Obesity in America: Focusing on psychosocial stress as a risk factor

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Trends in obesity 1999-2000 to 2017-2018

Hales et al. (2020)
The Cost of Obesity

- In 2013, total medical costs of obesity estimated to be $342.2 billion\(^1\)
- In 2014, obesity accounted for 6.5% to 12.6% of total absenteeism costs in the workplace, translating to an estimated $8.65 billion per year\(^2\)
- Obesity accounted for 18% of deaths among Americans\(^3\)
  - Obesity is believed to cause up to 90,000 cancer deaths per year\(^4\)
- An NIH study in 2014 found that severe obesity may shorten life expectancy up to 14 years\(^5\)
The Impact of Obesity\textsuperscript{1}
Obesity is a public health issue

Percent of Adults with Obesity by Race/Ethnicity, 2017-2018 (Age-adjusted)
Obesity Prevalence by Education Level and Sex

Ogden et al. 2017 MMWR
Obesity Prevalence by Income and Sex

Ogden et al. 2017 MMWR
Obesity Prevalence Among Foreign-Born Adults

Cuevas & Cofie (Accepted)
Projected U.S. State-Level Prevalence of Adult Obesity and Severe Obesity

Zachary J. Ward, M.P.H., Sara N. Breich, Ph.D., Angie L. Craddock, Sc.D.,
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Michael W. Long, Sc.D., and Steven L. Gortmaker, Ph.D.

ABSTRACT

BACKGROUND
Although the national obesity epidemic has been well documented, less is known about obesity at the U.S. state level. Current estimates are based on body measures reported by persons themselves that underestimate the prevalence of obesity, especially severe obesity.

METHODS
We developed methods to correct for self-reporting bias and to estimate state-specific and demographic subgroup-specific trends and projections of the prevalence of categories of body-mass index (BMI) BMI data reported by 6,264,226 adults (18 years of age or older) who participated in the Behavioral Risk Factor Surveillance System Survey (1993–1994 and 1999–2016) were obtained and corrected for quantile-specific self-reporting bias with the use of measured data from 57,131 adults who participated in the National Health and Nutrition Examination Survey. We fitted multinomial regressions for each state and subgroup to estimate the prevalence of four BMI categories from 1990 through 2030: underweight or normal weight (BMI the weight in kilograms divided by the square of the height in meters), ≤20, overweight (25 to <30), moderate obesity (30 to <35), and severe obesity (≥35). We evaluated the accuracy of our approach using data from 1990 through 2010 to predict 2016 outcomes.

RESULTS
The findings from our approach suggest with high predictive accuracy that by 2030 nearly 1 in 2 adults will have obesity (48.9%; 95% confidence interval [CI], 47.7 to 50.2), and the prevalence will be higher than 50% in 29 states and not below 35% in any state. Nearly 1 in 4 adults is projected to have severe obesity by 2030 (24.2%; 95% CI, 22.9 to 25.5), and the prevalence will be higher than 25% in 25 states. We predict that, nationally, severe obesity is likely to become the most common BMI category among women (27.4%; 95% CI, 26.1 to 29.2), non-Hispanic black adults (37.7%; 95% CI, 29.1 to 32.3), and low-income adults (32.7%; 95% CI, 30.2 to 33.7).
Interventions to combat obesity

- Tax on sugary drinks
- Positive body image
- Menu labeling
- Lifestyle behavioral interventions - Change in diet and physical activity
Interventions to combat obesity

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NIH Working Group Report: Innovative Research to Improve Maintenance of Weight Loss

Paul S. MacLean, Rena R. Wing, Terry Davidson, Leonard Epstein, Bret Goodpaster, Kevin D. Hall, Barry E. Levin, Michael G. Perri, Barbara J. Rolls, Michael Rosenbaum, Alexander J. Rothman, and Donna Ryan

Objectives: The National Institutes of Health, led by the National Heart, Lung, and Blood Institute, organized a working group of experts to discuss the problem of weight regain after weight loss. A number of experts in integrative physiology and behavioral psychology were convened with the goal of merging their perspectives regarding the barriers to scientific progress and the development of novel ways to improve long-term outcomes in obesity therapeutics. The specific objectives of this working group were to: (1) identify the challenges that make maintaining a reduced weight so difficult; (2) review strategies that have been used to improve success in previous studies; and (3) recommend novel solutions that could be examined in future studies of long-term weight control.

Results: Specific barriers to successful weight loss maintenance include poor adherence to behavioral regimens and physiological adaptations that promote weight regain. A better understanding of how these behavioral and physiological barriers are related, how they vary between individuals, and how they can be overcome will lead to the development of novel strategies with improved outcomes.

Conclusions: Greater collaboration and cross-talk between physiological and behavioral researchers is needed to advance the science and develop better strategies for weight loss maintenance.

