantial research efforts focused on relative versus absolute deprivation (Lynch *et al.* 2000) and workplace stress and its social construction (Wainwright and Calnan 2002). The granular occupational status hierarchies and longevity of the Whitehall cohorts have also facilitated productive investigations of social causation versus social selection mechanisms (Elovainio *et al.* 2011), complementing earlier tests of the causation versus selection debate as it pertained to psychiatric disorders (Dohrenwend *et al.* 1992).

Critics, however, have long admonished that traditional indicators of SES such as income level, educational attainment and occupational grade are incomplete explanatory and control variables in population research (Krieger *et al.* 1997, Muntaner and O'Campo 1993, Muntaner *et al.* 1991, 2000, Navarro *et al.* 2006, Wright 2009). This is in part because such indicators arise from numerous political and economic processes, which may have significant and direct effects on health in addition to those mediated by typical measures of SES. Such processes traditionally have been understood using relational theories of class, which have had less traction than traditional stratification approaches in population health research (Galobardes *et al.* 2006a, 2006b, Krieger *et al.* 1997, Muntaner *et al.* 2000). Instead, traditional measures of SES remain predominant, as they are easier to measure than relational constructs and because research has not tended to emphasize the causes of socioeconomic inequality, but rather the effects of socioeconomic position on health (Lynch and Kaplan 2000, Muntaner *et al.* 2010). Focusing only on the latter, however, without understanding the processes of power, context and meaning through which socioeconomic resources are obtained and experienced may ignore other aetiological pathways between political-economic structures and mental illnesses (Brenner 1973, Brown and Harris 1978, Faris and Dunham 1988, Hollingshead and Redlich 1953, Liem and Liem 1978, Srole and Langner *et al.* 1962). Furthermore, these measurement issues matter because standard approaches to SES may implicitly valorise extant social structures and therefore constrain the range of social and policy interventions deemed feasible and valid.

The primary aim of the present study is to explore how social class may influence depression and anxiety in ways that may be masked or incompletely explained by standard SES measures. A secondary aim is to extend earlier efforts to introduce explicitly theory-driven operationalisations of social class to social and psychiatric epidemiology. In the remainder of this section we briefly review the theoretical framework that informs traditional measures of SES and contrast it with the class theory that motivates our analysis. Next, we explore how class relations have been implicated historically in the aetiology of depression and anxiety. We then identify a potential mechanism for this relationship by connecting contemporary class theory to the body of literature on job strain and job control.

Stratificationist versus relational theories of class

Stratificationist conceptualisations of socioeconomic disadvantage provide the theoretical foundations for traditional measures of SES. However, critics (Krieger *et al.* 1997, Lynch and Kaplan 2000, Muntaner *et al.* 2000) have observed that studies that include simple stratification indicators such as income, education, occupational grade and so on rarely make an explicit reference to their theoretical underpinnings. A stratificationist perspective draws on the sociological tradition of structural functionalism, which contends that social stratification is universal and natural, and therefore must serve a purpose. For example, Davis and Moore (1945) suggested that inequality is functionally necessary to ensure that social positions of the greatest functional importance to society are conscientiously occupied by the most motivated and qualified individuals. This is achieved by differential remuneration. Contemporary stratification indicators, however, are only de facto functionalist, because they do not necessarily capture constructs that account for how individuals arrive in different social strata or address inequalities and interdependencies in the positions people occupy. Instead, they consist of attributes and conditions that are associated with people who are already situated in classes (Wright 2009). As critics (Muntaner and Lynch 1999, Muntaner and O'Campo 1993, Wohlfarth 1997) have argued, it may be more apt to consider stratification indicators (like SES) as 'outcomes', or proxies for processes that have already occurred, rather than 'exposures'. Doing so directs attention to more fundamental (Link and Phelan 1995) upstream antecedents responsible for numerous political-economic pathways to health outcomes in addition to SES.

In contrast, emphasis on processes and relations, as opposed to mere position, follows a rich tradition of Marxian and Weberian class analysis, in which class is properly understood not as an individual attribute but as individuals' relation to productive assets and their access to and exclusion from certain economic opportunities (Sørensen 2000, Wright 1997, 2009). In this relational perspective, classes are defined by mutually antagonistic self-interest, that is, the material welfare of one group depends causally on the material deprivations of another (Sørensen 2000, Wright 1997). In Wright's (1997) elaboration, social position is not simply a function of the inherited or achieved attributes of individuals but arises from the processes by which certain groups control productive resources by (i) excluding other groups from access to those resources and controlling their labour activities (domination), and by (ii) appropriating the fruits of that labour (exploitation). Thus, beyond a sorting mechanism, class relations are ongoing, dynamic interactions, and it is within these relations that we seek to explore determinants of depression and anxiety.

Depression and anxiety: sequelae of class relations?

We chose to focus this analysis on depression and anxiety because of historical attention to these outcomes in social theory, their prominence in social stress and social constructionist models of psychiatric illness, and prior evidence of their onlinear relationship with social class. They are the most common mental disorders in the general population (Kessler *et al.* 2011) and have been invoked in various forms by social theorists from Marx (2007) to Durkheim (2014), Sartre (2004) and Sennett and Cobb (1972), reflecting on the impact of capitalism on the psyche.

The effect of class relations on the development of depression and anxiety can be anticipated at the conjunction of social theory and the social stress paradigm (Kohn and Schooler 1983). The alienation of workers from production and the products of their labour is thought to diminish their self-efficacy and result in a sense of powerlessness (Gecas 1989, Seeman

1959) and self-estrangement, that is, engagement in activities that are not intrinsically rewarding. (Roberts 1987, Seeman 1975). Weber extended the issue of alienation qua of powerlessness and took industrial workers as a special example of those afflicted by universal trends towards bureaucratisation, mechanisation, depersonalisation and 'oppressive routine' (Gerth and Mills 1946: 50). Regarding self-estrangement, Marcuse (1991: xlvii) described the productive apparatus in advanced capitalism as shaping 'not only socially needed occupations, skills, and attitudes, but also individual needs and aspirations'.

