An Analysis of the Association Between Obesity and Work Productivity Impairment Among King County Workers

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Abstract

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Objective: Determine the obesity prevalence among a sample of workers in six low-wage industries in King County and evaluate the association between weight category and work productivity impairment within this sample.

Methods: Using data drawn from the HealthLinks Trial baseline survey, multiple linear regression analyses were conducted examining the association between weight category and work productivity impairment.

Results: The prevalence of obesity (BMI ≥ 30) among the study participants was 19.62%. Among the industries represented, *Arts, Entertainment, & Recreation* had the highest prevalence of obesity at 30.1%. The adjusted multiple linear regression model suggests that obese (BMI ≥ 30) and recommended weight (18.5 ≤ BMI < 25) workers of the same gender, age, race, education, industry, and job satisfaction who are in good or better health, will have a statistically significant difference in work productivity impairment, with obese workers predicted to have 16.8% more impairment than recommended weight workers. There was no statistically significant change in impairment between overweight (25 ≤ BMI to < 30) or underweight (BMI ≤ 18.5) workers relative to recommended weight workers. Health status was found to significantly modify and depression risk substantially mediate, the effect of obesity on work productivity impairment.

Conclusions: This study predicts that obese employees in this population, who are otherwise in good health, will on average, have higher work productivity impairment than recommended weight workers. Due to the substantial impact that health status and depression risk have on the association between obesity and work productivity, workplace health programs may wish to specifically address these issues in order to maximize work productivity.

INTRODUCTION

It is well documented that the prevalence of overweight and obesity in the United States is on the rise. According to the National Center for Health Statistics, the prevalence of obesity, among adults aged 20 and over has increased from 22.9% in the early 1990s to 36.4% in 2011 to 2014.[1] In fact, 69.5% of adults are either overweight or obese, based on a body mass index (BMI) greater than 25.0.[1]

The health effects of obesity have been studied extensively, and the research has consistently shown that obesity is linked with serious diseases and health conditions including type 2 diabetes, osteoarthritis, cardiovascular disease, hypertension, and stroke.[2] A study recently published in Lancet showed that each 5 kg/m^2 above a BMI of 25.0 is associated with a 30% higher all-cause mortality.[3]

The adverse workplace effects of obesity are also substantial. Several studies have shown that obesity is associated with increased rates of absenteeism (days off work) and presenteeism (reduced productivity while at work).[4,5] The total estimated cost of obesity among U.S. employees ranges from $147 billion per year to nearly $210 billion per year.[6,7] The obesity-related absenteeism cost is estimated to be $12.8 billion per year and the presenteeism cost is estimated to be $30 billion per year.[4] Obesity is also associated with increased occupational injuries. Compared to recommended weight ($18.5 \leq BMI < 25$) employees, employees in obesity class III ($BMI \geq 40$) had a higher incidence of claims (11.65 vs 5.8 claims per 100 FTE), more lost work days (183.63 vs 14.19 per 100 FTE), increased medical costs

($51,091 vs $7503 per 100 FTE), and higher worker compensation claims costs ($59,178 vs $5396 per 100 FTE).[8]

It is clear that obesity is a serious problem for the individual as well as the employer. While the overall health and economic impact of obesity has been well researched, there are few studies that have focused on low-wage industries in particular or examined which characteristics may modify the effects of obesity on work productivity within this population. This information may provide a high-yield target for workplace health program interventions within low-wage industries. This study seeks to (1) determine the obesity prevalence among a sample of workers in six low-wage industries in King County, (2) analyze the association between weight category and work productivity impairment, and (3) explore which variables may modify or confound the relationship between weight category and work productivity impairment.

METHODS

Study Sample

This analysis relies on baseline data collected through the HealthLinks Trial, a two-year study looking at the benefits of implementing evidence-based health promotion interventions among small employers.[9] A total of 78 employers in King County, Washington were enrolled in the HealthLinks Trial. The inclusion criteria for employers were that they (1) conduct operations in King County, (2) have 20 - 200 employees, and (3) belong to one of six low-wage industries. Inclusion criteria for survey participants were (1) an employee of an enrolled worksite, (2) age 21 or older, (3) able to read English, Spanish, Traditional Chinese, or Vietnamese, and (4) willing to participate in the survey.

