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Original Article

Psychosocial Work Conditions and Mental Health: Examining Differences Across Mental Illness and Well-Being Outcomes

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Abstract

Objectives: Psychosocial work conditions are determinants of mental illness among worker populations. However, while the focus on negative aspects of mental health has generated important contributions to the development of workplace interventions, there is less evidence on the factors that support the positive aspects of mental well-being. This study aimed to examine the association between psychosocial work conditions and mental health outcomes among a representative sample of Canadian workers; and to assess whether the relationships are consistent across measures of mental illness versus mental well-being.

Methods: Population-based data were obtained from the cross-sectional 2012 Canadian Community Health Survey. Psychosocial work conditions were measured using an abbreviated version of the Job Content Questionnaire. For mental illness, we focused on major depressive episodes, generalized anxiety disorders, and bipolar disorders in the past 12 months, as measured using Composite International Diagnostic Interview criteria. Mental well-being was defined as having flourishing mental health, based on items from the Mental Health Continuum—Short Form. Regression models provided odds ratios (ORs) and fitted probabilities for the relationship between work conditions and mental health, adjusting for covariates.

Results: Higher levels of *job control*, *social support*, and *job security* were associated with being free of disorders (ORs ranging from 1.08 to 1.15) as well as having flourishing mental health (ORs ranging from 1.10 to 1.14). Lower *physical effort* was associated with decreased odds of having flourishing mental health (OR 0.89). *Psychological demands* were not associated with any of the mental health outcomes in the fully-adjusted models. The overall pattern of these relationships was consistent across the two outcome models, although there was evidence of heterogeneity on the absolute probability scale. Specifically, there was a relatively *stronger* relationship between job control/social support/physical demands and well-being outcomes, compared with disorder outcomes.

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Conclusions: Psychosocial work conditions were associated with both negative and positive measures of mental health. However, mental illness and mental well-being may represent complementary, yet distinct, aspects in relation to psychosocial work conditions. Interventions targeting the psychosocial work environment may serve to improve both of these dimensions, although the measurement and examination of specific dimensions may be required to obtain an integrated and comprehensive understanding of mental health in the workplace.

Keywords: mental well-being; positive mental health; mental illness; psychosocial work environment; work exposures

Introduction

Mental illness is one of the leading causes of disability among working-age populations (Lim *et al*., 2008; OECD, 2012). Major depressive disorders, for example, accounted for an estimated 34.1 million years lived with disability in 2016 worldwide (Vos *et al*., 2017). In England, the prevalence of having at-least one common mental disorder (i.e. depressive episode, generalized anxiety disorder, panic disorder, phobia, and obsessive–compulsive disorder) among working individuals was estimated at 14.1% in 2007 (Stansfeld *et al*., 2013). In Canada, approximately 3.5 million individuals aged 15 years and older met the criteria for having a lifetime mood disorder in 2012, with 11.3% of the population reporting a lifetime major depressive episode (Pearson *et al*., 2013). These estimates have remained largely unchanged in recent decades (OECD, 2012; Jorm *et al*., 2017; Health and Safety Executive, 2017).

Given the sustained burden of mental illness among working-age populations (OECD, 2012; Health and Safety Executive, 2017; Jorm *et al*., 2017), research to date has tended to focus on mitigating the negatively framed aspects of mental health in the workplace (such as depression) rather than promoting the positively-framed aspects (such as mental well-being) (Stansfeld and Candy, 2006; Bonde, 2008; Theorell *et al*., 2015). Positive aspects of mental health generally include the presence of emotional well-being (e.g. positive affect, life satisfaction), psychological well-being (e.g. personal growth, purpose in life), and social well-being (e.g. social contribution, social integration) (Keyes, 2002; Hone *et al*., 2014; Linton *et al*., 2016; VanderWeele, 2017a). Various authors suggest that the concepts of mental illness and well-being belong to two separate but correlated axes, rather than opposite ends of a single continuum (Keyes, 2002; Huppert and Whittington, 2003; Keyes, 2005; du Plooy *et al*., 2018). Thus, an integrated approach to workplace mental health that focuses on both negative and positive aspects could be more effective than an approach that focuses on only one aspect (Reineholm *et al*., 2011; LaMontagne *et al*., 2014; Page *et al*., 2014; Finne *et al*., 2016; LaMontagne *et al*., 2016; Lee *et al*., 2016).

In the work setting, potential targets for intervention are the psychological and social characteristics of work (Michie and Williams, 2003; LaMontagne *et al*., 2010; Smith and LaMontagne, 2015; Enns *et al*., 2016; Joyce *et al*., 2016; Cocker *et al*., 2017), which play a role in the etiology of mental health conditions in the workplace. As summarized in various systematic reviews and meta-analyses (Stansfeld and Candy, 2006; Bonde, 2008; Theorell *et al*., 2015), studies have found that high levels of job strain (i.e. low decision latitude and high demands), low levels of social support at work, lower levels of job security, and perceived imbalances between job efforts and rewards are associated with common mental disorders such as depression and anxiety. However, while the focus on negative aspects of mental health (i.e. disorders) has generated important contributions to the development of workplace interventions, there is less evidence on the factors that support the positive aspects of mental health. Moreover, some authors suggest that models of the relationship between job strain and mental health are optimized for prediction of ill-health rather than positive well-being (Reineholm *et al*., 2011). To better inform an integrated approach that maximizes improvements in mental health in the workplace, it is important to understand whether negative and positive mental health represent complementary dimensions (i.e. the absence of mental health implies the presence of mental well-being), or whether distinct exposures in the workplace are associated with each dimension (i.e. each dimension represents a distinct underlying construct).