Descriptions such as these are concordant with diathesis-stress models of psychopathology (Abramson *et al.* 1978, Beck and Alford 2009, Monroe and Simons 1991) that emphasise the interaction between individuals' predispositions and stressful life experiences, both of which are themselves socially patterned and produced (Aneshensel 1992). In other words, relations to production and labour conditions may both shape and interact with the stressors to which workers are exposed and their reaction to those stressors (that is, their psychosocial resources). Such resources may include a variety of psychosocial constructs such as self-efficacy, attributional dispositions, internalising versus externalising locus of control, and workplace demand/control (that is, job strain), relevant to the development of psychopathology.

In particular, locus of control and job strain have been studied extensively with respect to work and affective disorders (Griffin *et al.* 2007, Landsbergis *et al.* 2012, Stansfeld and Candy 2006), although these constructs avoid explicit engagement with social class (Muntaner and O'Campo 1993). For example, research using the National Longitudinal Survey, of the labour market experiences of several large age cohorts has examined the effect of powerlessness (operationalised as external locus of control) on physical and mental distress. Powerlessness exacerbates the effect of job-related and economic-related stressful life events on psycho-physiological distress (Krause and Stryker 1984) and prospectively predicts greater limits to individuals' activity, psychosocial symptoms and deteriorating health conditions (Seeman and Lewis 1995), controlling for demographic characteristics and baseline health.

Similarly, extensive research has shown that psychosocial work stress and, in particular, job strain, are important risk factors in the development of depression (Eaton *et al.* 2001, Plaisier *et al.* 2007, Stansfeld *et al.* 1999, Wang *et al.* 2009). Workers with jobs low in decision latitude and high in demands show higher depressive symptoms than workers with jobs high in decision latitude and low in demands (Karasek 1979) and those with jobs low in direction, control and planning, as defined by the US Department of Labor, have higher psychological distress and major depression than those with jobs high in direction, control and planning (Link *et al.* 1993). Occupations in which individuals have high degrees of direction, control and planning over their own and others' work foster a sense of mastery and personal control, which in turn have been shown to be protective against depressive symptoms (Link *et al.* 1993). Viewed from the perspective of relational class theory, these situational workplace experiences may act as mediators between class relations and mental health outcomes (Muntaner and O'Campo 1993). In other words, as we discuss below, class relations may structure access to occupations with varying degrees of direction, control, and planning, which then determines individuals' risk of depression and anxiety.

Contradictory class locations and occupational control

Presumably, as one moves down an organisational hierarchy relative to its owners, one encounters more stress and adversity due to exploitation, alienation and exposure to poor working conditions. It would therefore be reasonable to assume that the relationship between

workplace status (and therefore SES) and depression and anxiety would be more or less inverse and linear, with lower status consistently translating into increased disorder. Yet insights into the contemporary class structure have led to hypotheses about the distribution of these disorders that are not readily predicted by such stratificationist theories and measures. Specifically, Wright's (1985) notion of contradictory class locations has been hypothesised to lead to psychosocial stressors that are known risk factors for depression and anxiety, and may explain why those occupying intermediate locations in class hierarchies appear to suffer higher rates of depression and anxiety than those at either the top or bottom (Muntaner *et al.* 1998, 2003, Wohlfarth 1997).

The concept of contradictory class locations emerges from Wright's (1985, 1997) effort to accommodate, in modern class analysis, the heterogeneous relations to production evident in post-industrial economies. In contemporary capitalism 85–90 per cent of the labour force does not own the means of production and must sell its labour on the market, but much of that group does not perform the sort of manual labour commonly associated with the blue collar working class, nor is it exploited and dominated in the same way (Wright 1997). Wright classifies this group along two dimensions: the possession of skills and expertise and the degree of formal authority within organisational hierarchies in relation to production, both of which confer privilege and strategic advantage. For example, someone with valued and uncommon skills can obtain higher wages (that is, endure less exploitation) and more autonomy (less domination) than unskilled workers. Likewise, upper management (employees closer to the top of an organisational hierarchy) may receive delegated ownership authority to participate in developing company policy, whereas supervisors (employees in the middle and lower ranks of the organisational hierarchy) may be expected to implement company policy but not develop it, entitling them to higher wages and autonomy than workers but lower wages and autonomy than managers. Such locations within class relations are contradictory because they embody aspects of both ownership and labour.

As developed by Muntaner and O'Campo *et al.* (1993), Muntaner *et al.* 1998, 2003) and Wohlfarth (1997), the constructs of skills, expertise and authority (vis-à-vis contradictory class locations) are conceptually related to Karasek's (1979) job strain model and research on occupational direction, control and planning (Link *et al.* 1993). The intersection of these two models suggests why contradictory class locations may predict adverse outcomes such as depression and anxiety relative to lower class positions: broadly speaking, all but the highest level of managers may be expected to enforce policies in which they have little say, while simultaneously facing the antagonism of subordinates (Muntaner *et al.* 1998).

There is some empirical evidence that contradictory class locations confer an elevated risk of depression and anxiety. Muntaner *et al.* (1998) observed in community-based longitudinal data from the Epidemiologic Catchment Area Study (Robins and Reiger 1991) that higher level managers displayed lower rates of major depression, anxiety disorder and alcohol disorders than either supervisors or workers, while supervisors displayed higher rates of major depression and alcohol disorders than either managers or workers. Subsequently, in the 2000–2001 Barcelona Health Interview Survey of 4219 city residents, Muntaner *et al.* (2003) found evidence that the more contradictory the class location, the poorer the mental health of respondents.

