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Are Physical Activity and Nutrition Indicators of the Checklist of Health Promotion Environments at Worksites (CHEW) Associated with Employee Obesity among Hotel Workers?

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Abstract

Objective—Worksites provide opportunities to reach more than 60% of adults in the United States, including populations diverse in race, ethnicity, gender, age, occupation, income, and health status. Employers that provide worksite weight management interventions have the potential to reduce sick leave, healthcare costs, and workers compensation costs, and increase employee morale and worker efficiency. Hotels specifically, represent a broad cross-section of job categories, and most hotels are staffed and operated similarly around the world. However, from our literature review, there have been no investigations of the association between the hotel environment and employees' obesity.

Methods—For this study, we tested the relationship between environmental factors in hotels and employees' body mass index (BMI).

Results—Overall no substantial correlations were found on any environmental variable. However, hotel size affected some relationships. Higher BMI was related to greater number of stairs, stair facilitation, and the healthy eating facilitation variables (excluding nutrition signs or posters) in medium sized hotels. Lower BMI was found with greater stair facilitation in small hotels; and with greater number of PA signs, lunchroom nutrition signs, and hotel nutrition signsin large hotels. Unionized status affected only two environmental variables. For unionized hotels, BMI was negatively correlated with PA signs and positively correlated with the healthy eating facilitation.

Conclusions—No logical pattern of association was found between workplace environmental factors and hotel employee BMI levels. Further research should investigate the interaction of the size and structure of the workplace with the impact of environmental efforts to reduce overweight and obesity.

More that 25% of U.S. adults are obese (1), and this proportion has been increasing rapidly for the past two decades. Obesity increases the risk of chronic illnesses such as cardiovascular disease, diabetes, and certain forms of cancer (2) and is linked to mental and social challenges such as depression (3) and discrimination (4). Obesity accounts for increased healthcare costs. Healthcare costs for the morbidly obese are 81% above those for the non-obese population and 47% above costs for the non–morbidly obese population (5).

The adult obesity prevalence rate in Hawai'i is about 21% (1). This relatively low prevalence rate is due to the large proportion of Asian and Filipino residents with BMIs lower than the national average (6,7). Males in Hawai'i have a higher BMI than the national average,

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especially Pacific Islanders who have the highest obesity rate in Hawai'i (8) and one of the highest in the world.

Environmental factors encouraging increased energy intake and decreased energy expenditure are in part responsible for the increasing obesity rates (9). Environmental, community, and societal factors influence dietary and physical activity behaviors that can contribute to a positive energy intake (9,10). Therefore, it is necessary to focus on environmental factors when addressing obesity.

Implementing obesity directed interventions at the worksite is an ideal setting since employees spend a significant amount of time at work. Worksites provide opportunities to reach more than 60% of adults in the United States (11), including diverse populations in terms of race, ethnicity, gender, age, and health status (12). Employers that provide worksite interventions have the potential to reduce sick leave, healthcare costs, and workers compensation costs (13,14). In 2006, the annual average number of workers in the hotel industry in the U.S. was 11,181 million (15). However, from our review of the literature, there is little known about hotel employees with respect to how their work environment is related to obesity. Since hotel employees represent a broad cross-section of job categories, and hotels are ubiquitous across most of the industrialized world, we investigated the relationship of environmental components at the worksite with BMI.

Methods

Study Design

The Work, Weight, and Wellness (3W) study is a group-randomized clinical trial of a multi-component weight loss and obesity prevention program conducted over 2 years at 30 hotel sites, including 11,559 employees on the island of O'ahu in Hawai'i. The 3W trial is introduced and described in more detail elsewhere (16). This paper uses cross-sectional baseline data to examine the association of environmental factors to obesity levels among hotel employees.

Participants

Participants (mean age=44.74, SD=11.25years; 40.56% had high school or less; 7.36% Hispanic) were recruited from the 3W program through Kaiser On The Job, a provider of worksite health promotion programs. All baseline participants were aggregated to their specific hotels. Hotel employee numbers ranged from 29 to 1,500. Hotel characteristics are displayed in Table 1.

