Effects of Social Determinants on Chinese Immigrant Food Service Workers' Work Performance and Injuries

Mental Health as a Mediator

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Objective: The effects of social discrimination, job concerns, and social support on worker mental health and the influence of mental health on occupational health outcomes have been documented intermittently. We propose an integrated, theory-driven model to distinguish the impact of social determinants on work performance and injuries and the mediating effects of mental health problems. **Methods:** The US Chinese immigrant food service workers ($N = 194$) completed a multimeasure interview; we tested the integrated model using structural equation modeling. **Results:** Mental health problems, which were associated with decreased work performance and increased injuries, also mediated relationships between job/employment concerns and both work performance and injuries but did not mediate the influences of discrimination and social support. **Conclusions:** This research reveals mechanisms by which social determinants influence immigrant worker health, pointing to complementary strategies for reducing occupational health disparities.

Food services is a major subsector of private employment in the United States, with approximately 13.1 million people employed in restaurants, accounting for 10% of the workforce.[1] Most establishments are small businesses, employing fewer than 100 and offering primarily low-waged positions.[1] Immigrants are attracted to this subsector because the jobs generally require minimal preparation and often do not require proficiency in the host country's official language. Thus, these jobs are an important financial resource for newly arrived immigrants, especially for those who enter the host country with limited capital and without a preexisting employment offer.[2,3]

Although research regarding this specific workforce is sparse, workplace hazards in food services have been documented and include biological, environ-mechanical, chemical, physical, and psychosocial hazards.[4,5] Among these, psychosocial hazards are the most salient concerns for immigrant food service workers.[4] The fluctuating work pace, racial discrimination, interpersonal tensions with supervisors or coworkers, and language demands are examples of stressors that generate psychological distress and mental health risks. Nationally, employers expend billions of dollars on reduced productivity resulting from employee mental health problems,[6] which are also associated with increased work injuries.[7] Compared with larger businesses, small businesses have fewer resources for worker health and safety (H&S) prevention and related interventions.[8,9] Consequently, innovative approaches to H&S prevention and intervention are needed to achieve better health and work outcomes for immigrant food service workers.

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The authors declare no conflicts of interest.

Completing interests: None

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DOI: 10.1097/JOM.0000000000000477

In this research, we posited a theory-driven model (Fig. 1) to elucidate mechanisms by which mental health effects occur and to provide knowledge essential for the design and implementation of new H&S intervention approaches.[10] Specifically, we sought to reveal the influence of social determinants on immigrant worker mental health, work performance, and work injuries. Mental health was hypothesized to mediate the relationships between the three identified social determinants and both work performance and work injuries. Data were collected from Chinese immigrants employed as food service workers in the northwest region of the United States.

MENTAL HEALTH PROBLEMS, WORK PERFORMANCE, AND WORK INJURIES

Mental health problems can have pervasive effects on cognitive, emotional, physical, and social functioning, decreasing work performance and employability. Work-related problems include increased time away from work due to health (absenteeism), impaired job performance and productivity while at work (presenteeism), and long-term disabilities.[6] In addition, medications sometimes necessary in the management of mental health problems also increase the risk for work injuries.[7]

SOCIAL DETERMINANTS OF MENTAL HEALTH

Considerable evidence confirms the negative influence of social discrimination on the mental health of ethnic and immigrant populations.[11,12] Immigrants, compared with their native-born, host-country counterparts, face unique psychosocial stressors due to immigration status, citizenship, language fluency, and accent-based discrimination.[12] Job/employment concerns such as job security, interpersonal relations in the workplace, and job demands/control are associated with poorer mental health for immigrants,[13] as well as the general working population.[14,15] The research on immigration and immigrant health shows that immigrants experience many challenges to social and economic mobility in the host country, especially among those who enter the country for reasons other than employment, who have limited human capital (eg, skill sets relevant to the host country and education), and who live in regions that lack adequate ethnic community support.[2] Thus, job/employment concerns are often greater for immigrants than their native-born counterparts. In this study, we included a measure of immigrant-specific job/employment concerns to capture the complexity of this determinant of immigrant mental health.

In contrast to the influences of social discrimination and job/employment concerns, well-documented evidence demonstrates that social support promotes mental health.[16,17] A meta-analysis of studies conducted mostly with nonimmigrants shows that social support has stronger effects on emotional affect (eg, depression) than on somatic symptoms (eg, pain),[18] and that perceived support, rather than actual support received, has the stronger effect on mental health.[19] Support from family and friends is critical to immigrants' adaptation in a new country.[20] Workplace support, when examined in the occupational H&S literature, is also a salient source of support associated with worker mental health.[21] In this study, we captured social support from both within and outside the workplace to broaden