Thus, population-based studies suggest that contradictory class locations are important for mental health. However, these findings are from selected cities (Baltimore, Maryland and Barcelona, Catalonia) and do not represent the national class structure in the US. Furthermore, the study in Barcelona used a non-diagnostic mental health measure, which has been found to be not associated with social stratification or social class in European samples (Muntaner *et al.* 2003). Finally, a stronger test of the contradictory class locations hypothesis would allow

distinctions between the private sector, where the concept and process of ownership is more straightforward, and the public sector.

Nonetheless, the findings summarised above are inconsistent with stratificationist theories of SES, which predict an inverse linear relationship between SES and mental health, but not with relational theories of class, which instead predict such nonlinear findings through numerous psychosocial mechanisms. The present study, then, builds on evidence for the role of contradictory class locations in explaining nonlinear patterns of mood and anxiety disorders by using a large, nationally representative survey of the general US population, the National Epidemiological Survey on Alcohol and Related Conditions (NESARC), which includes a fully structured diagnostic interview for the assessment of psychiatric disorders as well as extensive measures of SES.

Methods

Sample

This sample consists of participants in the 2001–2002 NESARC, a nationally representative US survey of civilian non-institutionalised participants aged 18 and older, interviewed in person. The National Institute on Alcohol Abuse and Alcoholism (NIAAA) sponsored the study and supervised the fieldwork, conducted by the US Bureau of the Census. The research protocol received full ethical review and approval from the US Census Bureau and US Office of Management and Budget. Young adults, Blacks and Latinos were oversampled; the overall response rate was 81 per cent. Further details of the sampling frame, demographics of the sample, and details about the interviewers, training and field quality control are described elsewhere (Grant *et al.* 2003a, 2003b, 2004a, 2007).

We restricted NESARC data to respondents who reported currently working full time (35+ hours per week) and who were not full-time homemakers (n = 21,859), as the role of domestic labor in individual versus household relation to production, while an important area for investigation, is beyond the scope of the present analysis. Separate analyses were conducted for the private sector and all sectors. The private sector includes employment by a private for-profit company, business or individual. All sectors include the private sector in addition to private not-for-profit, tax exempt or charitable organisation and federal, state, and local government (excluding armed forces).

Dependent variables

The NIAAA Alcohol Use Disorder and Associated Disabilities Interview Schedule DSM-IV (AUDADIS-IV) (Grant *et al.* 2001) was used to assess DSM-IV psychiatric disorders. This instrument was specifically designed for experienced lay interviewers and was developed to advance the measurement of substance use disorders and other mental disorders in large-scale surveys. Although evidence supports the contention that psychiatric nosology is shaped by sociocultural and political-economic context, for example, shifting moral narratives and social norms, political struggles and economic interests (see Branaman 2007, Conrad and Slodden 2013, Horwitz 2011, Wakefield 1992), the focus of the present study is not on the role of class relations in the social construction of depression and anxiety but rather on their prevalence and determinants as currently constructed.

DSM-IV-diagnosed disorders assessed by the AUDADIS-IV included major depression (‘depression’) as well as generalised anxiety disorder and panic disorder (‘anxiety’). We chose these disorders because the average age of onset relative to other mood and anxiety disorders is later (after age 18: Kessler *et al.* 2005), and we sought to focus on disorders that might arise

after entry in the workforce. The reliability and validity of mood and anxiety disorder diagnosis range from fair (kappa for panic disorder diagnosis = 0.42) to good (kappa for major depressive disorder diagnosis = 0.65) (Canino and Bravo *et al.* 1999, Grant *et al.* 1995, 2003a), including test–retest and clinical re-appraisal studies. The reliability of anxiety disorders diagnosed in the AUDADIS-IV is similar to those found for other instruments designed for national surveys such as the Composite International Diagnostic Interview and the Diagnostic Interview Schedule (Haro *et al.* 2006, Semler *et al.* 1987). Diagnoses were further validated using the Short-Form 12-Item Health Survey, Version 2, a mental disability score, in controlled linear regressions (Grant *et al.* 2004a, 2004b, 2005, Hasin *et al.* 2005).

Independent variables

Relation to production We constructed a class measure informed by Wright's typology and based on available indicators in the AUDADIS-IV. We categorised classes as owners, managers, supervisors and workers. Owners consist of respondents who identified as self-employed and earned more than or equal to $71,500 (the 90th percentile) in annual income. The 90th percentile was chosen because it clearly separates capitalists from small employers and the petty bourgeoisie, but is still obtainable by workers, managers and supervisors in a variety of occupations. A sensitivity analysis using a different income cut-off is described below. Managers consist of respondents who identified their occupation as executive, administrative or managerial and had more than or equal to a 4-year bachelor's degree. Supervisors consist of respondents who identified their occupation as executive, administrative or managerial and had less than a 4-year bachelor's degree. A bachelor's degree was chosen as a broad proxy for skills and expertise, in order to separate higher level management from lower level supervisors across a variety of occupations in which more specific educational credentials may have different meanings. A sensitivity analysis with no education proxy is discussed below. Workers consist of respondents who identified their occupation as private household; other services; farming, forestry, and fishing; operators, fabricators, and labourers; transportation and material moving; or handlers, equipment cleaners and labourers. We chose the above occupations to represent workers because examples provided under each of these categories on the AUDADIS-IV interview flashcard (Appendix A) did not explicitly mention special skills, expertise or managerial or supervisory functions. Sensitivity analyses using additional occupations to represent workers are discussed below.

Socioeconomic status We examined two traditional measures of SES to determine whether the NESARC sample is consistent with known SES prevalence patterns for depression and anxiety and to adjust for traditional SES measures in models presented below. For personal income, we grouped the continuous income variable into seven categories ranging from less than or equal to $20,000 ($n$ = 6142) to more than $120,000 ($n$ = 570). We grouped educational attainment into eight categories, ranging from 'none to grade 8' (n = 882) to 'completed graduate or professional degree' (n = 2183).