The objectives of this study were to examine the association between self-reported psychosocial work conditions and mental health outcomes among a population-based sample of Canadian workers; and to assess whether the relationships are heterogeneous across measures of mental illness versus mental well-being. Consistent with previous studies, we hypothesized that better ratings of psychosocial work conditions (i.e. high job control, high social support,

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low job insecurity) would be associated with both the absence of mental disorders (Stansfeld and Candy, 2006; Bonde, 2008; Theorell *et al*., 2015) as well as the presence of positive mental well-being (LaMontagne *et al*., 2016; Lee *et al*., 2016; VanderWeele, 2017a). However, in accordance with the dual-continua model of mental health (Keyes, 2005), we anticipated that differences in the magnitude and overall pattern of association would be observed across each of the dimensions.

Methods

Data sources

We conducted a secondary analysis of population-based survey data from the 2012 Canadian Community Health Survey – Mental Health (CCHS) (Statistics Canada, 2013). The CCHS is the only data source in Canada that provides population-based estimates of the psychosocial work environment (1,8) in combination with detailed data on negative and positive mental health using validated scales (Gilmour, 2014). The CCHS collects cross-sectional data on the national population, aged 15 years and over, who were living in the ten provinces. Excluded from coverage (<3% of the target population) were those who lived on reserves or other Aboriginal settlements, full-time members of the military, and the institutionalized population. The 2012 cycle was completed on a voluntary basis with an initial in-scope population of N = 36,443. Household and individual-level response rates were 79.8 and 86.3%, respectively, resulting in a final sample of 25,113 respondents. In our study, we restricted the sample to individuals who were aged 15–74 years (N = 22,346), were employed prior to completing the survey (N = 13,927), were not self-employed (N = 11,631) and who usually worked 8+ hours per week (N = 11,317). Analytic models focused on individuals with non-missing data on all covariates (N = 10,269) and non-missing data on outcomes (ranging from 10,209 to 10,264 across models).

Psychosocial work conditions

Psychosocial work conditions were measured in the CCHS using a modified version of the Job Content Questionnaire (JCQ). The JCQ was designed to measure the social and psychological characteristics of jobs in terms of five dimensions: decision latitude, psychological demands, social support, physical demands, and job insecurity. Scale items are asked in reference to the respondent's main job or business in the past 12 months, with response options ranging from 'Strongly agree' to 'Strongly disagree' (e.g. 'agreeing' that they were free from conflicting demands). Validity, reliability, and measurement properties of the original JCQ have been established in a variety of worker populations (Karasek *et al*., 1998; Brisson and Larocque, 2001; Bielecky *et al*., 2017). Although reliability scores for some items (e.g. psychological demands) are lower in the abbreviated versus full versions, recent work has confirmed the structural validity of the abbreviated job control and demands subscales between men and women in the Canadian national population (Bielecky *et al*., 2017). For our study, we calculated summary scores for each dimension, with higher scores indicating a positive work environment. Job control (based on five items) ranged from 0 to 20. Psychological demands (two items) ranged from 0 to 8, while social support (three items) ranged from 0 to 12. Physical effort and job security (single items) ranged from 0 to 4.

Negative mental health

Mood and anxiety disorders are coded in the CCHS based on the World Health Organization version of the Composite International Diagnostic Interview (WHO-CIDI) criteria (Gilmour 2014). The CIDI has been shown to have adequate interrater reliability and validity in clinical populations (Kurdyak and Gnam 2005). For our study, we focused on major depressive episodes (MDE), generalized anxiety disorders (GAD), and bipolar disorders (BIP) in the past 12 months, and excluded the substance abuse or dependence disorders. All disorders were coded separately as 'yes' versus 'no'. For analyses, we modeled the odds of having 'no' disorder so that the estimates were on the same reference frame as positive mental health outcomes (e.g., OR > 1 equals 'better' outcomes). We also combined the three disorders into a composite measure of negative mental health, defined as having no disorders versus one or more disorders.

Positive mental health

Positive mental health is measured in the CCHS using the Mental Health Continuum – Short Form (MHC-SF) (Keyes, 2005). The MHC-SF is based on a three-factor structure with the dimensions of emotional well-being (three items), social functioning (five items), and psychological functioning (six items). Respondents are asked to rate their level of well-being and functioning in the past month, with response options coded on a six-point scale (ranging from 'Never' to 'Almost every day'). The validity and reliability of the MHC-SF has been demonstrated within various populations (Hone *et al*., 2014). However, recent validation studies suggest that the social

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well-being subscale may function poorly in the Canadian population (Orpana *et al*., 2017).

For our study, we examined two subscales comprised of emotional well-being and functional (social/psychological) well-being, each defined as a continuous variable by summing across survey items. Subscales with missing item responses were imputed with mean responses from the non-missing items, allowing for a maximum of one missing item on the emotional subscale and two missing items for the social and psychological subscales. Sensitivity analyses examining models based on imputed versus non-imputed scores were consistent (data not shown). Total scores were also rescaled to a range of 1 to 10 for comparability across subscales, with higher scores indicating higher mental well-being.

The CCHS also provides a categorical measure of positive mental health based on the pattern of responses to the MHC-SF items (Gilmour, 2014). If a respondent answered positively (i.e. almost every day; every day) to at-least one out of three emotional items and at-least six out of eleven functional items, then they were coded as having flourishing mental health. If a respondent answered negatively (i.e. never; once or twice) to at-least one out of three emotional items and at-least six out of eleven functional items, then they were coded as having languishing mental health. Respondents who were neither flourishing nor languishing were coded as having moderate mental health. For analyses, we examined 'flourishing' versus 'moderate/languishing'.

