


RESEARCH ARTICLE

Mental illness, drinking, and the social division and structure of labor in the United States: 2003-2015

Seth J. Prins PhD, MPH^{1,2}  | Sarah McKetta MPH¹ |
Jonathan Platt MPH¹ | Carles Muntaner PhD, MHS³ |
Katherine M. Keyes PhD, MPH^{1,4} | Lisa M. Bates ScD, SM¹

¹ Department of Epidemiology, Columbia University, New York, New York

² Department of Sociomedical Sciences, Columbia University, New York, New York

³ Lawrence S. Bloomberg Faculty of Nursing, University of Toronto, Toronto, Ontario

⁴ Center for Research on Society and Health, Universidad Mayor, Santiago, Chile

Correspondence

Seth J. Prins, Departments of Epidemiology and Sociomedical Sciences, Columbia University, Mailman School of Public Health, New York 10032, NY.
Email: sjp2154@columbia.edu

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Abstract

Background: We draw on a relational theoretical perspective to investigate how the social division and structure of labor are associated with serious and moderate mental illness and binge and heavy drinking.

Methods: The Panel Study of Income Dynamics and the Occupational Information Network were linked to explore how occupation, the productivity-to-pay gap, unemployment, the gendered division of domestic labor, and factor-analytic and theory-derived dimensions of work are related to mental illness and drinking outcomes.

Results: Occupations involving manual labor and customer interaction, entertainment, sales, or other service-oriented labor were associated with increased odds of mental illness and drinking outcomes. Looking for work, more hours of housework, and a higher productivity-to-pay gap were associated with increased odds of mental illness. Physical/risky work was associated with binge and heavy drinking and serious mental illness; technical/craft work and automation were associated with binge drinking. Work characterized by higher authority, autonomy, and expertise was associated with lower odds of mental illness and drinking outcomes.

Conclusions: Situating work-related risk factors within their material context can help us better understand them as determinants of mental illness and identify appropriate targets for social change.

KEYWORDS

division of labor, drinking, mental health, occupational health, occupations, social class, work

1 | INTRODUCTION

How are mental illness and binge and heavy drinking patterned by the social division and structure of labor? There are long traditions of research in epidemiology and sociology on the relationships among occupations, the characteristics of work, and mental health outcomes.

But research on work and mental health across the labor force is at least a decade old, or utilizes decades old data. The intervening period witnessed ongoing neoliberal transformations of the state and significant dislocations in the U.S. labor market, including continued wage stagnation, increasing economic inequality, declines in union membership and attendant reductions in protections for workers, increasing job insecurity, ongoing market deregulation, and a global economic crisis.¹⁻⁶ Theory and evidence from past research, from materialist and psychosocial perspectives, provide strong reasons to

Institution at which the work was performed: Columbia University.

expect these processes and events to influence the social division and structure of labor in ways that have collateral consequences for population mental health.^{7,8}

The present study thus has two primary aims: first, it describes the prevalence and odds of serious and moderate mental illness (“mental illness”) and binge and heavy drinking (“drinking outcomes”) across Census occupation categories in a contemporary, nationally representative sample, updating the literature on their occupational distribution. It also explores the relationship between these outcomes and other aspects of the social division and structure of labor (defined below), specifically, the gap between workers’ productivity and pay, unemployment, and the gendered division of domestic labor. Second, it investigates whether and how the structure of work in the early 21st century is associated with mental illness and drinking outcomes. Building on the research of Hadden et al.⁹ and Alterman et al.,¹⁰ the study makes novel use of the Department of Labor’s Occupational Information Network (O*NET), an under-utilized data source, and derives contemporary dimensions of the structure of work associated with mental illness and drinking outcomes.¹¹

1.1 | Work and mental health

The social division and structure of labor have implications for individual and population mental health. A person’s occupation, and the nature of their work, is a snapshot of dynamic power relations, between labor and capital, workers and bosses, the regulatory state and corporations, and even spouses or domestic partners. By virtue of being a snapshot, the effects of these social relations are difficult to detect and estimate; however, researchers have sought to operationalize the organization and character of work in ways that might reveal their traces.

Toward that end, this study adopts a relational approach¹² to understanding social class and work as social determinants of health. It draws on relational theoretical perspectives that view the social division of labor into various occupations, and the structure or character of the work done in those occupations, as dynamic, often mutually antagonistic social relations in which individuals are situated relative to their roles in economic production.¹³ From this perspective, the *social division of labor* refers to the complex system that emerges in a commodity-producing society, in which individuals engage in qualitatively different forms of work.¹⁴ Different people engage in different trades, crafts, and professional specialties across numerous sectors and production processes. In capitalist economies, the social division of labor is driven “chaotically and anarchically by the market,”¹³ but can be tamed by regulations, social protections, and public investments in particular sectors through subsidies, grants, etc.

The early 21st century was characterized by ongoing changes in the social division of labor; namely, the continued decline in the goods-producing sector and growth of the service sector. Between 1999 and 2017, the percentage of the work force in the goods-producing sector dropped from 19% to 13.9%, while that of the service sector rose from 78% to 86.3%.^{15,16} This period was also characterized by ongoing wage stagnation coupled with an increase in work hours for all but the

top 1% of wage earners, constituting a “productivity-to-pay gap.”¹⁷ For example, from 1973 to 2013, hourly compensation of a typical worker rose just 9%, while productivity increased 74%.¹⁷

The social division of labor is implicated in mental health: research using U.S. data from the early 1980s found that lawyers, secretaries, and other teachers and counselors had elevated odds of depression relative to people in other occupations.¹⁸ Alcohol consumption in particular, while not a health problem per se, is patterned by occupation^{19–22} and causally implicated in at least 60 medical conditions, accounting for roughly the same amount of death and disability as tobacco and hypertension.²³ Occupations are clearly implicated in population mental health: a recent study found that suicide rates differ appreciably by occupation, with the highest rates in farming, fishing, and forestry; construction and extraction; and installation, maintenance, and repair.²⁴

The *structure of labor* refers to the organization of work and the character of work. Different jobs have different physical and psychosocial contexts, and are organized in different ways: the assembly line involves more repetition and fast pace; website design involves more problem-solving and creativity. These characteristics are not merely the aggregated individual attributes of the people who end up in particular jobs, but also reflect “the habituation of the worker to the mode of production.”¹³