Analysis

We tabulated the prevalence of any lifetime and 12-month depression and anxiety by class categories, first restricting the data to the private sector and then including all sectors. We also tabulated depression and anxiety by income and education in the full sample. We constructed bivariate and adjusted logistic regression models (one for each of lifetime and 12-month depression and anxiety as the outcomes) to determine the odds of disorder across classes, in

the private sector and all sectors. Adjusted models include sex, age, ancestry group and metropolitan statistical area. Descriptive statistics were conducted using PROC SURVEYFREQ and regression models using PROC SURVEYLOGISTIC in SAS 9.3. The study design oversampled hard to reach groups, thus sample weights were incorporated to generate estimates that are nationally representative of the demographics of the USA based on the 2000 census. Further, design weights were incorporated to account for the stratified complex sampling strategy. Standard errors were estimated using Taylor series linearisation.

Sensitivity analysis

We performed four sensitivity analyses on our class measures. We wanted to ensure that our results were not contingent on our education proxy for managers and supervisors, our income cut-off for owners or our choice of worker occupations. In our first sensitivity analysis we collapsed the manager and supervisor categories by removing the education proxy and the income cut-off for owners. Owners consist of respondents who identified as self-employed, and managers or supervisors consist of respondents who identified their occupation as executive, administrative or managerial. In our next two sensitivity analyses we utilised our original class categories but systematically added occupations to the worker category. We did this because our original class operationalisation excluded from the worker category any occupations that involve special skills or expertise, or managerial or supervisory functions. Therefore, in our second sensitivity analysis we constructed an eight-occupation worker category that included sales; administrative support including clerical; private household; other services; farming, forestry, and fishing; operators, fabricators, and labourers; transportation and material moving; and handlers, equipment cleaners, and labourers. In our third sensitivity analysis, we constructed a 12-occupation worker category that included professional specialty; technical and related support; sales; administrative support, including clerical; private household; protective services; other services; farming, forestry, and fishing; precision production, craft, and repair; operators, fabricators, and labourers; transportation and material moving; and handlers, equipment cleaners, and labourers. In our fourth sensitivity analysis we lowered the income cut-off for owners to the 75th percentile, or $48,000 annual income.

Results

Table 1 presents prevalence estimates of lifetime and 12-month depression and anxiety by class and sector. With few exceptions and as hypothesised, contradictory class locations display the highest prevalence of depression and anxiety relative to non-contradictory class locations. In the private sector and all sectors, supervisors have the highest prevalence of all disorder categories. For lifetime disorders managers have the next highest prevalence, while owners had similar or lower prevalence than workers. For 12-month disorders the pattern is less consistent for depression but consistent for anxiety.

Odds ratios (OR) from bivariate logistic regression models show modest to strong effects of contradictory class location in the hypothesised direction (Table 2). For example, in the private sector, relative to workers, supervisors had higher odds of lifetime depression (OR: 1.75, 95% CI 1.58–1.93), lifetime anxiety (2.33, 1.97–2.75), 12-month depression (1.19, 1.03–1.37) and 12-month anxiety (1.76, 1.39–2.23). Compared to workers, managers had the next highest odds of lifetime depression (1.2, 1.06–1.35) and lifetime anxiety (1.36, 1.19–1.57). The pattern was identical, though the OR was slightly smaller, when the sample consisted of all sectors. For the private sector, when owners form the reference group (data not shown), supervisors

Table 1 *Prevalence of lifetime and current depression and anxiety across class locations*

		Depression				*Anxiety*			
		Lifetime		*12-month*		*Lifetime*		*12-month*	
Class	*N*	*%*	*SE*	*%*	*SE*	*%*	*SE*	*%*	*SE*
Private sector									
Worker	3047	11.72	0.45	5.22	0.29	4.90	0.27	2.25	0.19
Supervisor	1483	18.83	0.48	6.15	0.37	10.71	0.58	3.88	0.31
Manager	1039	13.71	0.58	4.36	0.31	6.56	0.27	2.48	0.19
Owner	227	11.08	1.06	4.47	0.90	2.29	0.58	0.43	0.02
All sectors									
Worker	3430	11.88	0.41	5.29	0.29	4.94	0.25	2.30	0.18
Supervisor	1867	18.73	0.38	5.78	0.31	11.29	0.50	3.63	0.25
Manager	1557	16.08	0.57	4.95	0.24	6.56	0.23	2.56	0.15
Owner	227	11.08	1.06	4.47	0.90	2.29	0.58	0.43	0.02

Note: Workers identified their occupation as private household; farming, forestry, and fishing; operators, fabricators, and labourers; transportation and material moving; or handlers, equipment cleaners, and labourers. Managers identified their occupation as executive, administrative or managerial, and had ≥ bachelor's degree. Supervisors meet the same criteria as managers but have < bachelor's degree. Owners identified as self-employed and earned ≥ $71,500 (the 90th percentile) in annual income. All sectors includes private for-profit company, business, or individual; private not-for-profit, tax exempt, or charitable organisation; and federal, state and local government (excluding armed forces).

have the highest odds of lifetime depression (1.86, 1.5–2.31), 12-month depression (1.4, 0.9–2.16), lifetime anxiety (5.13, 3.1–8.6) and 12-month anxiety (9.39, 7.76–11.35), respectively.

Adjustment for age, sex, ancestry group, and metropolitan statistical area did not change the pattern of findings comparing supervisors to workers for any outcomes except 12-month depression; however, the magnitude of the effect of contradictory class location was weaker. The estimates for managers relative to workers were also reduced or null in some cases. Comparing supervisors to owners (data not shown), supervisors had higher odds of lifetime depression (1.49, 1.17–1.87), lifetime anxiety (4.38, 2.61–7.35) and 12-month anxiety (7.26, 5.83–9.04). There was no effect for 12-month depression (0.99, 0.62–1.6). Managers and workers had similar odds of all disorders relative to owners. Sex and ancestry group were the primary drivers of the reduced adjusted effects.