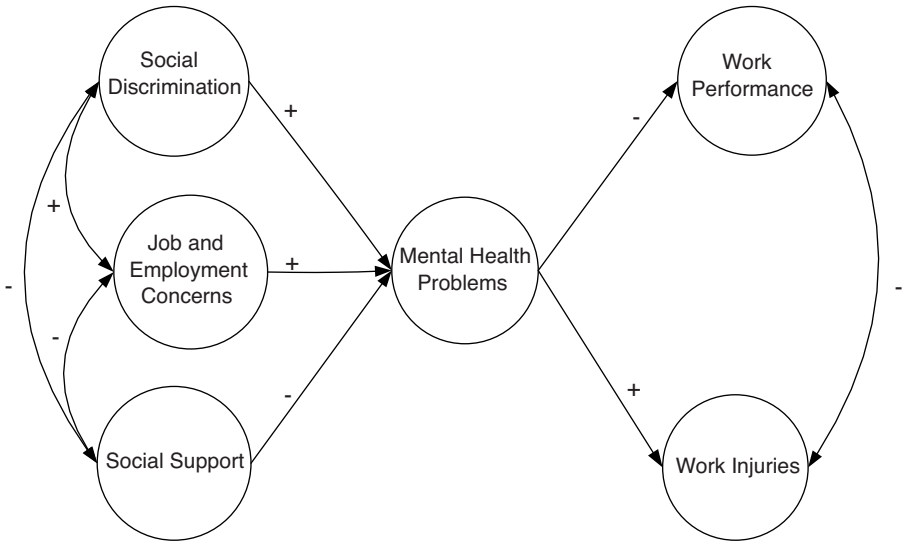

FIGURE 1. Theoretical model depicting the mediation effects of mental health problems between (1) social determinants of health and (2) work performance and injuries. Single-headed arrows show directional relationships; curved double-headed arrows indicate correlations. Positive (+) and negative relationships (−) are denoted.

the understanding of its role in the promotion of immigrant mental health.

METHODS

This study used a cross-sectional design to test a theory-driven model. Approval from the institutional review board of the authors' affiliated university was obtained prior to participant recruitment.

Sample

The sample consisted of Chinese immigrants ($N = 194$) working in the food services sector in King County, Washington, in the United States. The inclusion criteria for participants were—non–US-born Chinese; aged 18 years or older; able to understand and speak Chinese (Mandarin), Cantonese, or English; and employed in the food services for a minimum of 6 months at the time of interview.

Research Procedures

Participants were recruited between June, 2010, and October, 2011, through 268 food service locations that were randomly selected from a comprehensive business roster. Study sites were generally small establishments (less than 100 workers/site). To ensure for a successful recruitment, interviewers made multiple visits to each worksite and researchers posted flyers in community venues. Existing study participants also made snowball referrals to friends or family members. Of the total sample, 73 participants were recruited at the worksite, 104 were recruited through snowball referrals, and 17 were self-referred after reading one of the distributed flyers. There were no major differences in sample characteristics except for age and years in the United States (calculated from age at time of immigration to age at interview). Each study participant chose an interview location and participated in the comprehensive, in-person interview conducted in Chinese by a trained, bilingual interviewer.

Measures

A multiple indicator, latent variable approach was used. Most latent variables were based on indicators (measured variables) constructed or adapted from existing scales.[13,22–24] Scale items, unless otherwise noted, were rated using five-point, Likert-type response options with higher scale values reflecting higher levels of the measured variable. Confirmatory factor analysis was used to establish the multiple indicator measurement model. Confirmatory factor analysis results indicated acceptable fit indices for the nonnormed fit index (NNFI = 0.93), comparative fit index (CFI = 0.95), root mean square error of approximation (RMSEA = 0.063; 95% confidence interval, 0.043 to 0.082), and chi-square test ($\chi^2 = 121.33$; $df = 71$, $n = 177$, $P < 0.001$).[25] Table 1 summarizes the latent variables, their respective indicators, and factor loadings on the basis of the final measurement model.

Dependent Variables

Work performance, defined as the quantity and quality of work execution, was indexed using two indicators—perceived overall job performance and frequency of *reduced* quantity and quality of work performance during the past 28 days.[24] Overall job performance was measured with a single-item rating of performance from 0 (worst performance) to 10 (top performance). Reduced quantity and quality of work performance ($\alpha = 0.81$) was measured using six items rated with five-point frequency scales to capture workers' perception of their work performance over the last 28 days. The correlation between the two indicators was moderately strong at $r = 0.58$, $P < 0.001$.

Work injuries tapped common injuries experienced in food service occupations.[4] Seven items were used to assess the frequency of food service-related injuries over the past 12 months, including cuts/lacerations/punctures, heat burns, cold burns, falls, muscle/joint soreness or pain, sprains or strains, and contact dermatitis. Item responses were summed to index work injuries.

Independent Variables

Social discrimination was operationalized using three indicators to measure the frequency of subtle discrimination, overt discrimination, and unfair treatment due to one's skin color, accent, or other social characteristics.[13] Subtle discrimination (eg, treated with less courtesy in the past month) was measured with four items ($\alpha = 0.76$) from the Everyday Discrimination Scale developed for the Detroit Area Study[26] and later adapted for use in the Filipino American Community Epidemiological Study (fACES). Overt discrimination (eg, called names or insulted) was captured using five items ($\alpha = 0.48$) from the Everyday Discrimination Scale. Unfair treatment, modified from the fACES,[13] was the sum of three items ($\alpha = 0.84$) tapping unfair treatment due to one's race/ethnicity, speaking a different language, and/or speaking with an accent. Correlations among the three indicators ranged from $r = 0.45$ to 0.62, $P < 0.001$.