For example, one aspect of the structure of labor is the separation of the work of production into distinct tasks performed by different workers. This subdivision of production is an innovation of managers and owners of capital, enabling them to extract as much value as possible from the labor they purchase.^{13,14} For example, a trend observed over the course of the 20th century was the deskilling of workers through scientific management and technologization. Through deskilling, managers and owners gained tighter control over the labor process, greater efficiency, and higher profits. First observed in manufacturing, deskilling has also occurred in once “white collar” occupations, for example clerical and administrative work.^{25,26} Conversely, some professional occupations have resisted deskilling and replacement by technology, such as jobs that require high levels of technical, professional, or creative expertise.²⁷

Considerable research has explored how the organization of work creates stress that can manifest in mental illness and substance use problems. Imbalances in the demands of work (pace, complexity, emotional toll) relative to workers’ control and autonomy are associated with increased depression, alcohol abuse and dependence, and drug dependence.^{19,28,29} Imbalances between effort and reward are also associated with increases in common psychiatric disorders, including depression and anxiety.^{30,31} Alienation, self-estrangement, and powerlessness in work are associated with heavier drinking patterns and the development of problem drinking among workers with low occupational status.^{32,33} However, much of this research prioritizes psychosocial explanations over more relational approaches that situate psychosocial risk factors within the material context of workplace organization, a context designed to increase productivity and profit.

Shifts in power relations against workers and in favor of capital also saw one of the most significant changes in the social division and

structure of labor since the turn of the century, the normalization of precarious labor and job insecurity.^{34,35} Often euphemistically described as “flexible work” or “the gig economy,” precarious labor can indeed be characterized by increased flexibility, but primarily of the sort that benefits employers. This flexibility makes it easier for employers to fire workers, use temporary laborers, and provide only contingent and part-time jobs, without benefits, through individual contracts and other forms of casualization.³⁶ Contingent and casualized labor has also made its way into professional sectors such as journalism and academia.^{37–39}

Unemployment and job insecurity influence mental illness and drinking. Unemployment results in economic strains and psychosocial exposures that increase the risk of depression, psychological distress, and harmful drinking.^{40–42} Workers in contingent or casualized jobs share characteristics with people who are unemployed (including periods of unemployment themselves), and share many of the same health risks.^{43,44} Furthermore, contingent and casualized workers typically have less autonomy, are less likely to raise concerns about workplace health and safety, and have worse health outcomes.^{45–47} “Job churning,” or high rates of job loss during periods of low unemployment, is also associated with poorer health outcomes.⁴⁸

Changes in the social division and structure of labor also intersect with racialized and gendered power relations, the latter of which we will briefly explore in the present study. (Doing justice to race, gender, and the social division and structure of labor, from a relational theoretical perspective, is beyond the scope of the present study.) Nonetheless, women are concentrated in occupations that are characteristically more stressful, with greater exposure to low decision latitude, high job insecurity, low wages, and lack of benefits.⁴⁹ Furthermore, despite representing nearly half of the labor force, between 2003 and 2007, women spent 68% more hours on housework than men.⁵⁰ Hours of housework are positively associated with depressive symptomology⁵¹ and inequity in household labor contributes substantially to gender differences in psychological distress.⁵²

1.2 | The present study

This study revisits the effects of the social division and structure of labor on mental illness and drinking outcomes, building on insights and evidence from research in 1990s and early 2000s. The objective is to conduct a broad, theory-informed empirical analysis of work and mental health, across a wide range of exposures related to the social division and structure of labor that track the major trends summarized above, to both update the literature and identify areas that warrant subsequent in-depth research. Specifically, this study sets out to answer three questions: First, how does the social division of labor pattern mental illness and drinking outcomes in the early 21st century? Second, is there an empirical structure of labor, and if so, what is its relationship to these outcomes? Third, can we theoretically derive dimensions of work that are also related to mental illness and drinking outcomes? To answer these questions, this study draws on the Panel Study of Income Dynamics, a nationally-representative, longitudinal survey of households in the United States, and the

Occupational Information Network (O*NET), a comprehensive database of occupations and their characteristics. To our knowledge, this is the first time the latest iteration of the O*NET has been utilized to explore the relationship between the underlying structure of work and mental health across the labor market.

2 | METHODS

2.1 | Data and sample

We used data from the 2003–2015 waves of the Panel Study on Income Dynamics (PSID), the world's longest-running household panel survey.⁵³ PSID surveys are administered at the level of the household. Heads of household were the primary respondents of interest in 1968 when the study began; however, PSID also collects information (from heads of household) on spouses and children. We chose the years 2003–2015 because we are interested in updating the literature on work and mental health with data since the turn of the century, and because these years represented the best overlap in availability for mental illness and drinking measures, updated Census occupation codes, and the O*NET, which has been updated annually since 2003. We used the 2017 version of the O*NET database in our analyses.

We restricted the PSID sample to respondents who indicated that their total annual hours of work were greater than zero and selected a Census occupation category. We excluded individuals who had retired and those in the military (See Table 1 for details).

We linked PSID data with data from the O*NET.⁵⁴ The O*NET is a comprehensive database of work and work characteristics developed under the sponsorship of the US Department of Labor. The O*NET database identifies, defines, and classifies occupations along six major domains: worker characteristics, worker requirements, experience requirements, occupation requirements, occupational characteristics, and occupation-specific information. Data are collected continuously based on a two-stage design in which (i) a random sample of businesses expected to employ workers in the targeted occupations are identified and (ii), a random sample of workers from those selected businesses are sampled. Data are collected by surveying job incumbents using standardized questionnaires. For occupations where it would be difficult to sample workers, O*NET data collectors identify and sample occupation experts from professional or trade association membership lists. Additional ratings are provided by trained occupation analysts. Responses from all three sources are used to provide complete information for each occupation.⁵⁵ The O*NET provides information for roughly 1000 occupations, which are organized based on the Bureau of Labor Statistics Standard Occupational Classification (SOC) system. This allowed us to link them with Census occupation codes for heads of household and spouses in the PSID.