As noted by previous authors (Orpana *et al*., 2017), a limitation of this approach is that the 6 (out of 11) items are endorsed using the combined psychological and social scales. Thus, individuals may be classified as having flourishing mental health even if they scored high on the social subscale yet low on the psychological subscale (or vice versa). Nevertheless, this categorization of 'flourishing' versus 'not flourishing' mental health has been used as a common indicator of mental well-being in previous studies (Westerhof and Keyes, 2010; Gilmour, 2014). The presence of flourishing mental health also has been linked with all-cause mortality, suicidal behavior and healthcare usage in previous studies (Hone *et al*., 2014).

Analyses

Outcome-specific analyses

Linear and logistic regression models examined the association between psychosocial work conditions and each of the negative and positive mental health outcomes. Base models were adjusted for geographic region of residence. Fully-adjusted models accounted for geographic region, sex, age (grouped), highest education level, marital status, interview language (English, French/other), and immigration status (<10 years since immigration, 10+ years, Canadian born). We also included a measure of lifetime history of depressive episodes in the period prior to the most recent 12-month survey recall period (yes/no), based on retrospectively assessed age-of-onset variables available in the data. Given noted differences in work and mental health outcomes by sex (Stansfeld and Candy, 2006), initial models were estimated separately for males and females. All point estimates were calculated using CCHS survey weights to account for non-equal probability of selection and post-stratification adjustments. Standard errors were calculated using 500 bootstrap survey weights, per Statistics Canada methodology. Analyses were completed using Stata/MP 15.1 (College Station, TX, USA).

Comparison of negative and positive mental health

We used a multivariate modeling approach to examine whether the coefficients for psychosocial work conditions differed across negative (i.e. disorders) and positive (i.e. flourishing) mental health outcomes (Horton and Fitzmaurice, 2004). In this approach, a single model is estimated that incorporates an indicator variable denoting the type of outcome, plus an interaction term between the indicator variable and each psychosocial work condition. A test for significance of the interaction term indicates whether there are differences in estimates for psychosocial work conditions across each outcome type. The advantage of this approach is that it enables a formal test for heterogeneity in outcome-specific estimates using all available data, while also accounting for correlation between outcomes within a given individual (Horton and Fitzmaurice, 2004). Point estimates and standard errors are equivalent to the univariate (i.e. single-outcome) models. However, the cross-model estimates for heterogeneity are appropriately adjusted for potential correlation.

Using the above approach, we tested for differences in estimates across outcome models on the odds ratio (OR) (multiplicative) and probability (additive) scales. On the *odds ratio* scale, cross-product regression coefficients between psychosocial work conditions and outcome type were tested for statistical significance. Evidence for heterogeneity in estimates was indicated by cross-product terms that were significantly different from a null value of '1'. On the *probability* scale, we calculated the fitted probabilities of having each outcome via the marginal standardization method (i.e. average adjusted predictions) (Muller and MacLehose, 2014).

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We then contrasted the average marginal effects (i.e. 'slopes' of the fitted probability profiles) for the relationship between psychosocial work conditions and each outcome to assess whether the relationships were the same (i.e. parallel slopes) or different (i.e. non-parallel slopes) across outcome types (Karaca-Mandic *et al.*, 2012). Evidence of heterogeneity on the probability scale was indicated by a discrete difference in slopes that was significantly different from a null value of '0'.

We examined both scales to provide complementary interpretations of any heterogeneity in estimates across outcomes (VanderWeele and Knol, 2014). Specifically, on the OR scale, we were interested in understanding whether the underlying relationships between psychosocial work conditions and mental health outcomes were similar in magnitude and direction. On the probability scale, we were interested in the potential public health impact in relation to absolute levels of mental health conditions, given that it focuses on whether the anticipated effect of changes in a risk factor (psychosocial work conditions) might be greater across certain subgroups (in our case, those with mental disorder versus well-being outcomes). The probability scale may be relevant for the development of targeted interventions that aim to maximize the potential impact in terms of targeting specific populations with limited resources (VanderWeele and Knol, 2014), as it incorporates information on the baseline prevalence of health outcomes while identifying groups with the greatest prevalence of each condition.

Ethics

Ethical approval for the secondary analysis of survey data was obtained from the University of Toronto Health Sciences I Ethics Committee. Data were obtained from the confidential microdata files, accessed via Statistics Canada's Research Data Centre.

Results

Study sample

Table 1 presents the distribution of sociodemographic variables and mental health conditions within the study sample. The overall prevalence of having one or more of the three mental disorders in the past 12 months was 6.5% (4.7% for MDE, 2.3% for GAD, and 1.4% for BIP). Females had a higher prevalence of having one or more disorders compared to males (8.1 versus 4.9%, respectively). More than three-quarters of the overall sample had flourishing mental health (77.4%), and this was consistent for both males and females. There were sex differences in education status, with females having higher levels of educational attainment compared with males. There were no statistically significant sex differences in the distribution of respondents by age or marital status.