Measures

Environmental Assessment—the environmental assessment was an observation based on the Checklist of Health Promotion Environments at Worksites (CHEW) (17). The CHEW protocol, scoring, validity and reliability documentation can be found at http://www.drjamessallis.sdsu.edu/measures.html. Due to the nature of our worksites (Hotels) some of the CHEW items did not apply and only the worksite itself was assessed, not of the surrounding area. Thus scales were calculated for:

PA signs *[Total Number of Physical Activity Signs + Total Number of Onsite Exercise Class Notices + Total Offsite Physical Activities Offered by Hotel + Total Other Sponsor Offsite Physical Activities Offered + Total Number of Other Notices for Physical Activities]*;

Number of stairs per hotel;

Stair facilitation *[Total Number of Staircases not enclosed + Total Number of Staircases Seen from Entrance + Total Number of Staircases Carpeted + Total Number of Staircases Painted + Total Number of Staircases Where Utilities Are Not Visible in Staircase + Total Number of Staircases Where Door is Ajar + Total Number of Staircases Where Door Is Unlocked + Total Number of Staircases Where Door is Marked "Stairs" + Total Number of Staircases Where No Warning Sign is Labeled + Total Number of Staircases Where Floor is Labeled + Total Number of Staircases Where Exits Are Not Restricted + Total Number of Staircases Where Signs Encourage Use]*;

Lunchroom nutrition signs *[Total Low Fat Lunchroom Signs + Total Fruits/Veggies Lunchroom Signs + Total Lunchroom Signs on Weight Loss + Notices on bulletin board about dietary info (1=yes, 0=no)]*;

Hotel nutrition signs *[Total number of nutritional prompts posted + total number of nutritional signs or posters present]*; and

Healthy eating facilitation *[Low Fat food choices available + Total Number of Nutritional Labels Posted + Low Fat Vending Machine Choices Ratio + Soft Drinks in Vending Machines Ratio+ Hot Drinks in Vending Machines Available Ratio + Low Fat Vending Machine* Prompts Ratio + Lunch Room Signs/Posters Score + Lunch Room Convenience Score (Total Microwaves in Lunchroom + Total Refrigerators in Lunchroom + Total Toaster Ovens in Lunchroom + Total Lunchroom Seating Near Food/Total Number of Lunchrooms].

To ensure standardized data collection, assessor training included going through the revised CHEW recording form in detail and conducting at least two practice environmental assessments with an expert rater. Baseline inter-rater-reliability among the assessors and experts assessed on about 20% (six) hotels was high (mean Kappa=.92; SD=.04).

Body Mass Index—(BMI) was obtained by dividing the weight by the height squared (Kg/m^2). Height and weight are obtained onsite by 3W staff using a standard stadiometer and balance scale with participants removing their shoes.

Data Analysis

Statistical analysis was performed at the hotel level. Frequencies for sex, ethnicity, job category, size of hotel categories, proportion of employees by BMI category, and cafeteria (% yes) were analyzed. Assumptions for normalcy of the data were not severely violated, thus a Pearson's correlation was run for the environmental scores by hotel level BMI. Significance interpretation is overly conservative due to site level analysis, therefore, Cohen's guideline for interpretation of the correlation coefficient (18) will be used: small ranging from |.10| – |.29|; medium ranging from |.30| – |.49|; and large ranging from |.50| – |1.0|. We will conservatively focus on the medium and large correlations.

Results

Table 1 reveals that smaller hotels are likely to have more operatives/unskilled employees, more females, and more Filipino employees. Similarly, non-union hotels are likely to have more females and more Filipino employees.

Table 2 presents the correlation of the calculated environmental variables with BMI across hotel size and union status. Overall no medium or large correlations were found on any environmental variable. Hotel size impacted some relationships. Positive correlations were found for number of stairs, stair facilitation, and the healthy eating facilitation variables with BMI only in medium sized hotels. Whereas negative correlations were found with stair

facilitation and BMI in small hotels; and PA signs, lunchroom nutrition signs, and hotel nutrition signsin large hotels. Unionized status impacted only two environmental variables. There was a negative correlation of PA signs and BMI and a positive correlation of the healthy eating facilitation indicator with BMI for unionized hotels.

Discussion

There is a lack of information about hotel employees with respect to how their work environment is related to obesity. Hotels are ubiquitous across most of the industrialized world, and include various job categories. Therefore, this study examined the relationship of environmental components at the hotel worksite with BMI.