For all occupations, we obtained 102 items from the *work activities* (eg, monitor processes, materials, or surroundings; establish and maintain interpersonal relationships), *work context* (eg, responsibility for outcomes and results, cramped work space or awkward positions), and *required education, training, and experience* sections of the O*NET, the building blocks for our proxies of the structure of labor. We chose

TABLE 1 Description of study sample in 2003 (N = 12 423)

Variable	N	Percent
Sex		
Male	5664	45.6
Female	6759	54.4
Racialized group membership		
White	7610	61.3
Black	3401	27.4
AI/AN	79	0.64
Asian	210	1.7
NH/PI	566	4.6
Other	166	1.3
Employment status		
Working now	8354	90.07
Temp layoff/leave	88	0.95
Looking	454	4.89
Disabled	53	0.57
Keeping house	253	2.73
Student	73	0.79
Household income		
<\$35 K	4281	34.5
\$35-62.7 K	3500	28.1
\$62.7-100 K	2579	20.8
>\$100 K	2063	16.6
Industry		
Goods producing	2086	22.7
Services	6578	71.6
Occupation		
Architecture/engineering	161	1.74
Arts/entertainment	161	1.74
Building/grounds maintenance	369	3.98
Business operations specialists	149	1.61
Community/soc services	153	1.65
Computer/mathematical	181	1.95
Construction/extraction	447	4.82
Education, training, and library	564	6.08
Farming/fishing/forestry	128	1.38
Financial specialists	176	1.90
Food prep/serving	379	4.09
Healthcare practitioner/tech	409	4.41
Healthcare support	288	3.11
Installation/maintenance/repair	395	4.26
Legal	80	0.86
Life, phys, soc sciences	88	0.95
Management	882	9.51
Office/admin support	1415	15.26
Personal care/service	329	3.55
Production operations	809	8.72

(Continues)

TABLE 1 (Continued)

Variable	N	Percent
Protective services	240	2.59
Sales	889	9.58
Transportation/material moving	583	6.29
Health condition		
Moderate mental illness	2229	24
Serious mental illness	260	2.8
Heavy drinking (2005)	190	2
Binge drinking (2005)	404	4.2

to focus on these aspects because we are interested in the structural qualities of occupations as social locations, rather than the attributes or skills of the individuals who occupy those locations. (Granted this is not a mutually exclusive distinction, especially for education, training, and experience.) Each SOC occupation code is given a “level” and “importance” score, which we summed for each of the 102 work activity and work context items. While the same work activity can be important for a variety of occupations, the amount or level of the activity needed in those occupations can differ dramatically.^a We chose to sum, rather than average, level and importance scores to avoid making the assumption that level and importance were equally weighted. Education, training, and experience for each SOC occupation are each measured by an integer scale, which is administered to a sample of job incumbents and occupation experts. We took the weighted mean of these scores for each occupation. This left a dataset of roughly 1000 occupations with 102 work activity, work context, and education, training, and experience variables. To reduce collinearity, we explored a correlation matrix of the 102 items, and combined items that were correlated at greater than 0.8 by taking their mean. This reduced the number of items to 72. We chose 0.8 as the cutoff because exploratory data analysis suggested that this level of correlation sufficiently reduced the data while retaining theoretical interpretability. Finally, when there were multiple SOC occupation codes for a single Census occupation code, we took the mean of SOC code item values, in order to merge the O*NET data with the PSID data.

2.2 | Measures

2.2.1 | Occupation

Occupation, our proxy for the social division of labor, was classified by 3-digit Census occupation codes from the 2000 Census. We combined the 508 Census occupation codes appearing in the PSID into 23 standard occupation categories (Table 1).

2.2.2 | Employment status

Employment status is indicated by comparing respondents whose current employment status is “looking for work/unemployed” to those who are currently employed.

2.2.3 | Total housework hours

Our proxy for the gendered division of domestic labor, this measure represents respondents' number of hours per week spent on cooking, cleaning, and other work around the house.

2.2.4 | Index of productivity to pay

For full-time workers below the top 1% of wage earnings, we created a crude productivity-to-pay indicator, to operationalize the productivity-to-pay gap discussed above. We defined this indicator as

$$\frac{\text{Received wages} - \text{True wages}}{\text{Received wages}}$$

where *received wages* are an individual's hourly pay based on a 40-hour work week, and *true wages* are an individual's hourly pay based on the number of hours they actually worked.¹⁴ This measure can be interpreted as the percentage of their received wage that individuals were hypothetically not paid for productive hours, assuming their output per hour was constant and they were paid at the same rate for every hour worked. This measure is a crude indicator of economic exploitation.

2.2.5 | Factor-analytically derived structure of work

We hypothesized that the 72 work activity; context; and education, training, and experience items from the O*NET represented a smaller number of underlying latent factors. We conducted an exploratory factor analysis to determine an optimal factor structure, balancing model fit with the intelligibility of the resulting latent variables. Analysis was performed via weighted least squares and an oblimin rotation for oblique factors. Per convention, we chose loadings greater than 0.3 as the cut point for the strength of association between items and factors,⁵⁶⁻⁵⁸ and created linear combinations of items by summing the product of item values and their factor loadings, for each occupation. Our preferred factor structure contained nine factors (Root Mean Square Error of Approximation = 0.08, Tucker Lewis Index = 0.79), which we labeled as follows. We also include the number of items and internal reliability for each scale:

1. *Physical and risky*, 18 items (Cronbach's $\alpha = 0.92$) characterized by manual labor, exposure to environmental hazards, and other bodily risks.
2. *Managerial leadership*, 18 items (Cronbach's $\alpha = 0.95$) characterized by developing objectives and strategies, monitoring and controlling resources, and coordinating, guiding, and training others.
3. *Analytic and administrative*, 11 items (Cronbach's $\alpha = 0.93$) characterized by analyzing, interpreting, evaluating, and recording information.
4. *Biomedical exposures and care*, 11 items (Cronbach's $\alpha = 0.77$) characterized by interacting closely with and caring for sick people.

5. *Service and sales*, 12 items (Cronbach's $\alpha = 0.89$) characterized by dealing with customers, selling or influencing them, and working with the public.
6. *Team leadership*, 9 items (Cronbach's $\alpha = 0.82$) characterized by coordinating and leading others and working with a group or team.
7. *Technical and craft*, 6 items (Cronbach's $\alpha = 0.88$) characterized by working with and repairing technical devices, parts, and equipment.
8. *Assembly line*, 9 items (Cronbach's $\alpha = 0.74$) characterized by repetition, exactness, and time pressure.
9. *Freedom/unstructured*, 7 items (Cronbach's $\alpha = 0.8$) characterized by high levels of experience and education and the ability to determine tasks, priorities, and goals.