Negative mental health

Table 2 presents the ORs for the association between psychosocial work conditions and the mental disorder outcomes. Psychosocial work conditions were associated with diagnoses of MDE and GAD in both the base and fully-adjusted models, with adjustments for covariates having a minimal impact on the magnitude of the estimates. For MDE, higher levels of job control (OR 1.09) and social support (OR 1.13) were associated with a greater odds of being disorder-free. For GAD, higher levels of job control (OR 1.09), lower levels of psychological demands (OR 1.15) and higher ratings of job security (OR 1.28) were associated with a greater odds of being disorder-free. Psychosocial work conditions were not significantly associated with BIP in the fully-adjusted models. Physical effort was not associated with any of the disorder outcomes in the base or adjusted models.

Positive mental health

Table 2 also presents the linear regression estimates for the association between psychosocial work conditions and the positive mental health outcomes. Psychosocial work conditions were associated with positive mental health scores in both the base and fully-adjusted models. Focusing on the total summary score of positive mental health, higher levels of job control (β 0.058), social support (β 0.096), and job security (β 0.106) were associated with better ratings of positive mental health, whereas lower physical effort (β −0.062) was associated with worse ratings of positive mental health. Psychological demands were not associated with the total summary score.

Sex differences

Table 3 presents the adjusted ORs for the association between psychosocial work conditions and the mental disorder/well-being outcomes, estimated separately for males and females.

For both males and females, higher *job control* and *social support* were associated with a greater odds of being disorder-free. For males (but not females), higher *job security* and lower *psychological demands* were also associated with greater odds of being disorder-free. However, only the difference in ORs for job security

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Table 1. Distribution of selected sociodemographic variables, by sex. CCHS 2012. Estimates are weighted to account for complex sampling design ($N = 10,269$) .

	Male	Female	Total
Covariates	*Col. %*	*Col. %*	*Col. %*
Region			
BC	12.2	12.6	12.4
Prairies (AB, SK, MB)	19.2	17.8	18.5
ON	40.1	39.2	39.6
QC	22.1	23.4	22.8
Atlantic (NB, NS, PE, NL)	6.4	7.0	6.7
Age			
15–24 years	16.9	17.2	17.1
25–34	22.9	20.9	21.9
35–44	22.5	22.3	22.4
45–54	22.1	25.1	23.6
55–74	15.7	14.4	15.1
Marital status			
Widowed/separated/divorced/single	38.1	41.0	39.5
Married/common-law	61.9	59.0	60.5
Education			
1 Less than secondary	11.8	8.1	10.0
2 Secondary to some post-secondary	23.9	22.8	23.3
3 Trade, college or university cert./dip.	42.0	38.4	40.2
4 Bachelor's or university deg.	22.3	30.8	26.4
Immigrant status			
<10 years	7.8	5.8	6.8
≥10 years	15.4	16.6	16.0
Non-immigrant	76.9	77.6	77.2
Lifetime history of depression			
Depressive episode in years prior-to-past-year (vs. no)	8.6	14.8	11.7
Psychosocial work exposures	*Mean*	*Mean*	*Mean*
High job control (0–20)	12.9	12.6	12.8
Low psych demands (0–8)	3.6	3.3	3.5
High social support (0–12)	8.5	8.4	8.5
Low physical effort (0–4)	1.7	2.1	1.9
Secure job (0–4)	3.1	3.1	3.1
Mental health conditions	*Col. %*	*Col. %*	*Col. %*
Disorders (past 12 months)			
1. MDE (yes vs. no)	3.2	6.2	4.7
2. Generalized anxiety disorder (yes vs. no)	1.6	2.9	2.3
3. Bipolar disorder (yes vs. no)	1.5	1.3	1.4
4. Any of the above three disorders (any vs. none)	4.9	8.1	6.5
Well-being (past month)			
Flourishing (vs. languishing/moderate)	77.4	77.3	77.4

among males versus females was statistically significant (OR 1.44 for males; OR 0.98 for females; *P*-value for interaction 0.005). The remaining male/female differences in disorder outcomes were not statistically significant on either the OR or probability scales.

For both males and females, higher *job control* and *social support* were associated with a greater odds of having flourishing mental health (ORs ranging from 1.10 to 1.17); while lower *physical effort* was associated with a decreased odds of having flourishing mental health (ORs ranging from 0.87 to 0.91). For males, but not for females, higher *job security* was associated with a 16% increase in the odds of reporting flourishing mental health. However, these male/female differences in

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Table 2. Regression coefficients for the association between psychosocial work conditions[a] and mental disorders (odds ratios) mental well-being (linear regression) outcomes[b]. Weighted estimates with bootstrapped 95% confidence intervals. CCHS 2012. Sample size ranging from *N* = 10,209 to 10,264 across outcome models.