Table 3 shows the distribution of depression and anxiety across traditional measures of SES: income categories and educational attainment. As expected, income displays a negative linear relationship with lifetime and 12-month depression and anxiety, with some exceptions in the highest income category. Educational attainment shows a nonlinear prevalence pattern that varies by disorder. In general, individuals who do not complete an educational milestone (some high school, some college) have a higher prevalence of depression and anxiety than individuals who complete the respective educational milestone (completed high school, completed college). Prevalence then typically increases among individuals with some or completed graduation or professional education.

Sensitivity analyses

We hypothesised that collapsing the manager and supervisor categories by removing the education proxy for skills or expertise would dilute the effects of contradictory class location, but that this broader contradictory class location category would still show higher odds of

Table 2 *Bivariate and adjusted odds of depression and anxiety among managers, supervisors, and owners relative to workers, private and all sectors*

	Depression				*Anxiety*			
	Lifetime		*12-month*		*Lifetime*		*12-month*	
	OR	*95% CI*	*OR*	*95% CI*	*OR*	*95% CI*	*OR*	*95% CI*
Private sector								
Bivariate								
Worker	1		1		1		1	
Supervisor	1.75	(1.58–1.93)	1.19	(1.03–1.37)	2.33	(1.97–2.75)	1.76	(1.39–2.23)
Manager	1.20	(1.06–1.35)	0.83	(0.70–0.98)	1.36	(1.19–1.57)	1.11	(0.89–1.37)
Owner	0.94	(0.75–1.18)	0.85	(0.56–1.30)	0.45	(0.27–0.78)	0.19	(0.16–0.22)
Adjusted								
Worker	1		1		1		1	
Supervisor	1.32	(1.17–1.48)	0.88	(0.71–1.1)	1.66	(1.35–2.05)	1.25	(0.97–1.6)
Manager	1.01	(0.89–1.14)	0.70	(0.57–0.87)	1.06	(0.92–1.23)	0.88	(0.7–1.09)
Owner	0.89	(0.69–1.13)	0.88	(0.56–1.4)	0.38	(0.22–0.65)	0.17	(0.14–0.21)
All sectors								
Bivariate								
Worker	1		1		1		1	
Supervisor	1.71	(1.57–1.86)	1.10	(0.96–1.26)	2.45	(2.12–2.84)	1.60	(1.29–1.98)
Manager	1.42	(1.28–1.59)	0.93	(0.81–1.08)	1.35	(1.19–1.54)	1.12	(0.91–1.37)
Owner	0.92	(0.74–1.16)	0.84	(0.55–1.29)	0.45	(0.26–0.77)	0.18	(0.15–0.22)
Adjusted								
Worker	1		1		1		1	
Supervisor	1.26	(1.15–1.38)	0.82	(0.67–1)	1.77	(1.49–2.12)	1.19	(0.95–1.49)
Manager	1.17	(1.04–1.31)	0.80	(0.67–0.95)	1.04	(0.92–1.18)	0.92	(0.74–1.14)
Owner	0.87	(0.68–1.11)	0.87	(0.55–1.36)	0.38	(0.22–0.65)	0.17	(0.14–0.21)

Note: Adjusted models control for age, sex, ancestry group and metropolitan statistical area. Workers identified their occupation as private household; farming, forestry, and fishing; operators, fabricators, and labourers; transportation and material moving; or handlers, equipment cleaners, and labourers. Managers are employed by a for-profit company, business, or individual, identified their occupation as executive, administrative or managerial, and have ≥ a bachelor's degree. Supervisors meet the same criteria as managers but have < bachelor's degree. Owners identified as self-employed and earned ≥ $71,500 (the 90th percentile) in annual income.

depression and anxiety than non-contradictory locations. As expected, the manager or supervisor category had the highest prevalence of all disorders (Appendix B, Table B1) and significantly higher odds of all disorders except 12-month depression (Appendix B, Table B2, sensitivity analysis 1) relative to workers and owners (data not shown). We also hypothesised that the addition of occupations to the worker category would dilute but not nullify our findings, given the likely misclassification it would introduce. Reclassifying workers to include eight occupations showed reduced, but significant, effects of contradictory class location. Supervisors had higher odds of lifetime depression, lifetime anxiety and 12-month anxiety relative to workers (Appendix Table B2, sensitivity analysis 2) and higher odds of those same disorders relative to owners (not shown). Managers had the next highest odds relative to owners for lifetime disorders (data not shown). The effect of contradictory class location was further diminished, but not eliminated, after reclassifying the worker category to include 12 occupations. ORs show that relative to workers, supervisors maintained higher odds of lifetime

Table 3 *Prevalence of depression and anxiety across traditional measures of socioeconomic status*

