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Associations between Daily Work Hassles and Energy-Balance Behaviors in Female African American Workers: An Ecological Momentary Assessment Study

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Objective: Despite their high rate of labor force participation, African American women earn less and are overrepresented in service jobs that tend to have fewer benefits, longer work hours, and less flexibility. The aim of our study was to examine associations between work-related daily hassles and energy balance behaviors among female African American workers.

Design: A secondary analysis of a 7-day intensive longitudinal study using ecological momentary assessment (EMA).

Setting: Metropolitan area of Chicago, Illinois, United States; July 2012 through January 2013.

Participants: A convenience sample of 70 female African American workers.

Methods: EMA was used to collect information over seven days on work hassles and energy balance behaviors: empty calorie food intake; moderate-to-vigorous physical activity (MVPA); sedentary behavior; sleep duration; and sleep disturbance. Within-person associations between daily work hassles and each of these daily energy balance behaviors were analyzed using person fixed-effects regression.

Results: A total of 334 person-day observations from 70 female African American workers were included in the final analysis. Reporting at least one daily work hassle was associated with same-day higher empty calorie food intake (OR: 2.2, 95% CI: 1.0, 4.6) and more daily minutes of sedentary behavior (b: 35.8, 95% CI; .2, 71.3). However, no significant associations were found between prior-day work hassles and either food intake or sedentary behavior. Daily work hassles were not related to MVPA, sleep duration, or sleep disturbance.

Conclusions: Our study showed that daily work hassles were associated with female African American workers' empty calorie food intake and sedentary behaviors. Strategies to eliminate daily work hassles may help to improve their energy balance behaviors. *Ethn Dis*. 2021;31(2):177-186; doi:10.18865/ed.31.2.177

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Introduction

African American women have one of the highest labor force participation rates across racial/ethnic groups in the United States. In 2018, nearly two thirds of African American women participated in the labor force compared with 57.6% of White women.[1] Despite their high rate of labor force participation, African American women are underrepresented in managerial or professional occupations, more likely to be underemployed, and more likely to experience discrimination at work.[1] These characteristics of African American women's work life may adversely affect their behaviors (eg, diet) associated with energy balance and health.[2] Indeed, reflecting patterns in the general US population, employed African American women have the highest age-adjusted prevalence of obesity (ie, 40%) across all racial, ethnic, and gender groups in the United States.[3] In addition, women in midlife in the United States. have the highest likelihood of obesity among adults, particularly African American women. Recent estimates indicate nearly 60% (ie, 57.5%) of midlife African American women were obese.[4]

High consumption of empty-calorie food [5] (eg, snacks with limited nutrients), inadequate moderate-to-vigorous physical activity (MVPA), sedentary behavior, and short sleep duration [6] are known contributors to

energy imbalance and obesity. These poor energy balance behaviors are more common in African Americans compared with non-Hispanic Whites.[7] Importantly, these behaviors can vary day-to-day,[8] reflecting daily variations in individual decisions (eg, what to eat) and changes in circumstances that may affect these behaviors. For instance, stress from work can affect workers' daily moods and in turn, decisions about being physically active or sedentary that day.[9] Additionally, experiences may influence subsequent-day behaviors.[10] Little is known about factors that influence daily energy balance behaviors in African American women who work and any lingering or delayed behavioral effects.

The purpose of our study was to explore within-person associations between daily work hassles and energy balance behaviors in employed African American women.

Work-related daily hassles (ie, events, thoughts, or situations that can arouse short-term uncomfortable feelings such as annoyance, or frustration in daily life)[11,12] may affect daily energy balance behaviors. Indeed, previous studies have linked daily hassles to greater consumption of empty calorie foods[13] and increased or decreased physical activity.[14] The implications of daily hassles for behaviors may vary by the type of hassles.[13] However, to the best of our knowledge, no studies have examined the effects of work-related daily hassles across a variety of behaviors relevant for energy balance.

Research has shown that female African American workers experience more work-related stress than female non-Hispanic White workers.[15] Several studies have revealed that occupational stress was associated with increased consumption of energy-dense foods,[2] changed physical activity (eg, longer sedentary behaviors),[14] and sleep problems.[2,16] Thus, work-related daily hassles may increase the likelihood of female African American workers' poor energy balance behaviors. However, most studies focused on the effects of chronic or long-term occupational stress.