	No mental disorders			Mental well-being		
	No MDE in past 12 months	No GAD in past 12 months	No BIP in past 12 months	Emotional (1–10)	Functional (1–10)	Total score (1–10)
Base[c]	OR (95% CI)	OR (95% CI)	OR (95% CI)	Coef. (95% CI)	Coef. (95% CI)	Coef. (95% CI)
High job control (0–20)	1.12 (1.08, 1.17)	1.11 (1.04, 1.18)	1.10 (1.02, 1.19)	0.050 (0.034, 0.065)	0.066 (0.050, 0.082)	0.062 (0.047, 0.078)
Low psych demands (0–8)	1.04 (0.96, 1.14)	1.21 (1.08, 1.36)	1.12 (0.94, 1.35)	0.026 (–0.002, 0.053)	0.014 (–0.012, 0.039)	0.016 (–0.008, 0.040)
High social support (0–12)	1.16 (1.08, 1.24)	1.08 (0.98, 1.20)	1.06 (0.95, 1.19)	0.081 (0.057, 0.105)	0.107 (0.084, 0.129)	0.101 (0.080, 0.122)
Low physical effort (0–4)	0.95 (0.85, 1.06)	0.88 (0.76, 1.02)	1.18 (0.96, 1.45)	–0.034 (–0.069, 0.002)	–0.055 (–0.088, –0.023)	–0.051 (–0.082, –0.020)
Secure job (0–4)	1.14 (1.00, 1.31)	1.32 (1.09, 1.60)	1.22 (0.95, 1.58)	0.148 (0.087, 0.208)	0.115 (0.060, 0.169)	0.122 (0.070, 0.173)
Adjusted[d]						
High job control (0–20)	1.09 (1.03, 1.16)	1.09 (1.02, 1.17)	1.05 (0.96, 1.14)	0.047 (0.032, 0.063)	0.062 (0.045, 0.078)	0.058 (0.043, 0.074)
Low psych demands (0–8)	0.98 (0.90, 1.07)	1.15 (1.02, 1.29)	1.11 (0.94, 1.31)	0.028 (0.000, 0.055)	0.010 (–0.016, 0.036)	0.014 (–0.010, 0.038)
High social support (0–12)	1.13 (1.05, 1.21)	1.05 (0.95, 1.16)	1.06 (0.94, 1.20)	0.078 (0.054, 0.102)	0.101 (0.078, 0.124)	0.096 (0.075, 0.117)
Low physical effort (0–4)	1.01 (0.89, 1.15)	0.93 (0.80, 1.08)	1.13 (0.93, 1.38)	–0.037 (–0.076, 0.003)	–0.069 (–0.105, –0.034)	–0.062 (–0.096, –0.029)
Secure job (0–4)	1.09 (0.94, 1.26)	1.28 (1.06, 1.55)	1.16 (0.90, 1.49)	0.120 (0.062, 0.179)	0.102 (0.049, 0.155)	0.106 (0.056, 0.156)

[a]Higher scores on psychosocial work conditions = positive work environment. [b]Higher scores on negative and positive mental health outcomes = better mental health. [c]Base model controls for geographic region only. [d]Adjusted model controls for geographic region, sex, age, education, marital status, interview language, immigrant status, and history of depression.

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Table 3. Odds ratios for the association between psychosocial work conditions[a] and mental disorder/well-being outcomes[b], by sex. Fully-adjusted models[c]. Weighted estimates with bootstrapped 95% confidence intervals. CCHS 2012.

Psychosocial work conditions	Outcome 1: no disorders			
	Male	Female	Interaction on odds ratio scale[d]	Interaction on prevalence scale[e]
	No disorders (vs. any)	No disorders (vs. any)		
	OR (95% CI)	OR (95% CI)	*P*-value for difference	*P*-value for difference
Job control (0–20)	1.11 (1.04, 1.18)	1.06 (0.99, 1.13)	N.S.[f]	N.S.
Psychological demands (0–8)	1.11 (0.96, 1.28)	0.97 (0.88, 1.07)	N.S.	N.S.
Social support (0–12)	1.11 (1.01, 1.22)	1.13 (1.05, 1.23)	N.S.	N.S.
Physical effort (0–4)	1.02 (0.85, 1.22)	0.95 (0.84, 1.08)	N.S.	N.S.
Secure job (0–4)	1.44 (1.17, 1.76)	0.98 (0.83, 1.17)	0.005	0.009
Psychosocial work conditions	**Outcome 2: well-being**			
	Male	Female	Interaction on odds ratio scale	Interaction on prevalence scale
	Flourishing (vs. moderate/languishing)	*Flourishing (vs. moderate/languishing)*		
	OR (95% CI)	*OR (95% CI)*	*P-value for difference*	*P-value for difference*
Job control (0–20)	1.10 (1.06, 1.14)	1.10 (1.06, 1.15)	N.S.	N.S.
Psychological demands (0–8)	1.00 (0.94, 1.06)	0.99 (0.93, 1.06)	N.S.	N.S.
Social support (0–12)	1.11 (1.05, 1.18)	1.17 (1.10, 1.24)	N.S.	N.S.
Physical effort (0–4)	0.87 (0.79, 0.96)	0.91 (0.83, 1.00)	N.S.	N.S.
Secure job (0–4)	1.16 (1.03, 1.31)	1.07 (0.95, 1.21)	N.S.	N.S.

[a]Higher scores on psychosocial work conditions = positive work environment. [b]Higher scores on negative and positive mental health outcomes = better mental health. [c]All models are adjusted for geographic region, age, education, marital status, interview language, immigrant status, and history of depression. [d]Interaction test on multiplicative scale is based on cross-product regression coefficients included in the model. N.S. = not statistically significant at the $P < 0.05$ alpha level. [e]Interaction test on additive scale is based on contrasts of predicted probabilities. N.S. = not statistically significant at the $P < 0.05$ alpha level. [f]N.S. = not statistically significant at the $P < 0.05$ alpha level.

well-being outcomes were not statistically significant on either the OR or probability scales.

Comparison across mental illness and well-being outcomes

Table 4 presents the adjusted ORs for the association between psychosocial work conditions and the two composite mental health outcomes, as well as tests for heterogeneity in estimates across outcomes. Adjustment for covariates had minimal impact on the magnitude of the estimates across the base and fully-adjusted models (data not shown). Consistent associations were observed for *job control, social support, and job security* across the negative and positive mental health outcome models, with positive levels of these work conditions being associated with 'better' mental health outcomes (ORs ranging from 1.08 to 1.15). In contrast, *physical effort* was associated with decreased odds of having flourishing mental health (OR 0.89). *Psychological demands* were not associated with either of the mental health outcomes in the fully-adjusted models. Interaction tests for heterogeneity in ORs across the two outcome models were not statistically different, with a ratio of coefficients across models including a null difference of '1', suggesting that the magnitude of ORs were similar across models.