Study Measures

The HealthLinks Trial baseline survey asked participants about eating habits, worksite eating options, general physical activity, worksite physical activity, tobacco use, worksite tobacco cessation resources, general health, perceived impacts of the job on their health, work productivity, cancer screening, stress, and general demographics including age, gender, weight, height, ethnicity, race, education, and household income. Only variables used in this study are described below.

Work Productivity Impairment

Work productivity impairment was assessed in the HealthLinks Trial baseline survey using the Work Productivity and Activity Impairment (WPAI) questionnaire. The WPAI is a validated questionnaire which has been frequently used across a variety of occupations and health conditions to assess employee productivity impairment related to health.[10] Through a six question survey, the WPAI provides a quantitative assessment of absenteeism, presenteeism, total work impairment and activity impairment due to health. The first question of the original WPAI asks whether the participant is employed. This question was omitted from the HealthLinks Trial baseline survey, as each survey participant was known to be an employee of an enrolled worksite. The remaining questions of the WPAI were unaltered, and determined over the past seven days (1) hours missed due to health problems, (2) hours missed for other reasons, (3) hours actually worked, and (4) the degree that health affected productivity while working. Based on these questions, percent work time missed due to health (absenteeism), percent impairment while working due to health (presenteeism), and percent overall work impairment due to health can be calculated. The WPAI outcomes are expressed as impairment

percentages ranging from 0 to 100%, with higher numbers indicating greater impairment and less productivity. See Figure 1 for additional information.

Figure 1: Work Productivity Impairment Measures[11]

Questions:

1. Hours missed due to health problems
2. Hours missed for other reasons
3. Hours actually worked
4. The degree that health affected productivity while working

Absenteeism calculation:

$$\frac{Question\ 1}{Question\ 1 + Question\ 3}$$

Presenteeism calculation:

$$\frac{Question\ 4}{10}$$

Total work impairment calculation: Absenteeism + (1 - Absenteeism*Presenteeism)

$$\frac{Question\ 1}{Question\ 1 + Question\ 3} + \left(1 - \frac{Question\ 1}{Question\ 1 + Question\ 3} * \frac{Question\ 4}{10}\right)$$

Depression

Depression screening was conducted by including the Patient Health Questionnaire-2 (PHQ-2) in the survey. The PHQ-2 is a depression screening tool which has been shown to have a sensitivity of 96% and a negative predictive value of 98%.[12] While the PHQ-2 is highly effective at ruling out depression, the specificity and positive predictive values (57% and 33% respectively) are not sufficient to allow for the diagnosis of depression.[12] The PHQ-2 is scored from zero to six. A score of three or greater is a positive screen, suggesting the patient is at risk for depression. Survey participants were dichotomized as either *at risk for depression* (PHQ-2 ≥ 3) or *not at risk for depression* (PHQ-2 < 3)(at risk = 1, not at risk = 0). See Figure 2 for an example of the PHQ-2.

Figure 2: The Patient Health Questionnaire-2 (PHQ-2)				
Over the past 2 weeks, how often have you been bothered by any of the following problems?	**Not At All**	**Several Days**	**More Than Half the Days**	**Nearly Every Day**
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3

Health Status

Perceived health status was assessed through the Short Form 1 (SF-1), a common general health question adapted from the first question of the Short Form 36.[13] The SF-1 is a tool that is widely used to assess the general health of a population, and has been found to be a strong indicator of future health care and mortality.[14,15] The SF-1 asks the question: "In general, would you say your health is: Excellent, Very Good, Good, Fair, or Poor?" This question is scored on a five-point scale where Excellent = 1 and Poor = 5. Participants were dichotomized into categories of *fair or less* or *good or better* (fair or less = 1, good or better = 0).