		Depression				*Anxiety*			
		Lifetime		*12-month*		*Lifetime*		*12-month*	
SES	*N*	*%*	*SE*	*%*	*SE*	*%*	*SE*	*%*	*SE*
Income ($)									
≤ 20,000	6142	18.29	.34	8.65	.24	7.17	.20	3.50	.12
20,001–40,000	8622	17.66	.22	6.13	.14	7.38	.16	2.86	.08
40,001–60,000	3998	15.56	.30	5.16	.22	6.74	.20	2.31	.13
60,001–80,000	1536	14.15	.47	4.82	.31	5.85	.36	1.40	.18
80,001–100,000	756	11.19	.38	3.49	.16	5.39	.28	1.49	.14
100,001–120,000	235	10.13	1.25	4.01	.55	5.85	1.11	1.05	.03
> 120,000	570	15.13	.55	3.49	.33	6.22	.56	1.91	.48
Highest level of education									
None – grade 8	882	9.52	.69	3.82	.32	3.57	.30	1.70	.16
Some high school	1552	15.47	.54	8.05	.39	6.64	.37	3.26	.26
High school or GED	5949	14.97	.28	6.29	.24	6.82	.21	2.78	.13
Some college	4656	19.59	.33	7.01	.22	7.46	.20	3.07	.12
Associate/2-year degree	2277	17.91	.48	6.31	.29	9.37	.47	3.05	.20
College	3432	15.07	.29	5.25	.16	5.45	.15	2.17	.07
Some grad/professional	928	20.26	.65	6.07	.40	7.60	.52	1.95	.31
Grad/professional	2183	19.11	.40	6.57	.27	7.44	.25	2.67	.20

Note: Depression includes major depression. Anxiety includes generalised anxiety and panic disorder. In the USA, high school includes grades 9–12. GED, or general educational development, is a series of tests demonstrating skills equivalent to completion of high school. Associate/2-year degrees are awarded by community, junior or technical colleges and are often equivalent to the first 2 years of a 4-year bachelor's degree. College is typically a 4-year bachelor's degree.

depression, lifetime anxiety and 12-month anxiety (Appendix Table B2, sensitivity analysis 3) and all disorders relative to owners (not shown). Relative to owners, managers and workers showed similar odds of all disorders. Finally, using our original class categories but reducing the income cut-off for owners did not alter the pattern of our findings (Appendix Table A2, sensitivity analysis 4). Relative to workers, supervisors maintained the highest odds of all disorders, followed by managers. Relative to owners, supervisors had the highest odds of all disorders, followed by managers, who had the next highest odds for all disorders except 12-month depression.

Discussion

Using a relational measure of class, we found that individuals who occupy more contradictory class locations have a higher prevalence and odds of depression and anxiety than individuals in less contradictory class locations. As such, individuals' relation to production results in patterns of depression and anxiety that are distinct from those seen using traditional SES measures. These findings confirm results from prior studies that used measures of class based on the same neo-Marxian theory employed here (Muntaner *et al.* 1998, 2003), but extend the evidence by using nationally representative data that capture the contemporary national class

structure in the USA. The finding that supervisors and managers tend to have higher prevalence and odds of depression and anxiety than both owners and workers is important for understanding the aetiology of depression and anxiety vis-à-vis social stress theory, and has implications for measuring SES versus class.

Regarding stress theory, our findings suggest that class relations may structure exposure to depressogenic and anxiogenic occupations, and that stresses from workplace domination and exploitation may extend beyond those associated with the relative material disadvantage that is a consequence of domination and exploitation. While social stress theory does not preclude a diversity of stressors and stress reactions that have different effects on physical and mental health, our findings imply that the social distribution of some labour-related stressors may not fit a stratificationist framework that views the social distribution linearly, along a social gradient (Adler *et al.* 2013, Braveman *et al.* 2005, Kunst *et al.* 1995, Mackenbach *et al.* 1997, Marmot *et al.* 1991).

Contradictory class locations may entail greater exposure to exogenous stressors consistent with the job strain model. They may also have an impact on individuals' interpretations of and responses to stressors encountered as a function of class location. Thus, it may not only be the social position that one occupies, but how one came to occupy and ascribe meaning to it, that has implications for depression and anxiety. For example, their relation to production may play a role in individuals' attributional dispositions, wherein low-level supervisors attribute their occupational conditions as resulting from internal, personal failings, whereas workers attribute their exploitation, alienation and lower levels of occupational control to factors external to themselves. Research has consistently shown that external attributions are protective against low self-esteem and internalising disorders such as depression (Abramson *et al.* 1989, Weiner 1985).

The notion that the subjective meaning of social location is important for mental health is also suggested by research on subjective social status (SSS). Using data from the Whitehall II study of British white-collar civil servants, researchers found that SSS was a strong predictor of depression after controlling for traditional measures of SES such as income, occupational grade and education (Singh-Manoux *et al.* 2003). While SSS may represent merely an averaging, and therefore a more accurate, index of traditional SES indicators, or alternatively the reverse causation of depressed or anxious individuals' biased rankings, it may also capture individuals' subjective interpretation of their social position and the meaning attached to it (Jackman and Jackman 1973, Wilkinson 1996).

Our findings provide evidence for the effects of social structure (the 'neomaterial matrix of contemporary life': Lynch *et al.* 2000: 1202) on mental health through mechanisms intertwined with the distribution of material goods. Although many of the mechanisms that bring structural phenomena under the skin are ultimately proximate and psychosocial, this does not necessarily imply that proximate, psychosocial interventions are the appropriate response to the findings described in this study. Furthermore, our findings are consistent with recommendations for redistributive policies and workplace democracy stemming from studies that tested hypotheses about other psychosocial mechanisms (Lynch *et al.* 1998, 2000, Muntaner *et al.* 2008, 2011, Wilkinson and Pickett 2007). That said, a relational class perspective is consistent with evidence that interventions at the level of the workplace environment are minimally effective, because meaningfully changing conditions such as worker autonomy requires changes to the very structure of wage labour, that is, class relations (Macleod and Davey Smith 2003, van der Klink *et al.* 2001).