Job/employment concerns are worries regarding the workplace context and are associated with immigration. Using items from the fACES,[13] two indicators were created to index this latent variable. General concerns (11 items, $\alpha = 0.83$) captured the frequency of

TABLE 1. Confirmatory Factor Analyses: Standardized Factor Loading for Work Performance, Work Injuries, and Predict Variables in the Final Measurement Model*

Latent Variable	Indicator	Factor Loading
Work performance	Perceived overall job performance	0.65
	Frequency of reduced quantity and quality of work performance	0.88†
Work injuries	Occurrence of work injuries	1.0‡
Social discrimination	Subtle discrimination	0.89
	Overt discrimination	0.73
	Unfair treatment	0.62
Job and employment concerns	General job concerns	0.84
	Immigrant-specific job concerns	0.77
	Perceived support from coworkers	−0.30§
Social support	Perceived support from family/relatives	0.64
	Perceived support from friends	0.51
	Perceived support from supervisors	0.76
	Perceived support from coworkers	0.28
Mental health problems	Psychosocial distress	0.80
	Somatic symptoms	0.75
	Daily functioning	0.71

*All loadings were statistically significant at $P < 0.05$. Correlated measurement errors were incorporated into the analysis between overt discrimination and somatic symptoms ($r = 0.45$), overall work performance and daily functioning ($r = -0.31$), psychological distress and perceived support from coworkers ($r = -0.43$), and somatic symptoms and work injuries ($r = 1.0E03$). The confirmatory factor analysis indicated acceptable fit indices of NNFI = 0.93, CFI = 0.95, RMSEA = 0.063 (95% confidence intervals, 0.043 to 0.082), and $\chi^2 = 121.33$ ($df = 71$, $n = 177$, $P < 0.001$).

†Responses were reverse coded so that the direction of the summed score would be consistent across all indicators of work performance.

‡Lamda (λ) parameter fixed at 1.0 for this single indicator.

§Perceived support from coworkers was a shared indicator, loading on both social support and job/employment concerns.

distressful concerns that people typically have about employment and work situations (eg, getting along with a boss). Immigrant-specific concerns (12 items, $\alpha = 0.78$) focused on the frequency of distressful concerns that uniquely pertain to immigrant status and racial stereotypes within job and employment contexts (eg, because I am Chinese, it is hard to get promotions/raises). The indicators were correlated at $r = 0.65$, $P < 0.001$.

Social support was characterized using four indicators to capture support from family, friends, supervisors, and coworkers. Adapted from items used by the fACES,[13] the study used 12 items to measure perceived emotional and instrumental support from family and friends. The internal consistency of perceived family or friend support was $\alpha = 0.87$ and 0.93, respectively. Perceived support from supervisors was the sum of 12 Likert-type items ($\alpha = 0.78$) that were adapted from Karasek's Workplace Support scale.[23] Perceived frequency of support from coworkers was the sum of two Likert-type items ($r = 0.36$) that were adapted from Johnson and Hall's Workplace Social Support scale.[22]

Mental health problems were indexed using indicators of psychosocial distress, somatic symptoms, and daily functioning. Adapted from items used in the fACES,[13] psychological distress was the sum of 21 items ($\alpha = 0.92$) assessing the intensity of distress caused by negative feelings and emotions (eg, feeling worthless and worrying too much about things) experienced over the 30 days prior to the interview. Somatic symptoms were measured with 17 items ($\alpha = 0.85$) that inquired about the level of distress from experiencing somatic symptoms (eg, headache and feeling weak in parts of the body) in the past 30 days. Daily functioning was based on the sum of four items ($\alpha = 0.80$) that indexed how frequently physical or emotional problems had interfered with work and other daily activities during the past 4 weeks. Correlations among the three indicators ranged from $r = 0.49$ to 0.63, $P < 0.001$.

Covariates

Sociodemographic variables known to be associated with the key study variables were included as covariates.[15,27] *Sex* was coded as a dichotomous variable (0 = female, 1 = male). *Age* was participants' self-reported age at the time of the interview; it was included to adjust for observed baseline differences. *Physical health* was measured with a five-point rating (1 = poor to 5 = excellent) of participants' perceived overall physical health. *English proficiency* and *years in the United States* were used as measures of acculturation. English proficiency assessed how well participants understood spoken English using a four-point Likert scale (1 = not at all to 4 = very well). Years in the United States were calculated using the difference between age at time of interview and age at time of immigration. Because the latter was not significantly associated with either dependent variable, it was removed from the final model to preserve degrees of freedom in the model testing. English proficiency was retained as a proxy measure of acculturation.

Analyses

In the preliminary analyses, we used descriptive statistics to examine the distributional properties of variables, the degree and pattern of missing data, and outliers. Missing data rates were low, falling less than 3%.[28] Scale internal consistency reliability was assessed using the Cronbach α. Confirmatory factor analysis, described above, was used to establish the measurement model (ie, factor loadings and factor correlations).

Using structural equation modeling (SEM) we tested for the effects of social discrimination, job/employment concerns, and social support on mental health problems as well as the mediation effects of mental health problems on work performance and work injuries. Structural equation modeling incorporates multiple indicators to measure the latent variables in the model, includes random

measurement error in the model testing, allows for simultaneous evaluation of the direct and indirect effects of independent variables on more than one dependent variable, and is well suited to assess mediation hypotheses.[25] Relevant covariates were incorporated to control for potential confounding effects. The fit of the SEM model was assessed using standard indices including χ^2, NNFI, CFI, and RMSEA.[25] P value set at 0.05 was used to evaluate the parameter estimates in the model.