Job Satisfaction

Reported job satisfaction was measured by asking the question: "Overall, how satisfied are you with your job? Completely Satisfied, Satisfied, Neutral, Somewhat Dissatisfied, or Completely Dissatisfied." This question is scored on a five-point scale where Completely Dissatisfied = 1 and Completely Satisfied = 5. Participants were coded as *satisfied* or *not satisfied* (Neutral to Completely Dissatisfied = 1, Satisfied or Completely Satisfied = 0).

Industry

Industry information was categorized based on each employer's North American Industry Classification System (NAICS) coding. The industry categories represented in the HealthLinks

Trial included (1) *Accommodation & Food*, (2) *Arts, Entertainment, & Recreation*, (3) *Educational Services*, (4) *Health Care and Social Services*, (5) *Retail Trade*, and (6) *Other Services except Public Administration*.

Demographics

Demographic information included age in years (18-34 = 0, 35-54 = 1, 55+ = 2), sex (male = 0, female = 1), race (White = 1, Black = 2, Asian = 3, and Other = 4), and educational attainment (high school or less = 0, some college or more = 1). Body mass index (BMI) was calculated as weight in kilograms divided by height in meters squared. Self-reported weight in pounds and height in feet and inches were converted to kilograms and meters, respectively. Four weight categories were created: underweight (BMI < 18.5), recommended weight (18.5 ≤ BMI < 25, reference), overweight (25 ≤ BMI < 30), and obese (BMI ≥ 30).

Statistical Analysis

Statistical analyses were performed using Stata software, version 14. Descriptive statistics were calculated to describe the study sample.

Prevalence of Obesity

The prevalence of obesity was calculated by sorting the sample industry categories into weight categories. Thus, for each weight category, the frequency of participants from a specific industry could be observed. A Pearson's χ^2 test was conducted to evaluate the independence of weight category and industry classification.

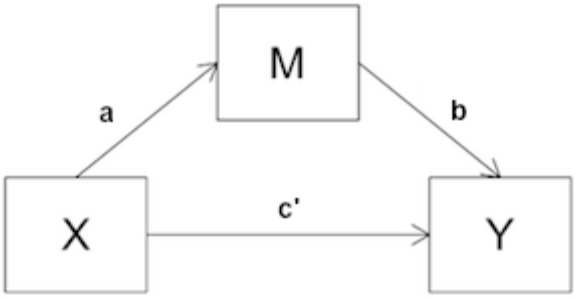
Association Between Weight Category and Work Productivity Impairment

A multiple linear regression model with log transformation of the dependent variable, was used to evaluate the association between weight category (a categorical variable) and work productivity impairment (a continuous variable), adjusting for clustering effect by worksite, as well as potential confounding by sex, age, race, education, industry, and job satisfaction.

Effect Modification and Mediation

An exploratory interaction analysis was conducted utilizing multiple linear regression with interaction terms to evaluate for effect modification by the measured variables (sex, age, race, education, industry, health status, job satisfaction, and depression risk). Sobel-Goodman mediation tests were also performed to evaluate whether statistically significant mediation was present. Utilizing this method, the coefficients for pathway ***a***, ***b***, and ***c'*** can be calculated (see Figure 3). The amount of mediation is calculated as the indirect effect of the causal variable (weight category) on the outcome (work impairment). This can be estimated as the product of ***a*** *x* ***b***. The direct effect is estimated by the coefficient for ***c'***. Therefore, the total effect (***c***) of the causal variable on the outcome is the sum of the direct effect (***c'***) and the indirect effect (***a*** *x* ***b***) or ***c*** = ***c'*** + ***ab***.