Overall, none of the environmental variables addressing physical activity and nutrition environments were related to BMI. Several explanations are plausible. This finding may be the situation at hotels. Hotel employees may not have a lot of opportunity to focus on health behaviors while at work but rather focus on health at home. Preliminary support for this in our results could be taken from the remarkably similar BMI's across hotel size and union status (average BMI 26.56; lowest subgroup average BMI 25.80 – highest subgroup average BMI 26.70). As such, environmental influences around the home or during leisure time may be more salient. However and more likely, several moderators such as hotel size and union status among others may have opposing influence and nullify overall relationships. Also, the quality of environmental prompts for PA and nutrition observed were, overall, not very high. Signs were not changed often and were rarely associated with other activities such as healthy campaigns.

Hotel size impacted some relationships. Counter to our hypothesis, greater number of stairs, stair facilitation, and the healthy eating facilitation variables were related to greater BMI but only in medium sized hotels. Mechanisms to confirm and explain these findings need to be investigated. Supporting our hypothesis, greater stair facilitation was related to lower BMI in small hotels; and greater number of PA signs, lunchroom nutrition signs, and hotel nutrition signswith lower BMI in large hotels. The stair facilitation finding for the small hotels may be related to the fewer number of flights of stairs involved compared to the larger hotels where stair use (several flights) may lead to bad time management and physically simply not be feasible. The finding that signage for PA and for nutrition was inversely related to BMI in large hotels has promising practical implications for intervention. Why this finding was only for the large hotels may be due to the fact that large hotels usually have multiple display boards and more wall space allowing repeated postings thus enforcing the messages.

Unionized status impacted only two environmental variables. Greater number of PA signs was related to lower BMI and greater healthy eating facilitation indicator was related to greater BMI for unionized hotels. These results do not indicate any strong or consistent associations of union status on the relationship of PA and nutritional environmental conditions in the worksites and BMI. There may be some interaction between the size of worksites and relatively weak associations between environmental prompts and BMI, but further research is needed to clarify this. It is likely that existing environmental prompts prior to the 3W study were not part of organized and ongoing campaigns to improve worker health.

Limitations to be considered for this study are the cross-sectional nature which does not allow for causal conclusions. The directionality of the relationship between the environment and BMI was not clear. An empirical question raised is whether normal weight employees seek out worksites that have healthier environments or if healthier environments promote healthier behaviors. Another limitation is the sample size, which is due to analyzing the data at the hotel level, and limits our power and our ability to do subgroup analysis.

These limitations notwithstanding, the findings from this study provide preliminary evidence that some environmental characteristics of different sized hotels are related to BMI (for small and large hotels). The fact that any relationships between worksite environmental characteristics and BMI were found could be considered surprising. This is because the environmental indicators were intended to explain eating and activity behaviors at the worksite, and there are several steps from those proximal outcomes to BMI. If worksite environments are related to BMI, then they should be more strongly related to eating and activity patterns at work, and future studies should examine the pathways from worksite environments to behavior to BMI and other health outcomes.

However, if these associations can be confirmed, there are practical implications. Further research is needed to a) clarify and identify facilitating environmental factors for hotels of various sizes, b) explore measures that not only document if environmental factors exist in the worksite but the quality and salience to the employees, c) investigate if these relationships can be replicated with subgroups (e.g., gender, ethnicity, worksite subgroups) and longitudinally, and d) conduct intervention trials manipulating the environment to determine if there is a causal relationship.

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Table 1

Hotel Demographic Characteristics by Hotel Categories.

	Job - (% in categories)			Sex	Ethnicity(% in categories)					BMI
	Managers/Prof/Tech	Operatives/Unskilled	Sales/Office/Craft	% F	Asian	Filipino	White	Other	Pacific Islander	Mean SD
Overall	**11.87**	**84.63**	**2.83**	**56.11**	**31.26**	**42.59**	**8.99**	**3.90**	**13.27**	**26.56 5.14**
Size (# of employees)										
<100	10.89	88.72	0.00	67.70	28.02	54.09	4.28	7.39	6.23	26.59 5.14
100–500	11.05	85.46	2.41	55.47	28.65	45.65	8.32	3.38	14.00	26.63 5.19
>500	12.72	83.40	3.55	55.27	33.95	38.49	10.17	3.92	13.48	25.80 4.61
Union status										
Non-Union	12.02	84.18	2.85	60.42	31.54	46.45	7.14	3.62	11.25	26.43 5.18
Union	11.72	85.12	2.82	51.41	30.94	38.36	11.02	4.20	15.47	26.70 5.08

Note: F – female; BMI – body mass index; SD – standard deviation. Subcategory percentages reported were row percentages - i.e. of all the hotels in the <100 hotel size category, what percentage were in each job category. Percentages may not add to 100% due to missing data.