Figure 1 presents the predicted probability of having each negative and positive mental health outcome across levels of psychosocial work conditions, calculated using the coefficients from the fully-adjusted models as presented in Table 4. Consistent with the adjusted ORs, the profile plots of the predicted probabilities suggest that positive levels of job control, social support and job security were associated with *better* mental illness and mental well-being outcomes; that lower physical effort was associated with *lower* prevalence of well-being (but not disorders); and that psychological demands were *not* associated with either outcome. Interaction tests for heterogeneity (Table 4) of the average marginal effects suggest that the relationships between psychosocial work conditions and mental health were significantly different across outcome types. Specifically, higher levels of job control and social

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Table 4. Association between psychosocial work conditions[a] and the composite mental disorder/well-being outcomes[b]. Fully-adjusted models[c]. Weighted estimates with bootstrapped 95% confidence intervals. CCHS 2012.

Psychosocial work conditions	Outcome 1: no disorders	Outcome 2: well-being	*Heterogeneity on odds ratio scale*[d]		*Heterogeneity on prevalence scale*[e]	
	No disorders (vs. any)	Flourishing (vs. moderate/languishing)	Ratio of odds ratios	*P*-value for diff.	Diff. in slopes	*P*-value for diff.
	OR (95% CI)	*OR (95% CI)*	*Col 2:Col 1*		*Col 2:Col 1*	
Job control (0–20)	1.08 (1.03, 1.13)	1.10 (1.07, 1.13)	1.02	N.S.[f]	1.2%	<0.001
Psychological demands (0–8)	1.03 (0.95, 1.11)	0.99 (0.95, 1.04)	0.97	N.S.	−0.3%	N.S.
Social support (0–12)	1.12 (1.05, 1.19)	1.14 (1.09, 1.19)	1.02	N.S.	1.5%	<0.001
Physical effort (0–4)	0.98 (0.89, 1.08)	0.89 (0.83, 0.95)	0.91	N.S.	−1.8%	<0.001
Secure job (0–4)	1.15 (1.01, 1.31)	1.12 (1.03, 1.22)	0.98	N.S.	1.2%	N.S.

[a]Higher scores on psychosocial work conditions = positive work environment. [b]Higher scores on negative and positive mental health outcomes = better mental health. [c]Fully-adjusted models include geographic region, sex, age, education, marital status, interview language, immigrant status, and history of depression. [d]Heterogeneity test on multiplicative scale is based on cross-product regression coefficients between type of outcome and each psychosocial work condition. Significant=heterogeneity in estimates across models. [e]Heterogeneity test on additive scale is based on contrasts of predicted probabilities. Significant=heterogeneity in estimates across models. [f]N.S. = not statistically significant at the $P < 0.05$ alpha level.

support were associated with even greater increases in the prevalence of well-being compared to disorders; while for physical demands, the relationship was only present for well-being outcomes, but not for disorder outcomes.

Discussion

This study examined the associations between self-reported psychosocial work conditions and mental health outcomes in Canada, focusing on whether the relationship was consistent across negative (i.e. disorders) and positive (i.e. well-being) dimensions of mental health. We found a cross-sectional relationship between various psychosocial work conditions and each of the mental health outcomes: higher levels of *job control*, *social support*, and *job security* were associated with being free of disorders as well as having flourishing mental health. However, lower *physical effort* was associated with decreased odds of having flourishing mental health only, whereas *psychological demands* were not associated with either of the composite mental health outcomes. The overall pattern of these relationships was consistent across the two outcome models, suggesting that the underlying relationships were similar. However, there was evidence of heterogeneity on the absolute probability scale, with a relatively *stronger* relationship between psychosocial work conditions and the prevalence of having flourishing mental health, compared with the prevalence of being free of disorders.

Heterogeneity in estimates

Only a few studies have explicitly examined both negative and positive dimensions of mental health simultaneously *and* within the context of work exposures (Reineholm *et al.*, 2011; Finne *et al.*, 2016; LaMontagne *et al.*, 2016). A study by LaMontagne *et al.* (2016), using cross-sectional survey data on a representative sample of 13,456 men in Australia, found qualitatively similar associations between psychosocial job quality and mental disorder and well-being, although the magnitude of associations was greater for well-being versus disorder outcomes. Reineholm *et al.* (2011), using survey data collected on 662 civil servants in Sweden, also found a differential relationship between psychosocial work conditions and mental health across disorder versus well-being measures. However, their study was in the opposite direction, with job strain and effort-reward imbalance models being more predictive of ill-health rather than subjective well-being. In contrast, Finne *et al.* (2016), using longitudinal survey data on 4158 Norwegian public and private sector employees, found that psychosocial work conditions were similarly associated with negative mental health (as measured by past-week symptoms of anxiety and depression) and positive affect (as measured by enjoyment of daily activities, alertness, and hope for the future) in a complementary fashion.