Figure 3: Mediation Diagram



RESULTS

Sample Description

A total of 78 employers in King County, Washington with workforces ranging from 20 to 235 employees participated in the study. There were 5896 employees across all 78 worksites. Of these, 4288 employees were on-site 20 hours or more each week. A total of 3302 employees completed the baseline survey. Since the survey was administered on-site, employees that were frequently on-site were more likely to complete the survey. Detailed demographic data is shown in Table 1. Most of the participants in this survey were younger than 55 years of age (82.22%) and the majority were White (61.89%), female (65.29%), had at least some college education (86.11%), were satisfied with their jobs (75.96%), and not at risk for depression (89.38%). The distribution of work productivity impairment within the sample was noted to be heavily right-skewed with the majority of participants at or near zero impairment. To better estimate the central tendency of the distribution, the geometric mean for work productivity impairment was calculated. The geometric mean of work productivity impairment within the population was 23.26% (95% CI: 22.33-24.23). Approximately half of the study participants reported no work impairment.

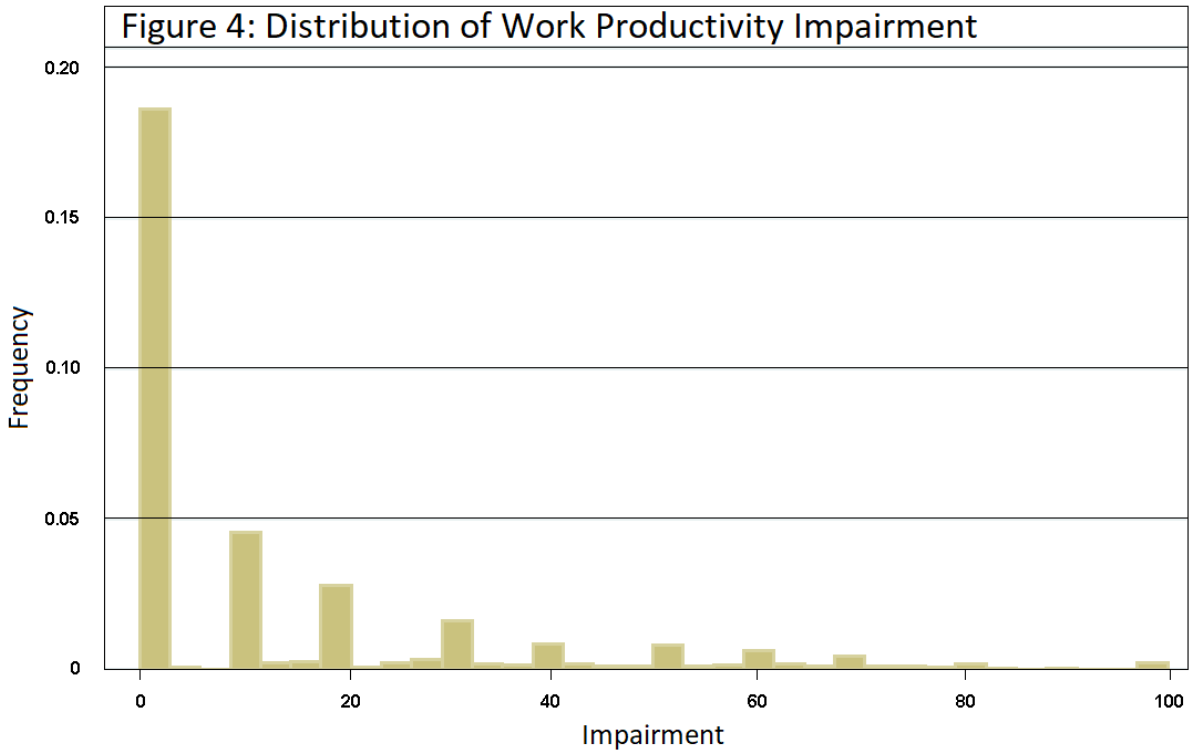
Two hundred and seventy survey participants were removed from the data set prior to statistical analysis due to invalid responses or values outside of the expected range for an adult. Records were dropped for weight reported outside the range of 90 to 500 lbs. and for height reported outside the range of 50 to 100 inches. Analyses were conducted utilizing the data from the remaining 3032 participants.