2.2.6 | Theoretically derived structure of work

The relational theoretical perspective that informs this study emphasizes the objective, material dynamics that characterize the organization of work. This perspective stands in contrast to traditional stratificationist approaches, which tend to focus on individuals' interactions within their immediate work environments, and take workplace organization as given, without considering how it is determined by external political, economic, and technological processes.⁵⁹ For example, while a stratificationist approach might prioritize workers' subjective psychosocial experiences of workplace demands⁶⁰ such as task requirements, workload, time pressures, deadlines, and rate requirements, a relational perspective would argue that (i) such prioritization may conceal the objective function of workplace demands to increase productivity and profit, and (ii) these objective features may be more appropriate targets for activism and intervention.⁵⁹ From these insights, particularly as they relate to deskilling,¹³ as well as workplace domination and managerial strategies to extract as much value from labor as possible,^{13,61} we developed four theoretically derived scales based on items selected from the 72 raw O*NET measures. These scales are an attempt to more explicitly operationalize the power relations that characterize the organization of work, and are represented by the sums of the following O*NET items. We also include the number of items, and internal reliability for each scale (Cronbach's α for scales with more than three items, and the Spearman-Brown ρ , i.e., the standardized Cronbach's α , for scales with three or fewer items⁶²).

1. *Authority*, 8 items (Cronbach's $\alpha = 0.89$): Coordinate, guide, lead, and develop others; responsibility for outcomes and results; frequency of decision making; impact of decisions on co-workers or company; monitor and control resources; scheduling work and activities and develop objectives and strategies; make decisions and solve problems; staff organizational units.
2. *Autonomy*, 2 items (Spearman-Brown $\rho = 0.8$): Freedom to make decisions; structured versus unstructured work.
3. *Automation*, 3 items (Spearman-Brown $\rho = 0.73$): Degree of automation, importance of repeating same tasks, pace determined by speed of equipment.

4. *Expertise*, 3 items (Spearman-Brown $\rho = 0.71$): On-site or in-plant training, related work experience, required level of education.

2.2.7 | Health outcomes

In 2003 and 2007-2015, respondents were administered the Kessler-6 (K6), a six-question scale that was developed to estimate the prevalence of serious mental illness as defined by US Public Law (PL) 102-321, the Alcohol, Drug Abuse, and Mental Health Administration Reorganization Act.⁶³ Serious mental illness is defined as at least one 12-month Diagnostic and Statistical Manual IV disorder (other than a substance use disorder) with serious impairment.^{64,65} Clinical validation studies have shown that the K6 reliably distinguishes between individuals with and without serious mental illness (Receiver Operating Characteristic Area Under the Curve [ROC AUC]: 0.86), using the cut point of 13 or greater on the scale.⁶⁵ A cut point of $5 \leq K6 < 13$ (ROC AUC: 0.82) has also been shown to reliably identify respondents with moderate mental illnesses, defined as mental distress necessitating mental health treatment and causing impairments in functioning.⁶⁶ Both outcomes are examined here.

In the 2005-2015 survey waves, participants were asked about their usual or average quantity and frequency of alcohol consumption. Consistent with guidelines from the National Institute on Alcohol Abuse and Alcoholism,⁶⁷ we defined "heavy drinking" as usually consuming four or more (women) or five or more (men) drinks in the same occasion, 60 or more times in the past year (or roughly five or more times per month). We defined "binge drinking" as consuming four or more (women) or five or more (men) drinks in the same occasion, at least once in the past month. Because these questions refer to the usual or average number of drinks, they likely underestimate the number of people who have binge drinking episodes or are heavy drinkers. While binge and heavy drinking are not health problems per se, they are associated with increased risk of alcohol dependence and alcohol use disorders, and attendant health problems.⁶⁸

2.2.8 | Control variables

Prevalence estimates and odds ratios are adjusted for the following variables unless otherwise noted: self-identified racialized group membership was recorded as black, white, American Indian/Alaska Native, Asian, Native Hawaiian/Pacific Islander, and other. Age was recorded in years. Employment status was categorized as described in Section 2.2.2. Relation to head of household was categorized as head, legal wife, or female cohabitor (no households were identified as headed by a woman with a male spouse present).

2.3 | Analysis

All analyses were conducted in R version 3.5.0. First we present odds ratios for the relationship between occupations and mental illness and drinking outcomes, utilizing PSID's longitudinal sampling weights to account for unequal selection probabilities, differential non-response, and differential attrition. These odds ratios and 95% confidence intervals were estimated using dummy variables for each occupation.

In each of these models, the reference group is all occupations other than the focal occupation. Model-based prevalence estimates for mental illness and drinking outcomes are presented in the Appendix. We then examine the relationships among our index of productivity to pay, housework hours, and mental illness and drinking outcomes. Next, we present odds ratios and 95% confidence intervals for the relationship between our factor analytic- and theory-derived scales of the structure of labor and mental illness and drinking outcomes. Odds ratios for factors and scales are estimated with continuous variables; the contrast is for a standard deviation unit increase in factor or scale. Estimates control for age, sex, racialized group membership, year, and relation to head of household unless otherwise noted. Complex survey design-weighted logistic models with design-based standard errors were fit with R package "survey."⁶⁹ Figures were generated in R package "ggplot2."⁷⁰ Figures show results for significant relationships; non-significant findings are excluded for readability.

2.3.1 | Sensitivity analysis

In our main analysis, we are interested in the total effect of work on mental illness and drinking outcomes; therefore, we do not control for income, as it is an outcome of a person's occupation and mediates the relationship between work and mental illness and drinking outcomes.⁷¹ However, in sensitivity analyses, we explore whether direct effects of work remain after blocking the pathway through a measure of household income. For these analyses, we categorized total annual household income as less than \$35 000, greater than \$35 000 and less than or equal to \$62 700, greater than \$62 700 and less than or equal to \$100 000, and greater than \$100 000.

3 | RESULTS

Table 1 provides demographic information on the analytic sample, which included 12 423 individuals in 2003. Approximately 72% of the sample worked in service-providing industries (cf. 83% of US adults¹⁶), with only 22.7% in goods-producing industries (cf. 17% of US adults¹⁶). The largest proportion of the sample worked in office and administrative support occupations (approximately 12%, cf. 17.7% of US adults¹⁶); followed by sales (7.5%, cf. 10.6% of US adults¹⁶) and management occupations (7.4%, cf., 5% of US adults¹⁶). The prevalence of moderate mental illness was 24% (cf. 27.9% of California adults⁶⁶), binge drinking 4.2% (cf. approximately 14.3% US adults), serious mental illness 2.8% (cf. 6.1% of US adults⁷²), and heavy drinking 2% (cf., approximately 7% of US adults⁷³).