RESULTS

Sample Description

The study participants included 104 (53.6%) women and 90 (46.4%) men, with an average age of 43.5 years (standard deviation = 13.8). Participants had lived in the United States for 10.7 years (standard deviation = 9.0) on average, and 75 (38.7%) were naturalized US citizens. The majority of participants came from China ($n = 155$, 79.9%), were married ($n = 138$, 71.1%), and had at least 12 years of formal education prior to immigration ($n = 159$, 80.4%). A little over a half of the participants ($n = 112$, 57.7%) understood at least some spoken English. Nearly three quarters ($n = 144$, 74.2%) reported places serving Chinese food as their primarily employment placement. Sample characteristics are summarized in Table 2.

Nearly 90% of the participants reported *never* or *hardly ever* experiencing any work injuries or illnesses in the past 12 months. Muscle/joint soreness or pain was the most commonly encountered work-related injury ($n = 52$, 27%); cuts/lacerations/punctures ($n = 32$, 17%) and heat burns (n = 28, 14%) were the second and third most commonly experienced injuries, respectively. Importantly, frequent occurrence (fairly or very often) of muscle/joint soreness or pain was reported across all types of food service positions, with the exception of host/hostess and cashier positions.

Values on perceived work performance ranged from 4 to 10; only 16% ($n = 31$) rated their work performance less than 8 on the 10-point scale. Ratings of reduced quantity and quality of work performance ranged from 16 to 30, with higher scores indicating *less frequent* decreases in the quantity or quality of work performance. Only 16.5% ($n = 32$) reported reduced quantity and quality of work performance scores less than 24 on a scale with a potential range of 6 to 30.

Testing the Hypothesized Model

Structural equation modeling results summarized in Fig. 2 reveal support for the hypothesized model ($\chi^2 = 174.22$, $df = 115$, $P < 0.001$; NNFI = 0.93; CFI = 0.95; RMSEA = 0.054). Specifically, social discrimination had a positive association with mental health problems, but the effect was not statistically significant ($\beta = 0.22$, $P = 0.09$). Job/employment concerns were associated with mental health problems ($\beta = 0.56$, $P < 0.05$), whereas social support was not ($\beta = -0.07$, $P = 0.42$). The measures of social discrimination and job/employment concerns were highly correlated ($r = 0.72$, $P < 0.05$), indicating redundancies. As posited, mental health problems mediated the relationship between job/employment concerns and both work performance ($\beta = -0.44$, $P < 0.05$) and work injuries ($\beta = 0.58$, $P < 0.05$).

Among the covariates, age was positively associated with perceived work performance ($\beta = 0.40$, $P < 0.05$), but not work injuries. Physical health was negatively associated with work injuries ($\beta = -0.16$, $P < 0.05$), but not work performance.

TABLE 2. Characteristics of the Study Sample ($N = 194$)

Variables	*n* (%)
Age, yrs	
18–25	31 (16.0)
26–35	25 (12.9)
36–45	38 (19.6)
46–55	56 (28.9)
56–65	41 (21.1)
>65	3 (1.5)
Home country prior to immigration	
China	155 (79.9)
Hong Kong	16 (8.2)
Taiwan	18 (9.3)
Others	5 (2.6)
Years education prior to immigration	
≤6	27 (13.9)
7–12	129 (66.5)
13–16	33 (17.0)
≥17	5 (2.6)
Ability to understand spoken English	
Not at all	11 (5.7)
Not much	71 (36.6)
Some	86 (44.3)
Very well	26 (13.4)
Annual household income	
<$25,000	84 (43.3)
$25,000–49,999	86 (44.3)
$50,000–99,999	14 (7.2)
$100,000–299,999	6 (3.1)
Do not know/refused to answer	4 (2.0)
Position at the primary workplace	
Kitchen worker	85 (43.8)
Front-end worker	79 (40.7)
Manager	8 (4.1)
Owner	14 (7.2)
Other (eg, delivery driver)	8 (4.1)
Types of food served at the primary workplace	
Chinese food	144 (74.2)
Other Asian food	24 (12.4)
Non-Asian food	12 (6.2)
Snacks and beverage only	1 (0.5)
Other (eg, mixed types of food)	13 (6.7)
Primary workplace service	
Limited service	34 (17.5)
Full service	146 (75.3)
Special food service	11 (5.7)
Other (eg, company cafeteria)	3 (1.5)

DISCUSSION

The findings show general consistency between the hypothesized model and the empirical data collected from Chinese immigrant workers employed in the US food services sector. The association between job/employment concerns and mental health problems was moderate and statistically significant. Mental health mediated the relationships between job/employment concerns and both work performance and work injuries. The associations between mental health problems and work performance and work injuries were moderate, although somewhat stronger for injuries than for performance. The influences of social discrimination and social support on mental health were not statistically significant, as hypothesized, although a trend effect for social discrimination was apparent. As hypothesized there were no *direct* associations between independent variables (social discrimination, job/employment concerns, and social support)