Using an intensive longitudinal design and ecological momentary assessment (EMA), the purpose of this secondary analysis was to explore within-person associations between daily work hassles and energy balance behaviors in employed African American women. We hypothesized that: 1) on days when they experienced work hassles, women would have higher empty calorie food intake, less MVPA, more sedentary behavior, short sleep duration, and sleep disturbance that day; and 2) on days when they experienced work hassles, women would have higher empty calorie food intake, less MVPA, and more sedentary behavior the following day.

Methods

Study Sample

This study used data from the African American Women's Daily Life Study (AAWDLS),[10] the original aims of which did not focus on work. Inclusion criteria were: 1) self-identified African American woman; and 2) aged 25 to 60 years. Exclusion criteria were: 1) self-identified inability to read and write English; and 2) full-time student. Participants were recruited at community sites and a public university in Chicago, Illinois. One hundred and two women enrolled; of these, one dropped out. Given our focus in this analysis on workers, we restricted the sample to participants who were employed in full-time or part-time jobs during the study period (N=74). Participants who had retired or did not have jobs during the study period were excluded (n=27). Daily hassles were assessed once daily, at the last of five daily EMA signals; therefore, an additional four women who did not complete any of the surveys that assessed work hassles were excluded from the sample. As a result, 70 women were included in the final analysis. Across this sample, 27 different occupations were represented, and the top five occupations were: customer service representative (12.9%); administrative assistant (11.4%); financial professional (8.6%); research administrator (8.6%); and manager (8.6%).

Data Collection Procedure

The study had three phases: baseline interview; consecutive 7-day EMA data collection period; and

post-interview. All data were collected July 2012 through January 2013. During the baseline interview, we obtained informed consent, administered a questionnaire that included demographics, and instructed on the equipment and EMA protocol. During the 7-day study period, we assessed participants' daily MVPA and sedentary behavior using an accelerometer (Actigraph GT1M), which participants were asked to wear at all times except when sleeping, showering/bathing, or swimming. Study-provided smartphones were used to administer web-based surveys that included questions about daily hassles and behaviors. These surveys were administered five times daily at random during the following time blocks: 7-10 am, 10-1 pm, 1-4 pm, 4-7 pm, and 7-10 pm. Based on participants' typical wake and sleep patterns, these five time blocks were adjusted as required. The survey was available for one hour once a signal was sent. A reminder was sent 45 minutes after the first signal. At post-interview, we collected the equipment, administered a follow-up questionnaire, and provided incentives for their participation (up to $100).

Measurements

Empty Calorie Food Intake

Empty calorie food intake was measured up to five times daily by asking whether, since the last signal, the participant ate any of the following food categories: cookies or sweet baked goods (eg, cake); chocolate or candies; ice-cream or frozen desserts; salty snacks (eg potato chips); and French fries or other fried side dishes. These five categories were derived from items in the Dietary Screener Questionnaire[17] and findings from earlier focus groups with African American women. Empty calorie food intake was considered endorsement of at least one of the five items. To create a day-level variable for analysis, we calculated the proportion of daily signals at which empty calorie food intake was reported. Due to its right-skewed distribution, we dichotomized the daily proportion of empty calorie food intake into two groups. Days that the proportion was higher than the median were considered "high" empty calorie food intake.

Moderate-to-Vigorous Physical Activity (MVPA) and Sedentary Behavior

MVPA and sedentary behavior were derived from valid days of accelerometer data, defined as days with at least 10 hours of accelerometer wear time.[18] A minimum of 60 consecutive minutes of zero activity intensity counts identified non-wear. Daily MVPA and sedentary behavior were measured as the total number of minutes of MVPA (ie, >2020 activity counts per minute) and sedentary time (0-99 activity counts per minute), respectively.[19] Because daily MVPA engagement was uncommon among the participants, we dichotomized daily MVPA engagement based on the median of the distribution: <10 minutes or ≥10 minutes (ie, MVPA engagement). Moreover, a 10-minute bout corresponds with some evidence in terms of the minimum amount required for health benefits.[20] Daily sedentary behavior was analyzed as a continuous variable.

Sleep

Measures of sleep behavior, administered as part of the first daily survey, were adapted from the Pittsburgh Sleep Quality Index.[21] Sleep duration was assessed using the following question: "How many hours of actual sleep did you get last night?" Research has suggested that <7 hours of sleep is associated with increased risk of chronic diseases.[22] Therefore, participants' sleep duration was dichotomized as >7 hours or ≤7 hours (ie, short sleep duration).