3.1 | Social division of labor

3.1.1 | Occupations

Figure 1 shows significant odds ratios (ORs) and 95% confidence intervals (CIs) for mental illness and drinking outcomes comparing each occupation to all other occupations. Occupations characterized by

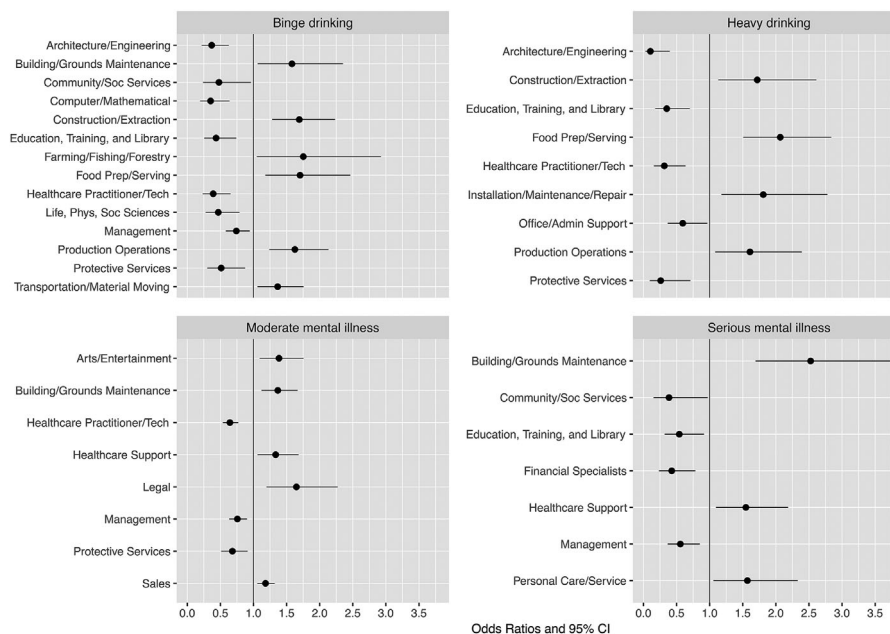


FIGURE 1 Odds ratios for mental illness and drinking outcomes for each occupation relative to all other occupations. Note. Serious mental illness is defined as a score of 13 or greater on the K6. Moderate mental illness is defined as score greater than or equal to 5 and less than 13 on the K6

manual labor (“blue collar” jobs) were associated with increased odds of drinking outcomes. Individuals in building and grounds maintenance; construction and extraction; farming, fishing, and forestry; food preparation and serving; production operations; and transportation and material moving occupations had higher odds of binge drinking relative to all other occupations. Eight occupations were associated with lower odds of binge drinking. Individuals in construction and extraction; food preparation and serving; installation, maintenance, and repair; and protective services occupations had higher odds of heavy drinking. A combination of occupations involving manual labor and those involving customer interaction, entertainment, sales or other service-oriented work (“pink collar” jobs) were associated with mental illness. For moderate mental illness, individuals in arts and entertainment; building and grounds maintenance; healthcare support; legal; and sales occupations had higher odds. Three occupations were associated with lower odds of moderate mental illness. Individuals in building and grounds maintenance; healthcare support; and personal care/services occupations had higher odds of serious mental illness. Four occupations were associated with lower odds of serious mental illness. See Supplementary material Table S1 for OR and 95%CI values. Supplementary material Table S2 shows the model-based prevalence estimates and standard errors for mental illness and drinking outcomes by occupation.

3.1.2 | Employment status

Looking for work/being unemployed was associated with increased odds of serious (3.7, 2.84-4.82) and moderate (1.86, 1.63-2.12) mental illness. Drinking outcomes were not significantly associated with employment status.

3.1.3 | Housework hours

Figure 2 shows the predicted probability of serious and moderate mental illness by weekly housework hours (our proxy for the gendered division of domestic labor), stratified by sex. Figure 2 shows that for both men and women, an increase in housework hours is significantly associated with increased moderate and serious mental illness; however, the frequency distribution of housework hours shows that more women engage in housework at all levels of weekly hours. Drinking outcomes were not significantly associated with housework hours.

3.2 | Structure of labor

3.2.1 | Productivity-to-pay indicator

Figure 3 shows the predicted probability of serious and moderate mental illness, for full time workers below the top 1% of earners, by the percentage of received wages that they were hypothetically not paid for productive hours. Figure 3 shows that the “percentage not paid” to workers is positively associated with moderate mental illness and serious mental illness for both men and women. Controlling for wage type, that is, salaried versus hourly pay, had no effect on this finding (results available upon request). Drinking outcomes were not associated with the productivity-to-pay indicator.

3.2.2 | O*NET factors

Figure 4 shows significant odds ratios for mental illness and drinking outcomes for standard deviation increases in O*NET factors. A

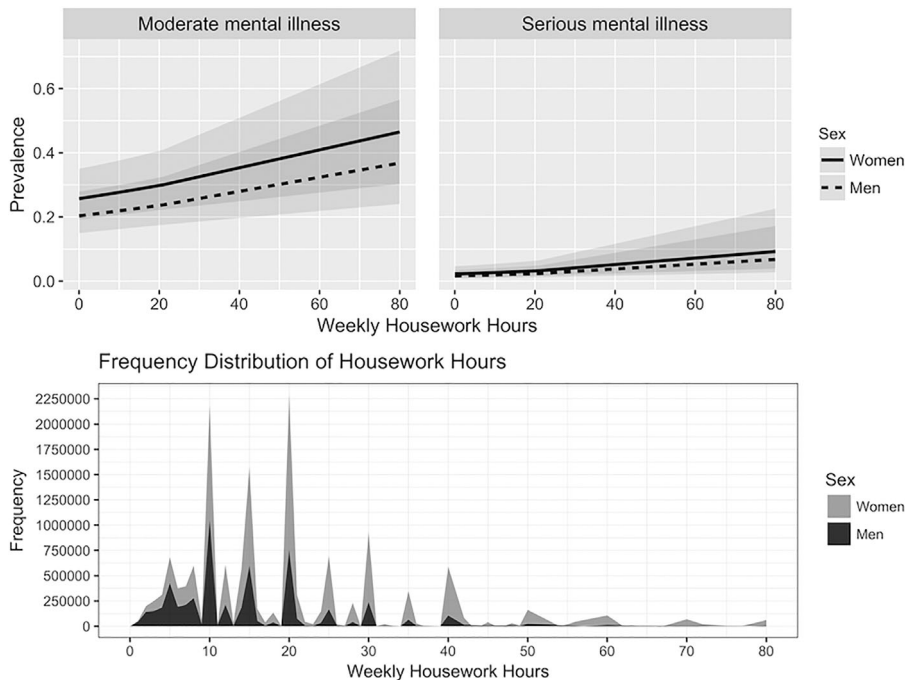


FIGURE 2 Predicted probability of serious and moderate mental illness relative to increases in housework hours. Note. Serious mental illness is defined as a score of 13 or greater on the K6. Moderate mental illness is defined as score greater than or equal to 5 and less than 13 on the K6