Table 1: Characteristics of the Survey Population Stratified by Weight Category					
	Underweight	**Recommended Weight**	**Overweight**	**Obese**	**Total**
	N = 58 (1.91)	N = 1390 (45.84)	N = 989 (32.62)	N = 595 (19.62)	N = 3032
Gender					
Men	9 (0.86)	388 (36.92)	446 (42.44)	208 (19.79)	1051
Women	49 (2.48)	999 (50.53)	543 (27.47)	386 (19.52)	1977
Age					
18 - 34	33 (2.69)	658 (53.54)	340 (27.66)	198 (16.11)	1229
35 - 54	18 (1.42)	517 (40.90)	450 (35.60)	279 (22.07)	1264
55 or more	7 (1.30)	215 (39.89)	199 (36.92)	118 (21.89)	539
Race					
White	31 (1.70)	827 (45..39)	604 (33.15)	360 (19.76)	1822
Black	5 (2.17)	85 (36.96)	86 (37.39)	54 (23.48)	230
Asian	15 (3.42)	281 (64.01)	112 (25.51)	31 (7.06)	439
Other	6 (1.32)	158 (34.88)	155 (34.22)	134 (29.58)	453
Education					
High school or less	8 (1.90)	166 (39.43)	144 (34.20)	103 (24.47)	421
Some college or more	50 (1.91)	1224 (46.88)	845 (32.36)	492 (18.84)	2611
Industry					
Accommodation	6 (2.41)	131 (52.61)	80 (32.13)	32 (12.85)	249
Arts & Recreation	-	43 (41.75)	29 (28.16)	31(30.10)	103
Education	8 (2.45)	173 (52.91)	103 (31.50)	43 (13.15)	327
Healthcare	24 (1.76)	623 (45.61)	436 (31.92)	283 (20.72)	1366
Retail Trade	6 (1.13)	279 (52.54)	145 (27.31)	101 (25.70)	594
Other Services	14 (3.07)	141 (30.92)	196 (42.98)	105 (17.68)	393
Health Status					
Fair or less	7 (2.02)	77 (22.25)	98 (28.32)	164 (47.40)	346
Good or better	51 (1.90)	1313 (48.88)	891 (33.17)	431 (16.05)	2686
Job Satisfaction					
Satisfied	41 (1.78)	1072 (46.55)	758 (32.91)	432 (18.76)	2303
Not satisfied	17 (2.33)	318 (43.62)	231 (31.69)	163 (22.36)	729
Depression Risk					
At risk	5 (1.63)	123 (40.07)	87 (28.34)	92 (29.97)	307
Not at risk	49 (1.90)	1202 (46.54)	856 (33.14)	476 (18.43)	2583

Recommended weight: 18.5 ≤ BMI < 25; Underweight: BMI < 18.5; Overweight: 25 ≤ BMI < 30; Obese: BMI ≥ 30. BMI = body mass index.

Distribution of Work Productivity Impairment

The distribution of work productivity impairment within the sample population was noted to be strongly right-skewed (see Figure 4). There was minimal difference (< 4 percentage points) between the geometric mean (GM) of work productivity impairment in the total population compared to the GM by gender, age, race, education or industry. Considerable variation in the GM of work productivity impairment was noted between the total population and the study participants who screened at risk for depression (+10.12 percentage points), who reported fair or less health (+8.00 percentage points), and those who reported dissatisfaction with their jobs (+5.41 percentage points). Table 2 further illustrates the GM of work productivity impairment among the subgroups of interest. To address the positive skew in the distribution of work productivity impairment, natural log transformation was applied to the dependent variable in the regression analysis.