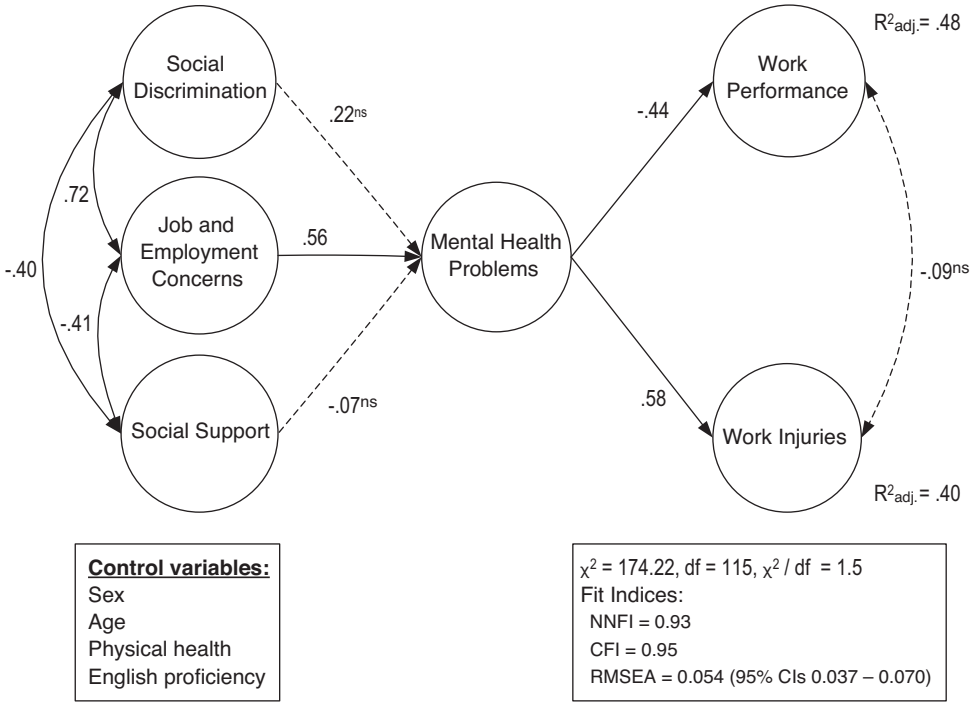

FIGURE 2. Estimated structural model showing the effects of social determinants on Chinese immigrant food service worker mental health problems, work performance, and work injuries. Solid lines represent significant paths ($P < 0.05$); dotted lines, not significant paths. Correlated errors were adjusted.

and dependent variables (work performance and work injuries). That is, all influences were mediated through mental health.

Work Injuries and Performance

The most commonly reported, nonfatal injuries in food services include (1) sprains or strains from slips, trips, and falls; (2) cuts and lacerations from knives, broken glasses, or dishes; (3) soreness/pain; and (4) heat burns.[29] In this study, participants reported common injuries (cuts, lacerations or punctures, and heat burns) similar to those previously documented for food service workers. Nevertheless, unlike the US injury surveillance data,[29] muscle/joint soreness or pain was reported as most prevalent and experienced by participants in nearly every job category in this study. Muscle/joint soreness or pain is the type of symptom that might be due to either work or non–work-related causes. Hence, compared with other types of injuries, it is more difficult to establish these as occupation-related injuries or illnesses. This might explain the apparent underreporting of muscle/joint pain and soreness in the US administrative data.[30]

Reported work performance indicated high levels of performance, or alternatively relatively low impairment of the quality and quantity of work among workers in this study. The hypothesized relationship between work performance and work injuries was not significant, however. A recent study of hotel restaurant workers in Taiwan[31] found that, despite experiencing a high prevalence of musculoskeletal pain or discomfort during work, only a small percentage of workers reported that their work performance was affected by this pain. Self-management strategies and ignoring the pain were two common methods used to manage pain or discomfort, which may serve to reduce the impact of pain and discomfort on work performance. A measure of the severity of work injury may, in fact, increase sensitivity in measuring work injury. Also, controlling for worker pain management or psychological compartmentalization of pain and discomfort would help clarify the relationship between work performance and work injuries.

Mental Health Problems as a Mediator

To our knowledge, this is the first occupational health research study to examine the role of mental health problems as a mediator between specific contextual factors and work-related outcomes. Mental illnesses are leading causes of disease burden and lead to disabilities; for example, workers with depression or anxiety disorders have decreased work performance and increased risks for injuries at work.[7,32] Economic effects resulting from productivity losses and injuries are extensive.[6] Other lines of research show that stressors linked with prevailing social conditions are associated with mental health problems.[12,13,15] On the contrary, social support from family, friends, or in the workplace typically serves as protective factors for mental health.[16,17,21] The mediation model tested in this research reflects the importance of developing theoretical frameworks to advance understanding the mechanisms by which social determinants of health influence worker health, as well as the relevance of mental health in this process. The results also substantiate the identified need for longitudinal research to elucidate mechanisms by which such complexities influence immigrant worker mental health and, in turn, work performance and work injuries.

The results offer a foundation for mental health promotion efforts targeting Chinese immigrant food service workers and suggest approaches needed to eliminate health disparities. Occupational health research and practices have been focused primarily on preventing physical injuries and illnesses for food service workers through administrative and engineering controls (eg, safety training and improved ventilation systems) of workplace hazards.[33] The mental health of the workers—both immigrant and domestic—has received relatively little research attention despite the documented prevalence of psychological stress faced by food service workers.[4] Although "upstream" systems approaches that necessarily change social conditions in which immigrant workers live are crucial and desirable,[34] these approaches require years of effort to effectively address social discrimination and job/employment concerns. On the