standard deviation increase in physical and risky work was associated with increased odds of binge drinking (1.25, 1.12-1.4), heavy drinking (1.25, 1.09-1.44), and serious mental illness (1.14, 1.02-1.28). A standard deviation increase in technical and craft work was associated with increased odds of binge drinking (1.15, 1.04-1.27). Standard deviation increases in analytic and administrative work, freedom/unstructured work, and managerial leadership work

were associated with lower odds of all four mental illness and drinking outcomes. Standard deviation increases in services and sales work and team leadership work were associated with lower odds of binge drinking, heavy drinking, and serious mental illness. A standard deviation increase in work characterized by biomedical exposures and care was associated with lower odds of heavy drinking.

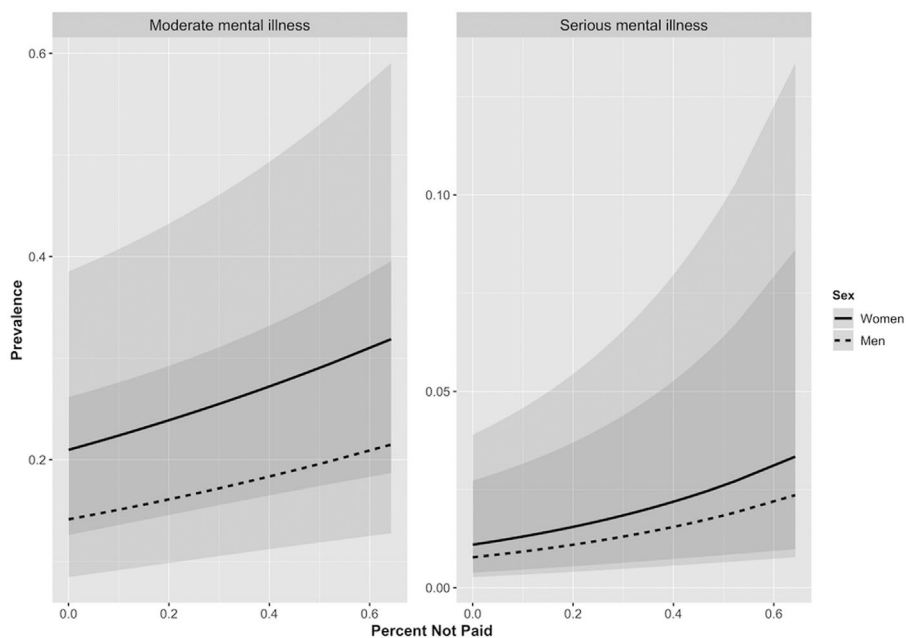


FIGURE 3 Predicted probability of serious and moderate mental illness relative to increases in the productivity to pay gap. Note. Each Y-axis has its own scale, in order to make contrasts visible. Serious mental illness is defined as a score of 13 or greater on the K6. Moderate mental illness is defined as score greater than or equal to 5 and less than 13 on the K6

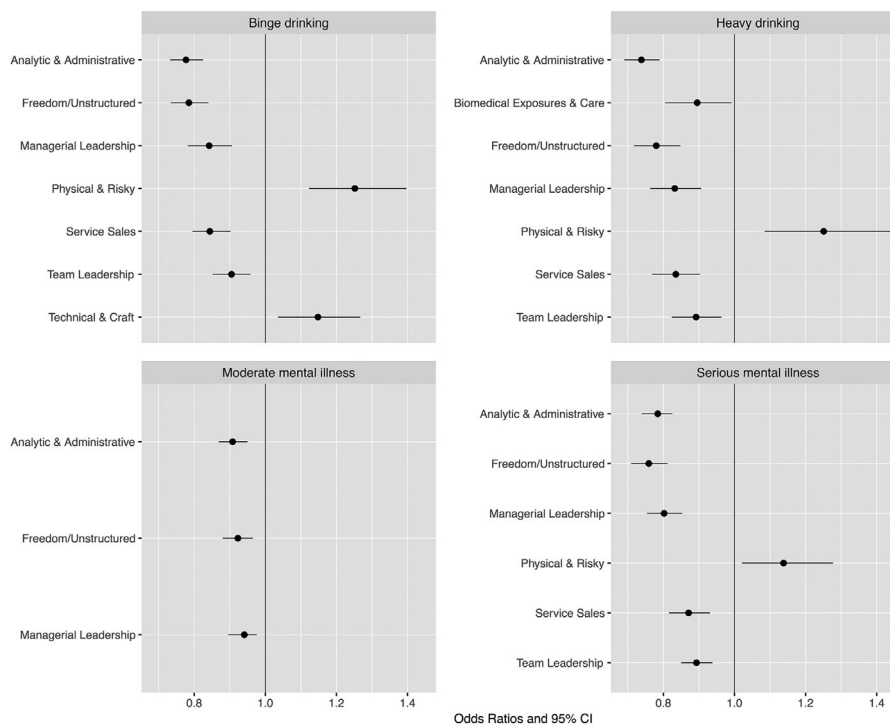


FIGURE 4 Odds ratios for mental illness and drinking outcomes for standard deviation increases in each factor-analytically derived O*NET dimension of work. *Note.* Serious mental illness is defined as a score of 13 or greater on the K6. Moderate mental illness is defined as score greater than or equal to 5 and less than 13 on the K6. “Heavy drinking” is defined as usually consuming 4 or more (women) or 5 or more (men) drinks in the same occasion, 60 or more times in the past year (or roughly 5 or more times per month). “Binge drinking” is defined as consuming 4 or more (women) or 5 or more (men) drinks in the same occasion, at least once in the past month

3.2.3 | Theoretically derived O*NET scales

Figure 5 shows significant odds ratios for mental illness and drinking outcomes by theoretically derived O*NET scales. A standard deviation increase in work characterized by automation was associated with increased odds of binge drinking (1.11, 1.05-1.17). Standard deviation increases in authority, autonomy, and expertise were all significantly associated with lower odds of heavy drinking, moderate mental illness, and serious mental illness.