NIH Working Group Report: Innovative Research to Improve Maintenance of Weight Loss

Paul S. MacLean1, Rena R. Wing2, Terry Davidson3, Leonard Epstein4, Bret Goodpaster5, Kevin D. Hall6, Barry E. Levin7, Michael G. Perri8, Barbara J. Rolls2, Michael Rosenbaum9, Alexander J. Rothman11, and Donna Ryan12

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Limited understanding of the upstream contributors to weight gain and regain

Biological and behavioral effects of stress or “triggers” which may affect weight loss maintenance
The Stress-Obesity Pathway\textsuperscript{1}
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\textsuperscript{1}Tomiyama 2014
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The Stress-Obesity Pathway

1 Tomiyama 2014
There is a limited understanding of how stressors contribute to obesity risk.

- **Neighborhood**: Safety, Violent Crime, Social Cohesion, Physical decay
- **Community**: Housing availability, Housing affordability, Job availability
- **Organizational**: High job demand, Treated unfairly in job, Job security
- **Family**: Parenting issues, Family conflict, Domestic Violence
- **Individual**: Loneliness, Financial strain, Childhood adversity
Chicago Community Adult Health Study

• 3,105 adults (aged 18 and over)

• Living in 343 neighborhood clusters within the city of Chicago

• Face-to-face interviews were conducted between May 2001 and March 2003 with one individual per selected household.
Psychosocial stressors

• Childhood adversity
• Acute life events
• Financial strain
• Neighborhood stressors
• Employment stressors
• Job discrimination
• Relationship stressors
• Lifetime discrimination

Methods

Outcome: Obesity vs. no obesity
Predictors: Psychosocial stressors

Sociodemographic factors and health behaviors

- Age
- Gender
- Race/ethnicity
- Socioeconomic status
- Smoking status
- Alcohol consumption

Logistics regression models
Racial/Ethnic Minorities More Likely to Have Higher Prevalence of Stressors Compared to Whites

The association between individual psychosocial stressors and obesity

Psychosocial stressors

- Childhood adversity
- Acute life events
- Financial strain
- Neighborhood stressors
- Employment stressors
- Job discrimination
- Relationship stressors
- Lifetime discrimination

Psychosocial stressors

- Childhood adversity
- Acute life events
- Financial strain
- Neighborhood stressors
- Employment stressors
- Job discrimination
- Relationship stressors
- Lifetime discrimination
- Cumulative exposure to stressors

The association between cumulative stress and obesity.
Take-aways Part 1

• Cumulative exposure to stress is associated with higher odds of obesity

• Addressing psychosocial stressors in lifestyle interventions

• Integrating mindfulness techniques

• Addressing stress at the policy level
Prevalence of Obesity Among U.S. Workers and Associations with Occupational Factors

Sara E. Luckhaupt, MD, MPH, Martha A. Cohen, PhD, Jia Li, MS, Geoffrey M. Calvert, MD, MPH

This activity is available for CME credit. See page A4 for information.

Background: Along with public health and clinical professionals, employers are taking note of rising obesity rates among their employees, as obesity is strongly related to chronic health problems and concomitant increased healthcare costs. Contributors to the obesity epidemic are complex and numerous, and may include several work characteristics.

Purpose: To explore associations between occupational factors and obesity among U.S. workers.

Methods: Data from the 2010 National Health Interview Survey were utilized to calculate weighted prevalence rates and prevalence ratios (PRs) for obesity in relation to workweek length, work schedule, work arrangement, hostile work environment, job insecurity, work–family imbalance, and industry and occupation of employment. Data were collected in 2010 and analyzed in 2012–2013.

Results: Overall, 27.7% of U.S. workers met the BMI criterion for obesity. Among all workers, employment for more than 40 hours per week and exposure to a hostile work environment were significantly associated with an increased prevalence of obesity, although the differences were modest. Employment in health care and social assistance and public administration industries, as well as architecture and engineering, community and social service, protective service, and office and administrative support occupations was also associated with increased obesity prevalence.

Conclusions: Work-related factors may contribute to the high prevalence of obesity in the U.S. working population. Public health professionals and employers should consider workplace interventions that target organization-level factors, such as scheduling and prevention of workplace hostility, along with individual-level factors such as diet and exercise.

Prevalence of Obesity by Weekly Hours Worked\textsuperscript{1}

Luckhaupt et al. 2014 AJPM
Industries and Occupations with an Increased Prevalence of Obesity

Industries with Increased Prevalence of Obesity

- Healthcare and Social Assistance
- Public Administration

Occupations with Increased Prevalence of Obesity

- Architecture and Engineering
- Community and Social Service
- Protective Service
- Office and Administrative Support
Prevalence of Stress in the Workplace\textsuperscript{1}

- 40\% of workers in the United States view their job as very or extremely stressful
- 25\% of workers believe that their job is their largest source of stress
- 75\% of workers think that workplace stress has increased compared to the last generation
- Job strain has been associated with depressive illnesses and workplace stress-related anxiety

\textsuperscript{1} Kamaldeep et al. 2012 JEPH
What is Job Strain?