contrary, in terms of individuals, prevention of mental health problems require timely, strategic efforts to keep the problems from deteriorating and becoming serious disorders to which considerable stigma is attached.[35] Effective interventions to prevent mental health problems—the identified mediator—point to the need for more immediate approaches to improve work performance and decrease work injuries in immigrant food service workers. Such efforts need to be conducted concomitantly with systems-level strategies to ensure long-term improvements in social conditions by reducing or eliminating social discrimination and serious job/employment concerns. Importantly, prevention efforts need not be extensive or costly. For example, a relatively uncomplicated telephone outreach/case management program was shown to be effective in improving the mental health status of workers.[36] Those in the intervention also demonstrated improvement in hours worked and job retention. A review of more traditional work stress interventions[37] implemented in various settings reveals a range of alternative approaches used to reduce the impact of work stress. Worker-focused interventions, such as cognitive–behavioral interventions and relaxation, reveal more consistent, positive results than organizational-level change (eg, task change). This suggests that culturally relevant, small group or individual interventions—such as mindfulness training, systematic relaxation, Tai-Chi exercise, or acupuncture—may be effective approaches to mental health promotion for immigrant groups.[38,39] Findings from this study as well as related research bring into focus the need for investigations designed to improve worker mental health and to promote its effects on work performance and injury reduction.

Social Context, Immigrant Worker Mental Health, and Work Outcomes

When examining the three identified social determinants of mental health simultaneously, job/employment concerns were the strongest determinant of Chinese immigrant food service workers' mental health. Immigrant health literature has long documented economic survival and occupational adaptation as the most pressing resettlement challenges for non–employment-based immigrants.[40] Complications arising from language barriers, recognized discrimination toward training or education from "foreign" countries, and novelty concerning the host country's social and economic systems, often lead immigrants to accept low-skilled, low-wage employment.[2,11] These jobs usually limit immigrant workers' opportunities to attend training, gain language fluency, and acquire employment skills, all of which are highly valued by employers. Because these low-skilled, low-wage jobs are often vulnerable positions in a local economy, the viability of this work is always in question, thus threatening immigrant worker economic survival and stability. In this study, only 13.4% of participants reported understanding spoken English very well. Moreover, 74.2% of the participants worked primarily at places serving Chinese food—43.8% were kitchen workers and 40.7% front-end workers. These sociodemographic characteristics draw critical attention to the barriers imposed by limited language capacity; barriers that prevent immigrants from obtaining better paying jobs in mainstream markets, a particularly important factor in economic mobility. Considering English language fluency and the occupational positions held by these study participants, job/employment concerns are a critical stressor for Chinese immigrant food service workers. The findings also provide compelling evidence about the adverse association of job/employment concerns on immigrant worker mental health, particularly for those immigrants with limited language proficiency who are employed in low-skilled, low-wage occupations.

Social discrimination and social support were not associated with mental health. Social discrimination and job/employment concerns were highly associated, however. This is partially attributable to the fact that one indicator of job/employment concerns (ie, *immigrant-specific* concerns) measured concerns pertinent to immigrant status and racial stereotypes specific to job and employment contexts, thus it overlapped with social discrimination measure. Because social discrimination and job/employment concerns were analyzed simultaneously in the SEM model, the existing strong association between the two variables might have attenuated the influence of social discrimination on mental health problems, which was evident in bivariate analyses. This was revealed in a post hoc analysis in which job/employment concerns were removed from the model, yielding a significant direct association between social discrimination and mental health problems.

The effect of social support on mental health problems was small and not significant. The effect size, however, was nearly identical to findings from a larger population study of US Filipino immigrants,[13] in which social support was statistically significant. This suggests that the current sample size lacked the power needed to detect this small effect. Meta-analyses[18,19] show that the average effect sizes of social support on mental health can range from $r = -0.08$ for social support on somatic symptoms to $r = 0.31$ for perceived social support on mental health. Although a different operationalization of social support and mental health outcomes render it difficult to compare study results, additional investigations are warranted to clarify the potentially small yet practically important effects of social support on immigrant worker mental health.

Study Limitations and Strengths

Because of the cross-sectional nature of the data, the causality of the determinants on worker mental health and their indirect influence on work performance and work injuries can only be inferred. As it was not feasible to select a random sample, there may be bias among those willing to participate. The final sample size was relatively small by SEM standards, limiting statistical power.[25] The measures were based on self-report; however, data anonymity and trained bilingual/bicultural interviewers were used to minimize the limitations of self-report data collection. There may be other unidentified biases because in general Chinese immigrant food service workers were hard to reach, particularly in situations where business owners or managers acted as gatekeepers. Finally, although multiple indicators were used in modeling to adjust for measurement error, the measures used for work injuries and social support themselves may not have been sufficient robust.

Despite these limitations, this study has notable, multiple strengths. The theory-driven model shaping this research integrated separate lines of research, allowing for tests of a priori hypothesized relations, including mediational mechanisms. Application of innovative methods and sophisticated designs is needed in occupational H&S research.[41] The use of SEM is a methodological strength that allows examination of complex relationships and yields direct and indirect effects of social determinants and worker mental health on work outcomes. The striking consistency of this study findings involving US Chinese immigrant workers with prior study findings from submodel testing using a large sample of US Filipino immigrants provides significant model verification. Importantly, this research not only successfully replicated but also extended earlier research by demonstrating the impact of social determinants and mental health on worker performance and work injuries.

Implications for Research and Practice

The study results raise compelling questions about whether focused mental health promotion would be efficacious in preventing or reducing declining work performance and/or injuries among Chinese immigrant workers, or whether broader work policy interventions would be necessary, or both. Systems- and institutional-level approaches, such as the implementation of new laws and regulations, changes in work organization, or partnership with other agencies, are all required to solve complex health and social issues such as occupational health disparities.[42] Nevertheless, it is challenging to

evaluate the effectiveness and efficacy of these types of macrolevel "interventions" for microlevel changes in target populations.