3.2.4 | Sensitivity analyses

We repeated the above analyses, controlling for total annual household income, to determine whether a direct effect of our measures of the social division and structure of labor remained. The results of these analyses are available upon request. Controlling for total annual household income did not appreciably alter the above findings; in particular, results for employment status, housework hours, and the productivity to pay gap remained intact. However, additional occupations, O*NET factors, and theoretically-derived scales became associated with mental illness and drinking outcomes for men and women.

4 | DISCUSSION

Using a large, contemporary, nationally representative sample, this study investigated (i) how the social division of labor patterns mental

illness and drinking outcomes in the early 21st century; (ii) whether there is there an empirical structure to the organization and character of work, and if so, whether it is associated with these outcomes; and (iii) whether we could derive, based on theory, dimensions of the organization and character of work that are also associated with these outcomes. This study analyzed a wide range of exposures related to the social division and structure of labor, to both update and extend knowledge on the relationship between work and mental health, and identify areas that warrant subsequent in-depth research. We found that the social division and structure of labor were associated with mental illness and drinking outcomes in several general and specific ways.

The finding that occupation is associated with mental illness and drinking outcomes is largely descriptive, but illustrates that the social division of labor may shape the distribution of these outcomes. Consistent with prior research,^{18,32,33,74} we find that “blue collar” and lower-status occupations are associated higher odds of drinking outcomes, and that lower-status and public-facing service, sales, and care jobs are associated with higher odds of mental illness. This finding is also consistent with data from the 2003 Canadian Community Health Survey, which found that individuals in sales and service; trades, transportation, and equipment operators; and processing, manufacturing, and utilities occupations had higher risk of poor mental health.⁷⁵ Prior studies largely used now-outdated versions of census occupation categories or used different measures of mental illness; yet, the results of the present study overlap with and extend this work, as we used

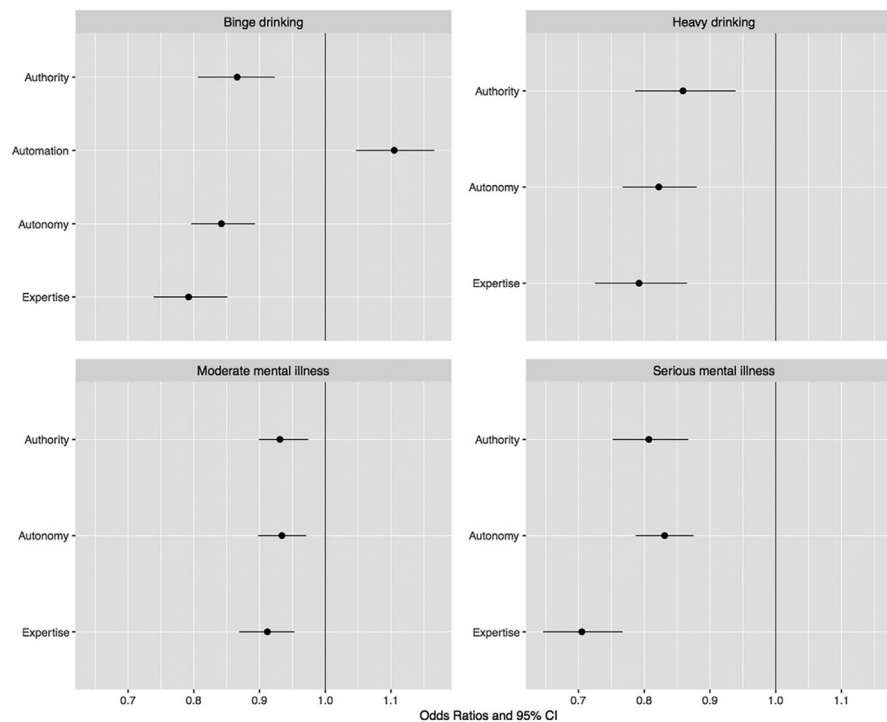


FIGURE 5 Odds ratios for mental illness and drinking outcomes for standard deviation increases in each theoretically derived O*NET dimension of work. *Note.* Serious mental illness is defined as a score of 13 or greater on the K6. Moderate mental illness is defined as score greater than or equal to 5 and less than 13 on the K6. “Heavy drinking” is defined as usually consuming 4 or more (women) or 5 or more (men) drinks in the same occasion, 60 or more times in the past year (or roughly 5 or more times per month). “Binge drinking” is defined as consuming 4 or more (women) or 5 or more (men) drinks in the same occasion, at least once in the past month

current Census occupation categories, a well-validated measure of mental illness, and contemporary, standard definitions of binge and heavy drinking.

Given that individuals' occupations and mental illness and drinking outcomes were ascertained in the same survey waves, it is also likely that some portion of the association between occupations and these outcomes reflects selection effects; that is, individuals with mental illness and those who engage in binge and heavy drinking may be more likely to obtain employment in particular occupations. In either case, results of sensitivity analyses revealed that these findings were not entirely explained by income.

This study found that looking for work/being unemployed was associated with increased odds of serious and moderate mental illness. These findings are consistent with prior research, which finds that unemployment and job insecurity are associated with increased mental illness, and that this relationship is not completely explained by selection effects.⁷⁶ In addition to the direct material and psychosocial consequences of unemployment and job insecurity (although our findings held after adjusting for income), these statuses may also have an indirect influence on mental illness and drinking; workers frequently looking for employment or in insecure jobs may be less inclined to organize collectively against harmful working conditions, since they are less secure in taking on their employers.³⁶

Consistent with prior research, more hours spent on housework are significantly associated with higher odds of moderate and serious mental illness for both men and women. Given that the average

number of hours spent on housework in our sample was 7.8 for men and 13.3 for women, our findings suggest that inequity in the division of domestic labor places women at risk of moderate and serious mental illness. This disparity represents persistent processes of oppression and economic exploitation, given that women's gains in workforce participation by the turn of the century did not reduce their disproportionate burden of unpaid domestic work.⁷⁷

Regarding the productivity-to-pay gap, for full-time workers below the top 1% of wage earners, every hour that an individual was hypothetically not paid for productive labor was associated with higher odds of moderate and serious mental illness. Sensitivity analyses show that this was the case regardless of individuals' income and regardless of whether the worker was salaried or paid hourly. This finding suggests that wage stagnation since the turn of the century has consequences for population mental health. More generally, the index of productivity to pay can be conceptualized as a crude measure of economic exploitation, which researchers have identified as an understudied social determinant of mental illness.^{78,79} Future research should develop more sophisticated operationalizations of individual- and group-level economic exploitation that account for employers' capital outlays for fixed assets, non-wage forms of worker compensation, and unequal distributions of income-generating assets, and link these measures to population health data. Focusing explicitly on the degree of exploitation in particular occupations or that particular individuals or groups experience, rather than proxies such as income inequality or socioeconomic status, shifts attention to the structural

processes that generate economic inequality and which may be more appropriate explanatory mechanisms for mental illness.