Taken together, our findings appear to support the notion that negative and positive aspects of mental health are correlated (in the sense that psychosocial work conditions had similar patterns of association) but distinct (in the sense that the relationships were not entirely complementary) (Keyes, 2005). This was evident when examining relationships on the probability scale. For example, at the highest levels of job control, the

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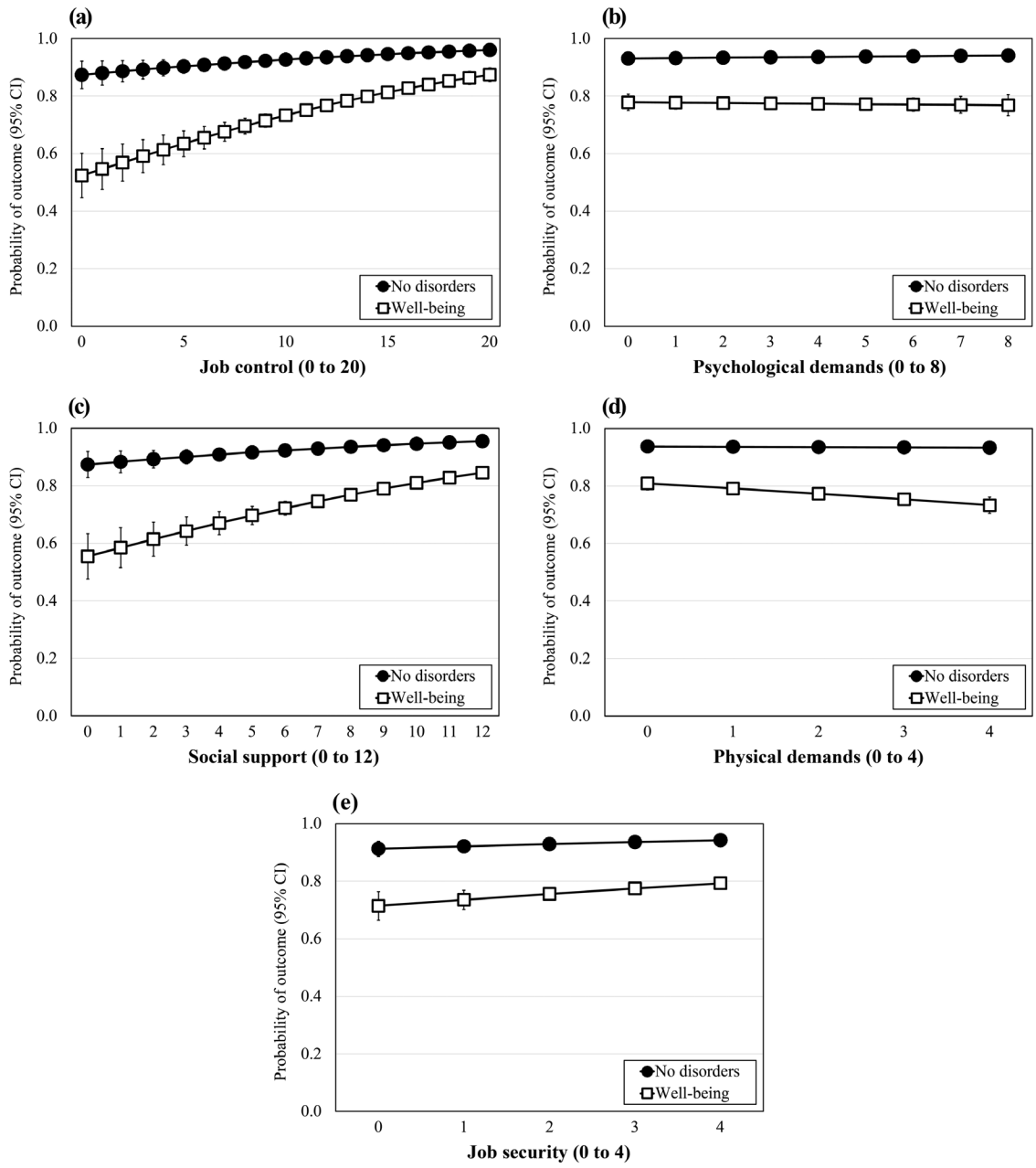

Figure 1. Fitted probability of having mental disorder and well-being outcomes across levels of psychosocial work conditions (in separate panels). Weighted estimates with bootstrapped 95% confidence intervals, derived from fully-adjusted models. CCHS 2012. [a]Higher scores on psychosocial work conditions = positive work environment. [b]Higher scores on negative and positive mental health outcomes = better mental health. [c]Fully-adjusted models include geographic region, sex, age, education, marital status, interview language, immigrant status, and history of depression.

prevalence of having flourishing mental health (i.e. being in 'good' mental health as measured on the positive scale) was lower than the prevalence of having no disorders (i.e. being in 'good' mental health as measured on the negative scale) by an estimated nine-percentage-points. However, at the lowest levels of job control, the prevalence of respondents with flourishing mental health was substantially lower than those with no disorders, with an estimated thirty-five percentage-point difference in ratings. Thus, although psychosocial work conditions

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were associated with both negative and positive mental health in the same direction, poor psychosocial work conditions had an even greater 'deleterious' association with mental well-being compared to mental disorders. This may have relevance for the development of workplace interventions, in that the public health impact of improving levels of some psychosocial work conditions (e.g. job control, social support) might be more substantial for well-being outcomes compared to disorder outcomes, to the extent that declines in mental disorders or improvements in mental well-being can be attributed to the psychosocial work environment.