Sleep disturbance was assessed by asking if participants had trouble sleeping during the previous night due to each of the following reasons: "could not get to sleep within 30 minutes; woke up in the middle of the night or early morning; had to get up to use the bathroom; could not breathe comfortably; felt too cold; felt too hot; had bad dreams; and had pain." We counted the total number of sleep disturbances reported per day. Because report of more than one sleep disturbance was relatively rare, we dichotomized this variable as none or at least one sleep disturbance.

Daily Work Hassles

We used an 89-item checklist, administered as part of the last daily survey, for the assessment of daily hassles. Daily work hassles were assessed by 11 items: six items from the Hassles and Uplifts Scale (ie, hassles arising from fellow workers, clients/customer/patients, supervisors/employers, workload, nature of work, meeting deadline at work),[11] two items from

the Hassles Scale (ie, employees, a problem on the job due to being a woman),[12] and three items developed based on the findings from our focus groups with African American women (ie, fellow workers not doing their work, someone at work was unfriendly or unwelcome, and being given more work or the most undesirable tasks or jobs at work than someone who is White/non-Black of equal or less seniority and qualifications). Because multiple daily work hassles were uncommon on any given day, we dichotomized this variable as none and one or more daily work hassles.

Covariates

We controlled for day of the week (weekend vs weekday) and non-work hassles as time-varying covariates. Daily non-work hassles were measured via the remaining 78 items in the aforementioned 89-item checklist. These items were based on existing daily hassles scales[11,12,23,24] and adapted based on the findings from our focus groups. Since the sum of daily non-work hassles was not normally distributed, we created a 3-level variable (low [0-3]; medium [4-8]; high [9 or more] based on tertiles of the distribution.

The following time-invariant variables were only used to describe characteristics of our sample: age in years; educational attainment; marital status; annual per capita household income; current employment status (ie, full-time vs part-time); and body mass index (BMI).

Analytical Strategy

We used Stata 13.1 (Statacorp, College Station, TX, USA) for data analysis. The major strength of fixed-effect regression models is that all time-invariant differences between persons are controlled, and the coefficients capture how within-person daily changes in a predictor are related to within-person daily changes in an outcome.[25] Therefore, we employed fixed-effect regression to test our hypotheses. Because the interaction terms between daily work hassles and participants' employment status were insignificant, both full-time and part-time workers were analyzed as a group.

For the first hypothesis, we used bivariate fixed-effect regression to estimate crude associations between daily work hassles and each energy balance behavior. We then regressed each behavioral outcome on daily work hassles controlling for time-varying covariates. Logistic fixed-effects regression was employed for empty calorie food intake, MVPA, and both sleep measures, whereas linear fixed-effects regression was used for sedentary behavior. For the second hypothesis, we regressed empty calorie food intake, MVPA, and sedentary behaviors on same-day and prior-day work hassles controlling for covariates, respectively.

The response rate of the EMA surveys was 71.3%. We employed pairwise deletion for missing data. As a result, 334, 328, and 209 person-days were available for the empty calorie food intake, physical activity, and sleep behaviors analyses, respectively.

Sensitivity Analysis

Energy balance behaviors may vary between workdays and non-workdays.[26,27] While workers can experience work-related stress on both work and non-work days,[28] work hassles may be higher on workdays. Thus, work schedule may be a potential confounder of daily work hassle-behavior associations. Because work schedule (ie, whether it was a workday or non-workday) was not assessed as part of the EMA survey, we further restricted our sample to those who were likely to work on a Monday to Friday schedule (n=41) to test the sensitivity of the results. We classified participants according to their likelihood of working weekdays only (vs some weekend work) based on: 1) reported occupations and job descriptions; and 2) corresponding occupational characteristics described in the Occupational Outlook Handbook[29] and O'NET online search.[30] After sample restriction, 188, 185, and 112 person-days were available for the empty calorie food intake, physical activity, and sleep measures analyses, respectively.

Ethical Standards Disclosure

This study was conducted according to the guidelines of the Declaration of Helsinki, and all procedures involving human subjects/patients were approved by the institutional review board at the University of Illinois at Chicago. Written informed consent was obtained from all participants.