• Widely studied measure of work stress\(^1\)
• Associated with CVD, stroke, and type 2 diabetes\(^1\)
• Includes factors such as job control and job demands\(^2\)
  • Job control encompasses factors such as decision authority and the opportunity to learn new skills
  • Examples of job demand indicators: pace, speed, time pressure, concentration, and attention
Karasek’s Job Strain Model

- **Job Demands**
  - Low
  - High

- **Job Decision Latitude**
  - (Skill Use + Decision Authority)
  - High
  - Low

- **Strain**
  - Low Strain
  - High Strain

- **Behavior**
  - Active
  - Passive

- **Risk**
  - Risk of Psychological Strain and Physical Illness

- **Active Learning, Motivation to Develop New Behavior Patterns**
Workplace Stressors and Obesity

• Currently, no association between job strain and obesity\textsuperscript{1,2}
• Hypothesize that job strain can lead to either weight gain or weight loss, obscuring the association\textsuperscript{1}

• Other dimensions of workplace stress need to be explored
New literature has found associations between:
- Hostile work environment$^3$
- Burnout and obesity$^2$
  - Emotional exhaustion and unhealthy eating
  - Professional efficacy and obesity
- Night shift work and increased risk of overweight and obesity$^1$
Prevalence of Obesity with a Hostile Work Environment

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
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<tbody>
<tr>
<td>30%</td>
<td>40%</td>
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Luckhaupt et al. 2014 AJPM
Review of Shift Work and Obesity Literature

Public Health

Meta-analysis on shift work and risks of specific obesity types

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Summary

Aims: This systematic review and meta-analysis evaluated the associations between shift work patterns and risks of specific types of obesity.

Methods: PubMed was searched until March 2017 for observational studies that examined the relationships between shift work patterns and obesity. Odds ratio for obesity was extracted using a fixed-effects or random-effects model. Subgroup meta-analyses were carried out for study design, specific obesity types and characteristics of shift work pattern.

Results: A total of 28 studies were included in this meta-analysis. The overall odds ratio of night shift work was 1.23 (95% confidence interval = 1.17–1.29) for risk of obesity/overweight. Cross-sectional studies showed a higher risk of 1.26 than those with the cohort design (risk ratio = 1.10). Shift workers had a higher frequency of developing abdominal obesity (odds ratio = 1.35) than other obesity types. Permanent night workers demonstrated a 29% higher risk than rotating shift workers (odds ratio 1.43 vs. 1.14).

Conclusion: This meta-analysis confirmed the risks of night shift work for the development of overweight and obesity with a potential gradient association suggested, especially for abdominal obesity. Modification of working schedules is recommended, particularly for prolonged permanent night work. More accurate and detailed measurements on shift work patterns should be conducted in future research.
How do we reduce stress and obesity in the workplace?
Workplace Stress-Reduction Interventions

• Individual interventions related to physical activity\(^1\)
• Green exercise shows promise\(^2\)
  • Believed to combine the benefits of physical activity and nature
  • Demonstrated better physiological benefits, higher scores of Positive Affect, and more potential for restoration from mental fatigue compared to indoor exercise
  • Weak but observable improvements in blood pressure and cortisol awakening response with exercise in nature
• Green exercise participants more likely to continue engaging in outdoor exercising
# Typology of stress management interventions

<table>
<thead>
<tr>
<th>Intervention type</th>
<th>Individual</th>
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<tbody>
<tr>
<td><strong>Primary</strong></td>
<td>Selection &amp; Assessment</td>
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<tr>
<td></td>
<td>Pre-employment medical</td>
</tr>
<tr>
<td></td>
<td>examination</td>
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<tr>
<td><strong>Secondary</strong></td>
<td>Mindfulness training</td>
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<tr>
<td></td>
<td>Health promotion, e.g., exercise</td>
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<tr>
<td></td>
<td>Cognitive behavioral therapy</td>
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<td></td>
<td>Relaxation</td>
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<td></td>
<td>Meditation</td>
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<tr>
<td><strong>Tertiary</strong></td>
<td>Employee Assistance Programs</td>
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<tr>
<td></td>
<td>Counseling</td>
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<tr>
<td></td>
<td>Disability management</td>
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| **Primary**       | Selection & Assessment  
                      Pre-employment medical examination | Job Redesign  
                      Working time and schedules  
                      Management training, e.g. mentoring |
| **Secondary**     | Mindfulness training  
                      Health promotion, e.g., exercise  
                      Cognitive behavioral therapy  
                      Relaxation  
                      Meditation | Improving communication and decision-making  
                      Conflict management  
                      Peer support groups  
                      Coaching & career planning |
| **Tertiary**      | Employee Assistance Programs  
                      Counseling  
                      Disability management | Vocational rehabilitation  
                      Outplacement |
Psychosocial Determinants of Health Lab

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- Shervin Assari, PhD (University of Michigan)
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Questions?