Outcome-specific relationships

The findings from our study on the individual mental *disorder* outcomes are consistent with the overall body of evidence (Stansfeld and Candy, 2006; Bonde, 2008; Theorell *et al.*, 2015). A meta-analytic review by Stansfeld and Candy (2006) found robust evidence that higher levels of job control, social support and job security were associated with decreased incidence of common mental disorders based on data from longitudinal studies. Our findings of no association between physical effort and the odds of having a mental disorder also are consistent with previous Canadian studies based on cross-sectional (Wang and Patten, 2001) and longitudinal (Wang, 2004) data from the National Population Health Survey. In our study, we found no association between psychological demands and the composite disorder outcomes. This is in contrast with the Stansfeld and Candy (2006) review of common mental disorders, although the Theorell review (2015) similarly found limited evidence of a relationship with depressive symptoms.

Our findings on mental *well-being* outcomes also are consistent with the overall body of evidence. For example, studies by Lee *et al.* (2016) and Schütte *et al.* (2014), using cross-sectional survey data, found that various negative psychosocial work conditions (e.g. job dissatisfaction, lack of reward, low social support, job insecurity) were associated with lower psychological well-being as measured using the World Health Organization-5 Well-being Index. We note the challenge in comparing our findings to individual studies due to the use of different scales as well as the lack of consensus definition for the concept of positive mental health (Hone *et al.*, 2014; Linton *et al.*, 2016).

Sex differences

In our study, we only observed sex differences in the relationship between job security and mental disorder outcomes, with job security being protective of the composite disorder outcome among males, but not among females. This finding is consistent with some (Bültmann *et al.*, 2002; Rugulies *et al.*, 2006; Kopp *et al.*, 2008; Wang *et al.*, 2008; Lee *et al.*, 2016) but not all previous studies (Wang and Patten, 2001; Wang, 2004; Cheng and Chan, 2008). In support of our findings, studies by Rugulies *et al.* (2006), Lee *et al.* (2016), Wang *et al.* (2008), and Bültmann *et al.* (2002) found larger estimates for the association between job insecurity and some mental disorders among men compared to women. In contrast, cross-sectional (Wang and Patten, 2001) and longitudinal (Wang, 2004) studies by Wang *et al.*, based on the data from the National Population Health Survey, found no significant differences across men and women in the relationship between job insecurity and major depressive episodes. Several explanations have been proposed to account for potential sex/gender-differences in relation to job insecurity, including differences in the experience of/response to job insecurity among men versus women, as well as differences in the importance of work-life roles (De Witte, 1999; Cheng and Chan, 2008).

Strengths and limitations

Our study has a number of strengths. While the data is cross-sectional, it represents a comprehensive, population-based examination of psychosocial work conditions and mental health outcomes. Our use of a 'multiple outcome' approach allows for a better understanding of complementary, yet distinct, sets of outcomes in association with a given set of exposure variables (VanderWeele, 2017b). Moreover, previous studies have examined either single-outcome models, or multiple outcomes without formal tests for heterogeneity between estimates. However, our simultaneous modeling approach enabled us to account for potential correlation between multiple outcomes within a given individual while testing for heterogeneity on both the multiplicative and additive scales. We also examined multiple indicators of the psychosocial work environment and mental health, defined using valid and reliable instruments.

A limitation of our study is the lack of data on personal or family history of mental health conditions. Prior mental health conditions for example, may be associated with perceptions of psychosocial work conditions as well as the onset of future mental health conditions (Stansfeld and Candy, 2006), thus accounting for a proportion of the relationship between these two variables. However, we note that previous studies have found a longitudinal relationship between psychosocial work conditions and mental health outcomes even after accounting for previous diagnoses (Rugulies *et al.*, 2006; Wang *et al.*, 2009; Smith and Bielecky, 2012; Harvey *et al.*, 2018). In our study, we attempted to address this

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by controlling for a retrospectively assessed measure of past history of depressive episodes in the period prior to the 12-month survey recall period, which had minimal impact on our findings.

There may be additional individual-level and workplace-level factors (Finne *et al*., 2016) not included in our models that may be relevant to one or both types of mental health outcomes (Stansfeld and Candy, 2006; Reineholm *et al*., 2011). Exposure and outcome measures were based on self-report, which may lead to biased associations due to common measurement methods (Podsakoff *et al*., 2003). Our measure of psychosocial work conditions also relied on a modified version of the JCQ, which might not capture all important dimensions of the psychosocial work environment.

Finally, our study focused on the relationship between psychosocial work conditions and mental health outcomes. Psychosocial conditions may provide an underlying measure of the variety of work demands that occur even within similar occupation groups (Stansfeld *et al*., 2013). However, these conditions are also nested within the broader work or organizational context (Stansfeld and Candy, 2006; Stansfeld *et al*., 2013); thus, there may be important differences in these relationships across industry or occupation settings. These contextual differences may be important to understand for the development of targeted interventions. Although our study sample was based on a general work population derived from national-level health survey data, future research on occupation groups at higher-risk for mental disorders may be informative.

Conclusions

Given the role of psychosocial work conditions as a potentially modifiable risk factor for mental health in the workplace (LaMontagne *et al*., 2010), our findings have implications for the development of interventions that target the psychosocial work environment. To the extent that declines in mental illness or improvements in mental well-being can be attributed to the psychosocial work environment, we might expect concurrent improvements in both outcome types in association with a general approach (Forsman *et al*., 2011). However, there are unique patterns of association across negative and positive mental health outcomes, and thus both aspects may require careful consideration for the development of interventions. Our study, although based on cross-sectional data, suggests that mental illness and mental well-being represent complementary, yet distinct, aspects of mental health in relation to psychosocial work conditions. Interventions targeting the psychosocial work environment may serve to improve both of these dimensions. However, the measurement and examination of both dimension may be required to obtain an integrated and comprehensive understanding of mental health in the workplace.

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