Results

Sample characteristics, including demographics, daily hassles, and energy balance behaviors, are summarized in Table 1. At least one work

Table 1. Characteristics of study participants (N=70)

	n	%	Mean	SD	Median	Range
Demographics characteristics, N=70						
Age[a], years			42.2	9.7	41	25-64
Educational attainment						
High school, GED, or less	8	11.4				
Associate degree/some college degree	21	30.0				
Bachelor's degree	22	31.4				
Graduate/professional degree	19	27.1				
Marital status						
Married or living with partner	24	34.3				
Separated or divorced	11	15.7				
Single	35	50.0				
Annual per capita household income ($)			21205.3	15485.9		
Working status						
Part-time	31	44.3				
Full-time	39	55.7				
BMI, kg/m^2[b]			33.8	9.7	31.7	19.7-64.4
EMA measurement[c], $n_{day}=334$						
Day of the survey						
Weekdays	235	70.4				
Weekends	99	29.6				
Daily hassles						
Work hassles			1	1.2	1	0-6
Yes	191	57.2				
No	143	42.8				
Non-work hassles[d]			6.1	5.8	5	0-47
Low (≤3)	131	39.2				
Medium (4-8)	108	32.3				
High (≥9)	95	28.4				
Daily energy balance behaviors						
Empty calorie food intake (%)			32.8	25.3	25	0-100
Low	171	51.2				
High	163	48.8				
MVPA engagement[e]						
Yes	38	11.6				
No	290	88.4				
Sedentary behavior[e] (minutes[f])			552.0	158.3	569	8-960
Short sleep duration[g]						
Yes	56	26.8				
No	153	73.2				
Sleep disturbance[g]			0.9	1.1	1	0-5
Yes	105	50.2				
No	104	49.8				

n_{day}, number of person-day observations; SD, standard deviation; GED, general education development; BMI, body mass index; EMA, ecological momentary assessment; MVPA, moderate or vigorous physical activity.

a. The range of age was between 25 and 64 years old.

b. Three missing values were noted in BMI.

c. The total person-day observations for the EMA data analysis were 334.

d. The cut-off points for the non-work hassles were based on its tertiles.

e. Six daily measurements for sedentary time and MVPA were missing; therefore, 328 out of 334 person-days observations were used for the analysis.

f. Converting minutes to hours, the average sedentary time was 9.2 hours.

g. Sleep measurements for previous night were assessed at the first signal of daily survey; however, daily hassles were measured at the last signal of daily survey. Thus, only sleep measures collected during survey days 2-7 could be used to analyze the associations between daily work hassles and daily sleep behaviors (ie, sleep duration and sleep disturbance). As a result, 209 person-day observations were available for analyses of sleep measures.

Table 2. Associations between daily work hassles and energy balance behaviors, N=70, n_{day}=334

	High empty calorie food intake, n_{day}=334	MVPA engagement, n_{day}=328	Sedentary behavior, minutes, n_{day}=328	Short sleep duration, n_{day}=209	Sleep disturbance, n_{day}=209
	OR (95% CI)	OR (95% CI)	b (95% CI)	OR (95% CI)	OR (95% CI)
Crude[a]					
Work hassles[b]	2.0 (1.0, 3.8)[f]	1.6 (.6, 4.3)	92.0 (57.9, 126.1)[g]	1.7 (.5, 5.2)	.6 (.2, 1.6)
Adjusted[c]					
Work hassles	2.2 (1.0, 4.6)[f]	1.1 (.3, 3.4)	35.8 (.2, 71.3)[f]	.8 (.2, 3.0)	.5 (.2, 1.6)
Crude[a]					
Prior-day work hassles[d]	1.1 (.5, 2.5)	1.1 (.3, 3.7)	17.1 (-29.2, 63.4)	--	--
Adjusted[e]					
Prior-day work hassles	1.1 (.5, 2.6)	1.0 (.3, 3.6)	-2.6 (-42.5, 37.4)	--	--

n_{day}, number of person-day observations; b, beta coefficient; OR, odds ratio; CI, confidence interval; MVPA, moderate or vigorous physical activity; Ref, reference group.
a. Person fixed-effect regression models were employed to estimate the associations. By using person fixed-effect regression models, all time-invariant differences between persons were controlled for.
b. The OR and beta coefficients estimated associations between changes in daily work hassles and changes in each energy balance behaviors within a person.
c. Respective models adjusted for day of the survey (ie, weekdays or weekends) and non-work hassles (eg, hassles arising from family and friends).
d. The OR and beta coefficients estimated associations between changes in prior-day work hassles and changes in respective energy balance behaviors within a person.
e. In addition to covariates, respective models adjusted same-day work hassles.
f. P<0.05.
g. P<.001.

hassle was identified on 57.2% of days. Half of women reported empty calorie food intake on at least one-third of daily observations. Overall, women engaged in MVPA on 11.6% of person days. On average, women were sedentary 9.2 hours daily. Women reported seven or fewer hours of sleep on 26.8% of days and at least one sleep disturbance on 50.2% of days (Table 1).