Prevalence of Obesity

The first aim of this study was to evaluate the obesity prevalence among a sample of workers in six low-wage industries in King County. A Pearson's χ^2 test ($\chi^2 = 50.13$, $P < 0.001$) for independence indicated a significant association between weight category and industry. Across the entire sample, the prevalence of obesity was 19.62% with 595 employees reporting a height and weight which resulted in an obese coding (BMI ≥ 30). As shown in Figure 5 and Table 1, *Arts, Entertainment, & Recreation* had the highest prevalence of obesity at 30.10%, followed by *Retail Trade* at 25.70%. *Health Care* and *Other Services* had a prevalence similar to the average across all industries. *Accommodation & Food* and *Educational Services* were substantially lower than the average across all industries at 12.85% and 13.15% respectively. With the exception of *Accommodation & Food* (mean age = 34.30, SD = 12.33) there was minimal variation in the mean age of the survey participants by industry. See Table 3 for further details.

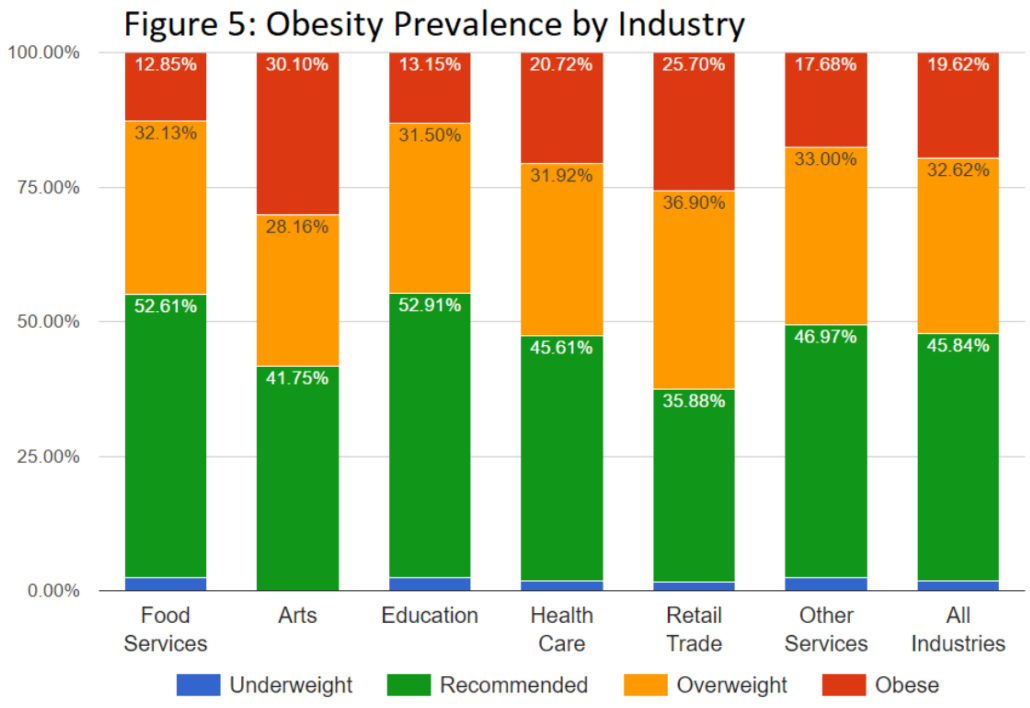


Table 2: Characteristics of the Survey Population Stratified by Work Productivity Impairment		
	Geometric Mean	**95% CI**
Gender		
Men	22.65	20.99 - 24.45
Women	23.52	22.40 - 24.68
Age		
18 - 34	23.97	22.56 - 25.46
35 - 54	23.26	21.80 - 24.82
55 or more	21.36	16.62 - 19.13
Race		
White	22.35	21.24 - 23.53
Black	26.31	21.94 - 31.54
Asian	23.91	21.56 - 26.51
Other	25.63	22..97 - 28.59
Education		
High school or less	26.13	22.95 - 29.76
Some college or more	22.87	21.92 - 23.87
Industry		
Accommodation	23.17	20.10 - 26.70
Arts & Recreation	23.96	19.40 - 29.60
Education	21.88	19.45 - 25.60
Healthcare	24.38	22.98 - 25.87
Retail Trade	23.01	20.12 - 26.30
Other Services	21.43	19.48 - 23.56
Health Status		
Fair or less	31.26	28.53 - 34.25
Good or better	21.95	20.99 - 22.96
Job Satisfaction		
Satisfied	21.32	20.33 - 22.37
Not satisfied	28.67	26.62 - 30.88
Depression Risk		
At risk	33.38	30.22 - 36.87
Not at risk	21.52	26.10 - 32.68
Total	23.26	22.33 - 24.23