The present study is limited by its reliance on proxies for capital assets, skill, expertise and authority that define contradictory class locations in relation to production. We chose to focus on ownership and control over the means of production because it is the essence of a relational class approach, and because existing psychiatric epidemiological data do not currently permit a

deeper examination of Wright's class typology. Direct measurement of Wright's class typology would entail questions about decision-making authority (relationship to domination within production) and the possession of skills or expertise (relationship to strategic knowledge of productive processes), via self-report or occupational codes, for example, from the US Department of Labor Occupational Information Network (2010). The AUDADIS-IV did not include direct measures such as these. If we had direct measures of skills and expertise and authority, either self-reported or objective, we might expect to find more nuanced associations between class location and depression or anxiety. For example, on the dimension of skills and expertise we might expect unskilled managers to have higher depression or anxiety than skilled managers. To our knowledge, no large, representative population data exist in the USA in which such hypotheses can be tested directly. In addition, we were unable to test directly whether workplace exposures (for example, job strain) act as mediators between class relations and mental health outcomes. If class relations structure access to occupations with varying degrees of direction, control and planning, this may explain the increased odds of depression and anxiety for managers and supervisors. We hope the present study underscores the importance of further pursuing this line of inquiry.

Our proxies are somewhat sensitive to occupations considered worker (Appendix B), that is, the effect of contradictory class location was reduced as we added occupations to the worker category or reduced the income cut-off for owners. Nonetheless, our proxies support the hypothesis that individuals in contradictory class locations are at greater risk for depression and anxiety than those in non-contradictory locations. This is because (i) despite a weakening of effect, the findings remained in the same direction; and (ii) the reduction in the magnitude of the effect of contradictory class locations conforms to our theoretical framework. When we added occupations to the worker category or reduced the income cut-off for owners, we were also clearly adding some managers, supervisors and individuals with special skills or expertise (see Appendix A). In other words, we added non-differential misclassification to our categorisation that we would expect to bias our results toward the null.

Our definition of owner as self-employed and earning the 90^{th} percentile in annual income (75^{th} percentile in the sensitivity analysis) may have resulted in an underestimation of the effect of contradictory class location on depression and anxiety. This is because, despite income cut-offs, the owner category probably included the singularly self-employed and small employers who may face work-related stresses that are more similar to those experienced by managers and supervisors than the traditional capitalist class. This may also explain why owners sometimes had higher prevalence and odds of disorder than workers.

Our findings are also limited by the NESARC's reliance on self-report for SES measures and a lack of clinical assessment of psychiatric disorder, which may result in spurious findings if cognitive biases related to SES responses (for example, low education being related to misunderstanding questions or the social desirability of endorsing mental health items). We also analysed NESARC data cross-sectionally, thereby limiting causal inference about the temporality of the association between class location and disorders.

Regarding comparative methods in the measurement of socioeconomic position in social and psychiatric epidemiology, our findings illustrate the need – as articulated by others (Krieger *et al.* 1997, Lynch and Kaplan 2000, Lynch *et al.* 2000, Muntaner *et al.* 1991) – for explicitly theory-driven operationalisations of socioeconomic position. This is not to say that traditional measures of SES such as income and education are not important and meaningful constructs for certain questions, but rather to suggest that understanding how socioeconomic position drives health outcomes is more complex than any single measure can convey. More precise measures of class, via occupational skills, expertise and authority already exist from the US Department of Labor. Other

constructs may be more difficult to routinely measure: for example, sociologists and social epidemiologists have calculated more traditionally defined exploitation rates for the manufacturing sector using the World Bank's world development indicators for value added as a percentage of gross domestic product (Boswell and Dixon 1993; Muntaner and Lynch 2002, Muntaner *et al.* 2002, World Bank n.d.). Such measures would provide objective, quantitative counterparts to psychosocial measures discussed above and constitute an under-explored line of inquiry into the relationship between class and mental health.

The findings of the present study allude to broader social problems that are the result of the political-economic arrangements of post-industrial capitalism in the developed world, characterised by deregulation, privatisation, capital mobility, the dismantling of trade unions and other working-class institutions, the withdrawal of the state from social provision and, domestically, the replacement of the manufacturing sector with the service sector (Harvey 2005). The health consequences of these trends have been reviewed extensively elsewhere (Navarro 2007) and the consequences for class relations are complex and manifold. As we have not tested hypotheses about such forces directly, the purpose of the present discussion is to emphasise the need for population health research to explicitly acknowledge the political-economic context in which quantitative measures of socioeconomic inequality are situated and engage openly with the theoretical framework that informs whatever operationalisation is chosen.

Our study used a large, nationally representative sample and diagnostic measures of depression and anxiety to identify and explore an apparent contradiction in the dominant social determinants of health discourse; that is, a nonlinear relationship between social class and certain mental illnesses. We documented how the political-economic arrangements that give rise to SES may affect depression and anxiety via relational class mechanisms in a nonlinear, non-gradational fashion. This was seen in the high prevalence and odds of depression and anxiety among supervisors and managers relative to workers and owners. Our findings suggest that class processes such as domination and exploitation warrant explicit attention in social and psychiatric epidemiology.

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Appendix A: NESARC occupation flashcard

Card 8A

Variable category		*Examples*
1	Executive, administrative, and managerial	Managers (business, financial restaurant, hotel); Public administrators; Administrators
2	Professional speciality	Teachers; Scientists; Lawyers; Accountants; Computer system analysts; Librarians; Doctors, RNs, Pas; Writers/artists/athletes
3	Technical and related support	Health technicians & technologists, LPN's, dental hygienists; Computer programmers & operators; Other technicians/technologists (industrial)
4	Sales	Sales representatives (retail, insurance, real estate): Sales workers, cashiers; Supervisors of sales workers; Shopkeepers, owners
5	Administrative support, including clerical	Computer installation & maintenance workers; Secretaries/typists/receptionists/bank tellers; Financial records processing (bookkeepers, clerks); Mail Distribution
6	Private household	Maids; Housekeepers; Butlers; Live-in child care workers
7	Protective services	Police/firefighters; Security guards/crossing guards
8	Other services	Food services (cooks, waiters, bartenders); Health services (dental assistants, nurses' aides); Cleaning and building services (janitors, *etc.*); Personal services (barbers, bellhops, child care workers)
9	Farming, forestry, and fishing	Farm operators/managers; Agricultural inspectors; Farm workers; Gardeners; Forestry and fishing operations
10	Precision production, craft, and repair	Manufacturing supervisors; Mechanics and repairers (cars, machinery, aircraft); Construction (supervisors, skilled workers);Precision production (tool and die, machinists, shoe repair, upholsterers, butchers)