Associations between daily work hassles and energy balance behaviors are summarized in Table 2. The upper panel shows concurrent associations between daily work hassles and behaviors. The lower panel presents associations between prior-day work hassles and empty calorie food intake and physical activity, respectively. As shown in the upper panel in Table 2, after controlling for covariates, reporting at least one daily work hassle was associated with an increased likelihood of high empty calorie food intake (OR: 2.2, 95% CI: 1.0, 4.6). Experiencing at least one daily work hassle was associated with an additional 35.8 minutes of sedentary behavior (b: 35.8, 95% CI: .2, 71.3). Daily work hassles were not significantly associated with MVPA engagement (OR: 1.1, 95% CI: .3, 3.4), short sleep duration (OR: .8, 95% CI: .2, 3.0), or sleep disturbance (OR: .5, 95% CI: .2, 1.6) (Table 2).

As shown in the lower panel in Table 2, prior-day work hassles were not associated with likelihood of empty calorie food intake, MVPA engagement, or minutes of sedentary behavior.

Sensitivity Analysis

Results of the sensitivity analysis are presented in Table 3. After restricting our sample to participants who were likely to only work on weekdays, the associations between daily work hassles and each energy balance behavior were similar except for empty calorie food intake, for which the association was attenuated.

Discussion

This study evaluated within-person associations between daily work hassles and energy balance behaviors in employed African American women in metropolitan Chicago. We found that on days that our study participants experienced at least one work hassle, they were more likely to consume a high level of empty calorie foods, and they engaged in more minutes of sedentary behavior. However, the association between work hassles and empty calorie food intake was attenuated in the sensitivity test. There were no significant associations between prior-day work hassles and empty calorie food intake or sedentary behavior. Daily

Table 3. Associations between daily work hassles and energy balance-related behaviors among African American women determined likely to work on weekdays only, (n=41, n_{day}=188[a]

	High empty calorie food intake, n_{day}= 188[b]	Having at least one 10-minute MVPA bout, n_{day}= 185[b]	Sedentary behavior, minutes, n_{day}= 185[b]	≤ 7-hour sleep duration, n_{day}= 112[b]	Having at least one sleep disturbance, n_{day}= 112[b]
	OR (95% CI)	OR (95% CI)	b (95% CI)	OR (95% CI)	OR (95% CI)
Work hassles[c]	1.4 (.5, 3.8)	1.1 (.2, 6.7)	59.1 (11.2, 107.2)[d]	.2 (<.1, 1.7)	.4 (.1, 2.6)

n_{day} number of person-day observations, b, adjusted beta coefficient, OR, adjusted odds ratio, CI, confidence interval, MVPA, moderate or vigorous physical activity.
a. After restricting the sample into those who were likely to work on a Monday to Friday schedule, the total valid person-days observations for analysis were 188. The total number of participants in restricted sample was 41.
b. The valid person-days observations for high empty calorie food intake, physical activity (i.e. sedentary behavior and MVPA), and sleep behaviors (eg, sleep duration and sleep disturbance) among restricted sample were 56.3%, 56.4%, and 53.6% of its initial observations, respectively.
c. Associations between work hassles and each energy balance behavior were adjusted for day of the survey (i.e., weekday, weekend) and non-work hassles.
d. P<.05.

work hassles were not significantly associated with engaging in MVPA, sleeping seven or fewer hours, or having at least one sleep disturbance.

Prior research has shown that daily hassles were positively associated with empty calorie food intake.[10,13] Daily work hassles may stimulate the release of the corticotrophin releasing hormone (CRH) from the hypothalamus, which elevates the cortisol levels[31] and further increases intake of energy-dense foods.[32] In this group of female African American workers, we found that daily work hassles were associated with increased same-day empty calorie food intake.

The association between daily work hassles and MVPA engagement was not statistically significant in our study. Stress in the workplace could be both a barrier to and an enabler of physical activity.[9,14] A qualitative study focusing on eating and physical activity described how workers' moods affected their same-day decisions about physical activity.[9] Engagement in physical activity had also been used by some of African American women as a strategy to alleviate stress.[33] Taken together, the association between work-related stress and physical activity may be moderated by mood or coping behaviors. As a result, the effect of work hassles on physical activity may be masked in our study. Furthermore, MVPA was uncommon in our sample. Additional investigations are needed to determine associations between daily work hassles and MVPA.