In addition, the food services and drinking places subsector consists mostly of small businesses. Limited occupational H&S resources, cost of control measures, and the view that employees are responsible for their own H&S while at work are all barriers to implementing management or engineering controls at small business sites.[8,9] On the contrary, evidence from prevention research that focuses on building strengths suggests alternative approaches that immigrant workers and/or their employers could use to nurture mental well-being.[43,44] Ethnic community settings such as Chinese faith-based organizations, Chinese language schools, or Asian community service agencies could be engaged as partners and serve as alternative venues to deliver preventative interventions.[45] Religious/spiritual leaders, teachers, and service providers in these settings typically share culturolinguistic backgrounds with, and are trusted by, their clientele. These organizations are community assets that have staff who either have or could be trained in techniques and skills to be offered in their direct interactions with immigrant workers. This added value focus would serve to educate immigrant workers, assist workers to reframe perspectives, and equip workers with skills to manage work demands effectively and to navigate discriminatory aspects of their work and social environments. Innovative theoretical and methodological approaches and interdisciplinary collaboration hold promise for the development of new approaches to prevent or reduce work performance loss and injuries among immigrant workers.

The ecological model—a commonly used theoretical framework for population health promotion—articulates the transactions between multilevel, nested ecological systems and the individuals situated in these systems. By integrating multiple lines of research, this study provides empirical evidence of relationships between social conditions, or contexts, immigrant food service worker mental health, and work outcomes. The study extends occupational health disparities research by incorporating contextual factors in and beyond the workplace and positing worker mental health as a mediator. Every immigrant population has its unique sociocultural characteristics and historical resettlement reasoning and processes; immigrant host countries have different political, economic, and sociocultural conditions. Replication with other immigrant food service workers will be necessary to advance theoretical development of relevant social processes concerning work performance and injury, as well as speak to the relevance of mental health in these complex processes. Longitudinal research is needed to verify the causality implied in the theoretical model. These developments are needed for the design and implementation of theory-driven occupational H&S interventions.

ACKNOWLEDGMENTS

We would like to express our deep appreciate to the many Chinese immigrant food service workers whose insights and contributions made this study possible. The study was supported by the Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health (NIOSH), a federal agency of the United States of America; grant number: K01 OH009308. The content of this paper is solely the responsibility of the authors and do not necessarily represent the official views of NIOSH.

REFERENCES

1. National Restaurant Association. 2013 restaurant industry pocket factbook. Secondary 2013 restaurant industry pocket factbook 2013. Available at: http://www.restaurant.org/Downloads/PDFs/News-Research/Factbook2013_LetterSize.pdf. Accessed December 15, 2013.
2. Smith PM, Chen C, Mustard C. Differential risk of employment in more physically demanding jobs among a recent cohort of immigrants to Canada. *Inj Prev.* 2009;15:252–258.
3. Tsai J, Bruck A. Sociocultural contexts and worker safety and health: findings of a study with Chinese immigrant restaurant workers. *AAOHN J.* 2009;57:51–58.
4. Tsai JH-C, Salazar MK. Occupational hazards and risks in restaurants: what Chinese immigrant workers face. *Fam Community Health.* 2007;30:S71–S79.
5. Gaydos M, Bhatia R, Morales A, et al. Promoting health and safety in San Francisco's Chinatown restaurants: findings and lessons learned from a pilot observational checklist. *Public Health Rep.* 2011;126(suppl 3):62–69.
6. Birnbaum HG, Kessler RC, Kelley D, et al. Employment burden of mild, moderate, and severe major depressive disorder: mental health services utilization and costs, and work performance. *Depress Anxiety.* 2010;27:78–89.
7. Haslam C, Atkinson S, Brown SS, et al. Anxiety and depression in the workplace: effects on the individual and organization (a focus group investigation). *J Affect Disord.* 2005;88:209–215.
8. Barbeau E, Roelofs C, Youngstrom R, et al. Assessment of occupational safety and health programs in small businesses. *Am J Ind Med.* 2004;45:371–379.
9. Eakin JM, Cava M, Smith TF. From theory to practice: a determinants approach to workplace health promotion in small businesses. *Health Promot Pract.* 2001;2:172–181.
10. MacKinnon DP, Fairchild AJ. Current directions in mediation analysis. *Curr Dir Psychol Sci.* 2009;18:16–20.
11. Agudelo-Suárez A, Gil-González D, Ronda-Pérez E, et al. Discrimination, work and health in immigrant populations in Spain. *Soc Sci Med.* 2009;68:1866–1874.
12. Gee GC, Ro A, Shariff-Marco S, et al. Racial discrimination and health among Asian Americans: evidence, assessment, and directions for future research. *Epidemiol Rev.* 2009;31:130–151.
13. Tsai JH-C, Thompson EA. Impact of social discrimination, job concerns, and social support on Filipino immigrant worker mental health and substance use. *Am J Ind Med.* 2013;56:1082–1094.
14. Cheng Y, Chen C-W, Chen C-J, Chiang T-L. Job insecurity and its association with health among employees in the Taiwanese general population. *Soc Sci Med.* 2005;61:41–52.
15. Faragher EB, Cass M, Cooper CL. The relationship between job satisfaction and health: a meta-analysis. *Occup Environ Med.* 2005;62:105–112.
16. Lin N. Conceptualizing social support. In: Lin N, Dean A, Ensel W, eds. *Social Support, Life Events, and Depression*. Orlando, FL: Academic Press; 1986:17–30.
17. Sarason BR, Shearin EN, Pierce GR, et al. Interrelations of social support measures: theoretical and practical implications. *J Pers Soc Psychol.* 1987;52:813–832.
18. Schwarzer R, Leppin A. Social support and health: a meta-analysis. *Psychol Health.* 1989;3:1–15.
19. Prati G, Pietrantoni L. The relation of perceived and received social support to mental health among first responders: a meta-analytic review. *J Community Psychol.* 2010;38:403–417.
20. Aroian KJ. Sources of social support and conflicts for Polish immigrants. *Qual Health Res.* 1992;2:178–207.
21. Marchand A, Blanc M-E. The contribution of work and non-work factors to the onset of psychological distress: an eight-year prospective study of a representative sample of employees in Canada. *J Occup Health Psychol.* 2010;52:176–185.
22. Johnson JV, Hall EM. Job strain, work place social support, and cardiovascular disease: a cross-sectional study of a random sample of the Swedish working population. *Am J Public Health.* 1988;78:1336–1342.
23. Karasek RA, Triantis KP, Chaudhry SS. Coworker and supervisor support as moderators of associations between task characteristics and mental strain. *J Occup Behav.* 1982;3:181–200.
24. Kessler RC, Ames M, Hymel PA, et al. Using the World Health Organization Health and Work Performance questionnaire (HPQ) to evaluate the indirect workplace costs of illness. *J Occup Environ Med.* 2004;46:S23–S37.
25. Kline RB. *Principles and Practices of Structural Equation Modeling*. New York, NY: Guilford Press; 1998.
26. Williams DR, Yu Y, Jackson JS, et al. Racial differences in physical and mental health: socioeconomic status, stress, and discrimination. *J Health Psychol.* 1997;2:335–351.
27. Takeuchi DT, Zane N, Hong S, et al. Immigration-related factors and mental disorders among Asian Americans. *Am J Public Health.* 2007;97(1):84–90.
28. Allison PD. Missing data techniques for structural equation modeling. *J Abnorm Psychol.* 2003;112:545–557.
29. Bureau of Labor Statistics. Occupational injuries/illness and fatal injuries profiles. Secondary Occupational injuries/illness and fatal injuries profiles