This study identified a 9-factor empirical structure to the organization and character of work, and found that physical and risky and technical and craft work were associated with binge and heavy drinking. These findings are consistent with Alterman and colleagues,¹⁰ who found that physical labor and hazardous work exposures were associated with heavy drinking. However, beyond physical and risky work, our factor structure differs from Alterman and colleagues' because we limited items for factor analysis to the characteristics of occupations and excluded characteristics of individuals who hold particular occupations. We did this because our theoretical orientation emphasizes the structure of work as a social relation rather than a set of individual attributes. We found that work characterized as *analytic and administrative, freedom/unstructured, managerial leadership, service and sales, and team leadership* were associated with lower odds of mental illness and drinking outcomes. Nonetheless, like Alterman and colleagues, our findings differ from traditional job strain and demand/control models of the character of labor by focusing on objective features of workplace organization rather than subjective assessments of the psychosocial work environment.⁵⁹ However, as Alterman and colleagues note, there is indirect evidence for substantial overlap between these operationalizations, to the extent that the objective features of workplace organization are correlated with subjective psychosocial assessments of the workplace environment. We argue that the traditional focus on the latter at the expense of the former prioritizes individual-level interventions that leave current structural arrangements intact, and are less likely to be effective than efforts that challenge and alter status quo power relations.

Finally, we operationalized theoretical insights on deskilling and "the habituation of the worker to the mode of production"¹³ along four dimension: *authority, autonomy, automation, and expertise*. We found that work characterized by high automation was associated with higher odds of binge drinking, and that higher authority, autonomy, and expertise were associated with lower odds of mental illness and drinking outcomes. These findings are intuitive, but also consistent with contemporary theory that certain occupations may place workers in strategic and privileged positions within labor markets and economic production.²⁷ Control over advanced knowledge and expertise renders these workers' labor effort difficult to monitor and control. Possession of delegated ownership authority also places workers in strategic and privileged positions within the apparatus of domination that ensures adequate effort from other workers.²⁷ By being relatively protected from domination and exploitation, work characterized by authority, autonomy, and expertise may offer protection from psychosocial risk factors for mental illness and drinking outcomes. Future research should develop explicit, objective measures of economic domination and investigate their relationship with mental health outcomes.

The social division and structure of labor have direct and indirect material consequences, such as work-related physical exertion or the ability to afford healthcare, that likely influence mental illness and drinking patterns. But the impact of features of work such as autonomy or automation on health outcomes ultimately requires diathesis-stress

models that account for how these material phenomena "get under the skin."^{43,80} A large body of research has identified potential mechanisms for this process, including various forms of alienation and anomie (eg, powerlessness, locus of control, self-estrangement), and has linked these mechanisms to stress and psychological distress.^{81,82} What remains empirically unclear, however, are the pathways connecting the objective features of the social division and structure of labor to these psychosocial mechanisms. For example, future research might link objective measures of exploitation and domination, O*NET factors and scales, and individual-level assessments of alienation and anomie to explore whether union membership or more democratic workplaces buffers the effect of authority, autonomy, automation, and expertise on mental illness and binge and heavy drinking. Similarly, this approach might be used to determine whether worker ownership of firms or establishments is associated with lower rates of mental illness and drinking outcomes.

Our findings should be understood in light of the following limitations. First, as noted, because our exposures and outcomes are measured in the same study waves over time, associations likely include some effect of social selection into occupations and jobs with particular characteristics. However, prior research suggests that findings such as ours cannot be fully accounted for by selection effects.²⁸ Second, PSID data are collected at the level of the household, and the head of the household is the primary respondent. Virtually all men in the sample were heads of household, versus 40% of women, and those women were likely to be widowed or divorced. The remaining 60% of women were spouses. Thus, women who are or were married are overrepresented in the PSID relative to other large surveys. Although we controlled for relation to head of household in all analyses, findings may not be fully generalizable. Third, there are other important social relations, in particular racialization, racism, gendering, and sexism, which select individuals into occupations and increase domination and exploitation at work⁸³⁻⁸⁷; these factors warrant more in-depth analysis beyond being treated as control variables.

Drawing on relational social theory regarding the social division and structure of labor, this study updated and extended knowledge about occupations, work, and the prevalence and odds of mental illness and binge and heavy drinking. Work characterized by physical and risky labor, technical and craft labor, and automation were detrimental for mental illness and drinking outcomes. Work characterized as *analytic and administrative, freedom/unstructured, managerial leadership, team leadership, and biomedical exposures/care*, in addition to work characterized by *authority, autonomy, and expertise*, were associated with lower odds of mental illness and drinking outcomes. Our findings suggest that explicit engagement with the objective features of occupations and the organization of work is necessary to situate psychosocial risk factors within their material context, to better understand the social division and structure of labor as determinants of mental health, and identify appropriate targets for social change.

AUTHORS' CONTRIBUTIONS

SJP conceived and designed the study and conducted the analyses. All authors participated in acquiring, analyzing, or interpreting data for the

work and drafting the work or revising it critically for important intellectual content. All authors provided final approval of the version to be published, and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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ETHICS APPROVAL AND INFORMED CONSENT

The research in this manuscript is a secondary analysis of publicly available, de-identified data. As such, it was exempt from IRB review at Columbia University. However, this study falls under a broader program of research that was approved by the Columbia University Institutional Review Board.

DISCLOSURE (AUTHORS)

The authors declare no conflicts of interest.

DISCLOSURE BY AJIM EDITOR OF RECORD

Paul Landsbergis declares that he has no conflict of interest in the review and publication decision regarding this article.

DISCLAIMER

None.

ENDNOTE

^a To understand the difference between level and importance, consider the skill "speaking": possession of this skill is equally important for paralegals and trial lawyers (compared to say, a landscaper), but paralegals do not require as high a level of this skill as trial lawyers, who might argue before the Supreme Court.

ORCID

Seth J. Prins  <http://orcid.org/0000-0003-2622-614X>

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

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