Similar to evidence on work-related stress,[14] our study showed that having at least one work hassle was significantly associated with increased sedentary behavior in employed African American women. Sedentary behavior (eg, television viewing) has been used as a coping behavior for work stress among African American women.[34] Therefore, exposure to daily work hassles may increase workers' television viewing that day and further increase their total sedentary time. Additionally, daily work hassles may diminish workers' motivations to exercise.[14]

No association was found between workers' daily exposures to work hassles and their subsequent sleep duration or sleep disturbance, which is consistent with the results of a study of 312 US workers.[35] The possible mechanism proposed by Sin et al[35] was that the pre-sleep somatic (eg, muscle tension) and cognitive (eg, worry, racing thoughts) arousal might alter the association between daily stressors and subsequent sleep.

In sensitivity analyses in which we sought to control for work schedule and assess whether work hassles specifically and not working in general were associated with behaviors, the association between work-related daily hassles and empty calorie food intake was attenuated and no longer statistically significant. There are two possible explanations. First, it has been suggested that people tend to consume less healthy foods (eg, more discretionary foods, fats) on weekends compared with weekdays,[27] which indicates that workers may also consume empty calorie foods on days they do not work. Workers may eat out to socialize with families or friends on non-work days.[9] This may explain why the association between work hassles and in-

take of empty calorie foods was weak and toward the null in our sensitivity analysis. Second, the sample size in our sensitivity test was limited. Thus, the attenuated effect may be related to reduced statistical power.

Our findings suggest that daily work hassles were important factors in employed African American women's energy balance behaviors, particularly for empty calorie snack intake and sedentary behaviors. This indicates that interventions to address daily work hassles may help to improve these energy balance behaviors and, in turn, lower obesity risk. Therefore, identifying and addressing sources of daily work hassles such as by reducing workload, increasing control over their schedule, providing social support, and promoting an anti-racist working environment may benefit African American women's energy balance behaviors. Furthermore, workplaces can make empty calorie snacks less accessible, such as by removing energy-dense, nutrient-poor food from vending machines or making healthy food choices (eg, salad, fruits) more readily available.[36] In terms of reducing sedentary behavior, activity-permissive workstations (eg, sit-stand devices) have received the most attention.[37] Providing on-site fitness facilities, making stairs more user friendly, and encouraging "walking meetings" are other strategies.

In this group of female African American workers, we found that daily work hassles were associated with increased same-day empty calorie food intake.

Strengths and Limitations

This study has several strengths. First, this is the first study of which we are aware that investigated dynamic associations between daily work hassles and a wide range of energy balance behaviors in employed African American women. Second, we used objective measures of sedentary time and MVPA to decrease misclassification of the level of physical activity and recall bias.

Nonetheless, this study has some limitations. First, we used convenience sampling to recruit participants in the original study; therefore, the generalizability of our findings is unclear. Second, wide confidence intervals are present for one of our findings (ie, sedentary behaviors), which may be related to the limited sample size. Third, because the original study was not designed to address questions related to work, we did not have information on whether it was a workday in our dataset and thus were unable to directly control for it in the analysis. We cannot rule out the possibility that associations between daily work hassles and behaviors reflect other effects of working, besides work hassles. Future research differentiating work-day behavior from work hassle behavior would be important. Nonetheless, the negative spillover of work to non-work days is increasingly common.[28] Workers can still experience work-related stress on non-work days. It is possible that the results of this study are underestimated. Additionally, causality cannot be inferred from the significant concurrent associations between daily work hassles and behaviors.

Conclusions

Prior research suggests African American women have higher levels of work-related stress and poorer energy balance behaviors. This study found that daily work hassles were associated with high empty calorie food intake and more sedentary behavior in employed African American women. Workplace interventions addressing factors that produce daily work hassles and that make healthier energy balance behaviors possible might not only help to reduce female African Americans workers' stress from work, but also reduce their empty calorie food intake and sedentary behavior, leading to improved health.

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Conflict of Interest

No conflicts of interest to report.