2012. Available at: http://data.bls.gov/gqt/RequestData. Accessed May 26, 2014.

30. Azaroff LS, Levenstein C, Wegman DH. Occupational injury and illness surveillance: conceptual filters explain underreporting. *Am J Public Health.* 2002;92:1421–2429.
31. Chyuan J-YA, Du C-L, Yeh W-Y, et al. Musculoskeletal disorders in hotel restaurant workers. *Occup Med.* 2004;54:55–57.
32. Wang J, Adair CE, Patten SB. Mental health and related disability among workers: a population-based study. *Am J Ind Med.* 2006;49:514–522.
33. National Institute for Occupational Safety and Health. *Restaurant and Food Services: Advancing Priorities Through Research and Partnerships*. Washington, DC: DHHS; 2012.
34. Krieger N. Workers are people too: societal aspects of occupational health disparities—an ecosocial perspective. *Am J Ind Med.* 2010;53:104–115.
35. Pumariega AJ, Rothe E, Pumariega JB. Mental health of immigrants and refugees. *Community Ment Health J.* 2005;41:581–597.
36. Wang PS, Simon GK, Avorn J, et al. Telephone screening, outreach, and care management for depressed workers and impact on clinical and work productivity outcomes. *JAMA.* 2007;298:1401–1411.
37. van der Bossche S, Houtman I. Work stress interventions and their effectiveness: a literature review. *Impact of Changing Social Structures on Stress and Quality of Life: Individual and Social perspectives (Stress Impact Project).* Surrey: Stress Impact Consortium; 2003:1–40.
38. Fang L, Schinke SP. Complementary alternative medicine use among Chinese Americans: findings from a community mental health service population. *Psychiatr Serv.* 2007;58:402–404.
39. Tang Y-Y, Ma Y, Wang J, et al. Short-term meditation training improves attention and self-regulation. *Proc Natl Acad Sci USA*. 2007;104:17152–17156.
40. Aroian KJ. A model of psychological adaptation to migration and resettlement. *Nurs Res.* 1990;39:5–10.
41. Hoven H, Siegrist J. Work characteristics, socioeconomic position, and health: a systematic review of mediation and moderation effects in prospective studies. *Occup Environ Med.* 2013;70:663–669.
42. Baron SL, Beard S, Davis LK, et al. Promoting integrated approaches to reducing health inequities among low-income workers: applying a social ecological framework. *Am J Ind Med.* 2013;57:539–556.
43. Sin NL, Lyubomirsky S. Enhancing well-being and alleviating depressive symptoms with positive psychology interventions: a practice-friendly meta-analysis. *J Clin Psychol.* 2009;65:467–487.
44. Varvogli L, Darviri C. Stress management techniques: evidence-based procedures that reduce stress and promote health. *Health Sci J.* 2011;5:74–89.
45. Tsai JH-C. *One Story, Two Interpretations: the Lived Experiences of Taiwanese Immigrant Families in the United States* [Dissertation]. University of Washington, Seattle, WA; 2001.