Table 3: Mean Age by Industry			
	Mean Age	**SD**	**Min/Max**
Accommodation	34.30	12.32	18/78
Arts	39.32	10.46	19/62
Education	39.73	12.74	19/76
Health	40.96	13.02	18/80
Retail	39.92	12.93	18/76
Other	40.81	12.65	18/76
All Industries	40.06	12.89	18/80

Association between Weight Category and Work Productivity Impairment

The second aim of this study was to analyze the association between weight category and work productivity impairment within the sample population. Multiple linear regression analyses with work productivity impairment as the dependent (continuous) variable and weight category as the independent (categorical) variable were performed. With model testing, the distribution of work productivity impairment was found to be strongly right skewed. Natural log transformation of the dependent variable served to adequately normalize the distribution allowing for more accurate regression modeling. A simple linear regression model suggests that obese workers report 18.4% more impairment ($p = 0.002$) on average than recommended weight workers. Underweight and overweight employees had a non-significant increase in impairment of 17.2% ($p = 0.248$) and 5.4% ($p = 0.269$) respectively.

Effect Modification, Mediation, and Confounding

The third aim of this study was to determine which variables may modify or confound the relationship between weight category and work productivity impairment. Through a formal interaction analysis, health status was found to be a statistically significant effect modifier ($p = 0.039$). The adjusted model was stratified by health status to account for this effect modification.

An exploratory analysis was also performed to determine whether the relationship between weight category and work productivity impairment was subject to mediation by any of the measured variables. Sobel-Goodman mediation tests confirmed that depression risk is a

statistically significant mediator of the effect of weight category on work productivity impairment.

The coefficients for effects ***a***, ***b***, and ***c'*** were calculated for depression risk (see the mediation diagram in Figure 3). The coefficient for effect ***a*** was 0.023 (SE = 0.008, p = 0.006) and the coefficient for effect ***b*** was 0.429 (SE = 0.056, p < 0.001). The product of coefficients (***a*** *x* ***b***) yielded an estimated indirect effect of 0.010 (SE = 0.004, p = 0.009). The direct effect (***c'***) was estimated as 0.036 (SE = 0.017, p = 0.031) and the total effect as 0.046 (SE = 0.017, p = 0.007). The proportion of the total effect mediated is 0.216. This indicates that depression risk mediates the relationship between weight category and work productivity impairment, accounting for approximately 22% of the total effect.

The remaining variables (sex, age, race, education, industry, and job satisfaction) were considered potential confounders of the association between weight category and work productivity and were adjusted for in the final model.

The final model, therefore, addresses the modifying effect of health status, potential clustering by worksite and confounding by sex, age, race, education, industry, and job satisfaction. The adjusted model predicts that among employees who are in good or better health, an obese worker will have 16.8% (p = 0.034) more total work productivity impairment than a recommended weight worker. There is no statistically-significant association between weight category and work productivity impairment among employees who are in fair or poor health. Table 4 illustrates the effect of stratification by health status within the adjusted model.

Table 4: Comparison of Stratified and Unstratified Models						
	Unstratified Model		Stratified Model			
			Health Status: "Fair or Less"		Health Status: "Good or Better"	
	Coefficient (p-value)	95% CI	Coefficient (p-value)	95% CI	Coefficient (p-value)	95% CI
Underweight	0.179 (0.150)	-0.07 - 0.42	0.245 (0.144)	-0.09 - 0.58	0.127 (0.339)	-0.16 - 0.39
Recommended Weight	ref	ref	ref	ref	ref	ref
Overweight	0.067 (0.154)	-0.03 - 0.16	-0.053 (0.638)	-0.28 - 0.17	0.057 (0.285)	-0.05 - 0.16
Obese	**0.156 (0.011)**	0.04 - 0.28	-0.189 (0.152)	-0.45 - 0.07	**0.155 (0.034)**	0.01 - 0.30
Adjusted for clustering by worksite and confounding by sex, age, race, education, industry, & job satisfaction Coefficients with p-values < 0.05 are highlighted						