Author Contributions

Research concept and design: Lin, Zenk; Acquisition of data: Jones, Zenk; Data analysis and interpretation: Lin, Jones, Martyn-Nemeth, Zenk; Manuscript draft: Lin, Martyn-Nemeth, Zenk; Statistical expertise: Lin, Jones, Martyn-Nemeth; Acquisition of funding: Zenk; Supervision: Zenk

References

1. U.S. Bureau of Labor Statistics. Labor force characteristics by race and ethnicity, 2018. 2019; https://www.bls.gov/opub/reports/race-and-ethnicity/2018/home.htm.
2. Nobrega S, Champagne N, Abreu M, et al. Obesity/overweight and the role of working conditions: a qualitative, participatory investigation. *Health Promot Pract*. 2016;17(1):127-136. https://doi.org/10.1177/1524839915602439 PMID:26333770
3. Gu JK, Charles LE, Bang KM, et al. Prevalence of obesity by occupation among US workers: the National Health Interview Survey 2004-2011. *J Occup Environ Med*. 2014;56(5):516-528. https://doi.org/10.1097/JOM.0000000000000133 PMID:24682108
4. Flegal KM, Kruszon-Moran D, Carroll MD, Fryar CD, Ogden CL. Trends in Obesity Among Adults in the United States, 2005 to 2014. *JAMA*. 2016;315(21):2284-2291. https://doi.org/10.1001/jama.2016.6458 PMID: 27272580
5. Murakami K, Livingstone MB. eating frequency is positively associated with overweight and central obesity in U.S. adults. *J Nutr*. 2015;145(12):2715-2724. https://doi.org/10.3945/jn.115.219808 PMID:26468490
6. Mozaffarian D, Hao T, Rimm EB, Willett WC, Hu FB. Changes in diet and lifestyle and long-term weight gain in women and men. *N Engl J Med*. 2011;364(25):2392-2404. https://doi.org/10.1056/NEJMoa1014296 PMID:21696306
7. Liu Y, Croft JB, Wheaton AG, et al. Clustering of five health-related behaviors for chronic disease prevention among adults, United States, 2013. *Prev Chronic Dis*. 2016;13:E70. https://doi.org/10.5888/pcd13.160054 PMID:27236381
8. Dunton GF, Atienza AA. The need for time-intensive information in healthful eating and physical activity research: a timely topic. *J Am Diet Assoc*. 2009;109(1):30-35. https://doi.org/10.1016/j.jada.2008.10.019 PMID:19103320
9. Power BT, Kiezebrink K, Allan JL, Campbell MK. Understanding perceived determinants of nurses' eating and physical activity behaviour: a theory-informed qualitative interview study. *BMC Obes*. 2017;4(1):18. https://doi.org/10.1186/s40608-017-0154-4 PMID:28491327
10. Zenk SN, Horoi I, McDonald A, Corte C, Riley B, Odoms-Young AM. Ecological momentary assessment of environmental and personal factors and snack food intake in African American women. *Appetite*. 2014;83:333-341. https://doi.org/10.1016/j.appet.2014.09.008 PMID:25239402
11. DeLongis A, Folkman S, Lazarus RS. The impact of daily stress on health and mood: psychological and social resources as mediators. *J Pers Soc Psychol*. 1988;54(3):486-495. https://doi.org/10.1037/0022-3514.54.3.486 PMID:3361420
12. Kanner AD, Coyne JC, Schaefer C, Lazarus RS. Comparison of two modes of stress measurement: daily hassles and uplifts versus major life events. *J Behav Med*. 1981;4(1):1-39. https://doi.org/10.1007/BF00844845 PMID:7288876
13. O'Connor DB, Jones F, Conner M, McMillan B, Ferguson E. Effects of daily hassles and eating style on eating behavior. *Health Psychol*. 2008;27(1S):S20-S31. https://doi.org/10.1037/0278-6133.27.1.S20 PMID:18248102
14. Stults-Kolehmainen MA, Sinha R. The effects of stress on physical activity and exercise. *Sports Med*. 2014;44(1):81-121. https://doi.org/10.1007/s40279-013-0090-5 PMID:24030837
15. Walcott-McQuigg JA. Worksite stress: gender and cultural diversity issues. *AAOHN J*. 1994;42(11):528-533. https://doi.org/10.1177/216507999404201101 PMID:7695797
16. Johannessen HA, Sterud T. Psychosocial factors at work and sleep problems: a longitudinal study of the general working population in Norway. *Int Arch Occup Environ Health*. 2017;90(7):597-608. https://doi.org/10.1007/s00420-017-1222-2 PMID:28429107