Appendix A *(continued)*

Card 8A

Variable category		*Examples*
11	Operators, fabricators, and laborers	Machine operators (textile, printing, metal, and woodworking); Fabricators; Assemblers; Inspectors and samplers
12	Transportation and material moving	Motor vehicle and other transportation workers (truck/bus/cab drivers, sailors)Material moving equipment operators (hoist, crane, tractor operators)
13	Handlers, equipment cleaners, and laborers	Construction labourers; Freight stock and material handlers (garbage collectors,vehicle washers, dock workers)
14	Military	Army, Navy, Marines, Air Force

Appendix B: Sensitivity analyses

Table B1 *Prevalence of lifetime and current depression and anxiety across three class locations, no education proxy*

	Depression				*Anxiety*			
	Lifetime		*12-month*		*Lifetime*		*12-month*	
Class	*%*	*SE*	*%*	*SE*	*%*	*SE*	*%*	*SE*
Worker	11.88	0.41	5.29	0.29	4.94	0.25	2.30	0.18
Manager/supervisor	17.50	0.36	5.39	0.19	9.10	0.29	3.13	0.16
Owner	14.79	0.58	4.36	0.41	5.88	0.40	2.37	0.21

Note: $N = 8109$. All sectors. Workers identified their occupation as private household; farming, forestry, and fishing; operators, fabricators, and labourers; transportation and material moving; or handlers, equipment cleaners, and labourers. Managers/supervisors consist of respondents who identified their occupation as executive, administrative, or managerial. Owners identified as self-employed and earned ≤ $71,500 (the 90^{th} percentile) in annual income.

Table B2 *Sensitivity analyses for the odds of depression and anxiety among managers, supervisors, and owners relative to workers, all sectors*

	Depression				*Anxiety*			
	Lifetime		*12-month*		*Lifetime*		*12-month*	
	OR	*95% CI*	*OR*	*95% CI*	*OR*	*95% CI*	*OR*	*95% CI*
Sensitivity analysis 1:[†]								
Worker	1							
Manager/supervisor	1.57	(1.45–1.71)	1.02	(0.91–1.15)	1.93	(1.7–2.19)	1.37	(1.13–1.67)
Owner	1.29	(1.13–1.47)	0.82	(0.66–1.02)	1.20	(1–1.44)	1.03	(0.81–1.32)
Sensitivity analysis 2:[‡]								
Worker	1		1		1		1	
Supervisor	1.22	(1.15–1.29)	0.87	(0.78–0.98)	1.86	(1.67–2.08)	1.34	(1.14–1.57)
Manager	1.02	(0.93–1.11)	0.74	(0.66–0.83)	1.03	(0.94–1.12)	0.93	(0.81–1.08)
Owner	0.66	(0.53–0.82)	0.67	(0.44–1.01)	0.34	(0.2–0.57)	0.15	(0.14–0.17)
Sensitivity analysis 3:[§]								
Worker	1		1		1		1	
Supervisor	1.13	(1.08–1.19)	0.85	(0.76–0.95)	1.78	(1.61–1.96)	1.36	(1.17–1.58)
Manager	0.94	(0.86–1.02)	0.72	(0.65–0.8)	0.98	(0.91–1.06)	0.95	(0.84–1.08)
Owner	0.61	(0.49–0.76)	0.65	(0.43–0.99)	0.33	(0.2–0.55)	0.16	(0.14–0.17)
Sensitivity analysis 4:[¶]								
Worker	1		1		1		1	
Supervisor	1.71	(1.57–1.86)	1.10	(0.96–1.26)	2.45	(2.12–2.84)	1.60	(1.29–1.98)
Manager	1.42	(1.28–1.59)	0.93	(0.81–1.08)	1.35	(1.19–1.54)	1.12	(0.91–1.37)
Owner	1.31	(1.15–1.48)	0.86	(0.65–1.13)	1.06	(0.87–1.29)	0.74	(0.62–0.88)

[†]N = 8109. Worker category includes private household; farming, forestry, and fishing; operators, fabricators, and labourers; transportation and material moving; and handlers, equipment cleaners, and labourers. Owners consist of respondents who identified as self-employed. Managers/supervisors consist of respondents who identified their occupation as executive, administrative or managerial.

[‡]N = 13,243. Worker category includes sales; administrative support, including clerical; private household; other services; farming, forestry, and fishing; operators, fabricators, and labourers; transportation and material moving; and handlers, equipment cleaners, and labourers. Managers identified their occupation as executive, administrative or managerial, and ≤ bachelor's degree. Supervisors meet the same criteria as managers but < a bachelor's degree.

[§]N = 20,510. Worker category includes professional specialty; technical and related support; sales; administrative support, including clerical; private household; protective services; other services; farming, forestry, and fishing; precision production, craft, and repair; operators, fabricators, and labourers; transportation and material moving; and handlers, equipment cleaners, and labourers. Managers identified their occupation as executive, administrative, or managerial, and have greater than or equal to a bachelor's degree. Supervisors meet the same criteria as managers but have less than a bachelor's degree.

[¶]N = 7263. Owners identified as self-employed and earned $48,000 in annual income (the 75th percentile). Worker category includes private household; farming, forestry, and fishing; operators, fabricators, and labourers; transportation and material moving; and handlers, equipment cleaners, and labourers. Managers identified their occupation as executive, administrative, or managerial, and have greater than or equal to a bachelor's degree. Supervisors meet the same criteria as managers but have less than a bachelor's degree.