DISCUSSION

This study is a secondary analysis of baseline data collected in the first phase of the HealthLinks Trial. The prevalence of obesity among all U.S. workers has been estimated to be 26.2%.[16] This study found that the prevalence of obesity among a sample of low-wage workers in King County is substantially less than the national average at 19.6%. Among the industries represented in this study, only *Arts, Entertainment, & Recreation* had a prevalence of obesity above the national average, at 30.1%. A Pearson's χ^2 test for independence demonstrated that industry category and weight category are associated. As a cross-sectional study, the direction of association cannot be determined. Nevertheless, it is plausible that certain industries may be more accommodating to workers with BMIs outside of the recommended range and as a result, suffer from reduced work productivity.

This study also found a significant association between obesity and work productivity impairment among low-wage workers in King County. This association persisted after

addressing effect modification by health status, clustering by worksite, and potential confounding by sex, age, race, education, industry, and job satisfaction. This model implies that obese and recommended weight workers of the same gender, age, race, education, industry, and job satisfaction who are in good or better health, will have a statistically significant difference in work productivity impairment, with obese workers predicted to have 16.8% more impairment than recommended weight workers. Among employees who are in fair or poor health, obesity had no statistically-significant impact on work productivity. This suggests that if an employee is not in good health, a change in weight category is unlikely to have a significant impact on the underlying work productivity impairment. In light of this, employers may wish to initially focus on improving the overall health status of the workforce. Among a workforce with good health, however, a change in weight category from obese to recommended weight may provide a substantial improvement in work productivity.

This study found no significant increase in work impairment among overweight workers compared to recommended weight workers. These results should be interpreted with caution, however, as overweight workers are known to have an increased risk for adverse health effects.[2,3] We believe these results serve to highlight the importance of maintaining a healthy weight and preventing progression into unhealthy weight categories.

This study also noted that depression risk mediates approximately 22% of the effect that weight category has on work productivity impairment. This suggests that including routine depression screening in a workplace health program, thereby prompting more timely evaluation and

management, could have a significant impact on work productivity, particularly among obese employees.

Strengths and Limitations

The primary strengths of this study are (1) that it is based on a large sample of workers in low-wage industries that are often not represented in research and (2) that it includes data on a variety of demographic variables and supplemental occupational variables which are useful for multivariable analyses. This study also had several limitations that should be addressed. First, there may be factors which contribute to work impairment that were unaccounted for in this analysis. Although the difference in effect estimates after adjusting for a number of potential confounding variables was minimal. Another limitation of this study is that the data is self-reported and cross-sectional. Notably, BMI calculations based on self-reported height and weight are frequently prone to error, with overweight and obese participants tending to underreport their weight.[17]

This analysis was conducted on a select group of workers from small employers in low-wage industries. As such, this sample may not be representative of all King County workers, and the generalizability of the study results may be limited. Finally, the relatively small sample size among certain subgroups generated in this analysis such as the underweight category and the *Arts, Entertainment & Recreation* industry may impact the interpretation and generalizability of the findings among these groups.

CONCLUSIONS

This study provides an estimate of the obesity prevalence among workers within low-wage industries in King County as well as an estimate of the impact of obesity on work productivity within this population. This analysis found that the obesity prevalence among low-wage workers in King County is considerably less than the national average. Furthermore, this study predicts that an obese employee in this population, who is otherwise in good health, will have a substantial increase in work productivity impairment relative to a recommended weight worker. This study also found that health status modifies and depression risk mediates the effect of obesity on work productivity. Therefore, in order to maximize work productivity within the workforce, workplace health programs may wish to develop interventions which specifically address obesity and depression risk.

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