17. National Health Interview Survey. Dietary screener questionnaire in the NHIS Cancer Control Supplement (CCS) 2010. Last accessed March 10, 2021 from https://epi.grants.cancer.gov/nhis/2010-screener/.
18. Troiano RP, Berrigan D, Dodd KW, Mâsse LC, Tilert T, McDowell M. Physical activity in the United States measured by accelerometer. *Med Sci Sports Exerc*. 2008;40(1):181-188. https://doi.org/10.1249/mss.0b013e31815a51b3 PMID:18091006
19. Matthews CE, Chen KY, Freedson PS, et al. Amount of time spent in sedentary behaviors in the United States, 2003-2004. *Am J Epidemiol*. 2008;167(7):875-881. https://doi.org/10.1093/aje/kwm390 PMID:18303006
20. Evenson KR, Wen F, Herring AH. Associations of accelerometry-assessed and self-reported physical activity and sedentary behavior with all-cause and cardiovascular mortality among US adults. *Am J Epidemiol*. 2016;184(9):621-632. https://doi.org/10.1093/aje/kww070 PMID:27760774
21. Buysse DJ, Reynolds CF III, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry Res*. 1989;28(2):193-213. https://doi.org/10.1016/0165-1781(89)90047-4 PMID:2748771
22. Anujuo K, Agyemang C, Snijder MB, et al. Contribution of short sleep duration to ethnic differences in cardiovascular disease: results from a cohort study in the Netherlands. *BMJ Open*. 2017;7(11):e017645. https://doi.org/10.1136/bmjopen-2017-017645 PMID:29151049
23. Brantley PJ, Waggoner CD, Jones GN, Rappaport NB. A Daily Stress Inventory: development, reliability, and validity. *J Behav Med*. 1987;10(1):61-74. https://doi.org/10.1007/BF00845128 PMID:3586002
24. Williams DR, Yan Yu, Jackson JS, Anderson NB. Racial differences in physical and mental health: socio-economic status, stress and discrimination. *J Health Psychol*. 1997;2(3):335-351. https://doi.org/10.1177/135910539700200305 PMID:22013026
25. Kohler U, Kreuter F. *Data Analysis Using Stata*. 3rd ed. College Station, Tex.: Stata Press; 2012:xxvi, 497 p.
26. Petersen H, Kecklund G, D'Onofrio P, Axelsson J, Åkerstedt T. Thank god it's Friday - sleep improved. *J Sleep Res*. 2017;26(5):567-571. https://doi.org/10.1111/jsr.12538 PMID:28425191
27. An R. Weekend-weekday differences in diet among U.S. adults, 2003-2012. *Ann Epidemiol*. 2016;26(1):57-65. https://doi.org/10.1016/j.annepidem.2015.10.010 PMID:26559331
28. Martinez-Corts I, Demerouti E, Bakker AB, Boz M. Spillover of interpersonal conflicts from work into nonwork: A daily diary study. *J Occup Health Psychol*. 2015;20(3):326-337. https://doi.org/10.1037/a0038661 PMID:25602278
29. U.S. Bureau of Labor Statistics. A-Z Index : Occupational Outlook Handbook. Last accessed March 10, 2021 from https://www.bls.gov/ooh/a-z-index.htm.
30. O*NET. Find Occupations. Last accessed March 10, 2021 from https://www.onetonline.org/find/.
31. Kunz-Ebrecht SR, Kirschbaum C, Steptoe A. Work stress, socioeconomic status and neuroendocrine activation over the working day. *Soc Sci Med*. 2004;58(8):1523-1530. https://doi.org/10.1016/S0277-9536(03)00347-2 PMID:14759695
32. Epel E, Lapidus R, McEwen B, Brownell K. Stress may add bite to appetite in women: a

laboratory study of stress-induced cortisol and eating behavior. *Psychoneuroendocrinology*. 2001;26(1):37-49. https://doi.org/10.1016/S0306-4530(00)00035-4 PMID:11070333
33. Nies MA, Vollman M, Cook T. African American women's experiences with physical activity in their daily lives. *Public Health Nurs*. 1999;16(1):23-31. https://doi.org/10.1046/j.1525-1446.1999.00023.x PMID:10074819
34. Warren TY, Wilcox S, St George SM, Brandt HM. African American women's perceived influences on and strategies to reduce sedentary behavior. *Qual Health Res*. 2018;28(7):1112-1122. https://doi.org/10.1177/1049732317748605 PMID:29291686
35. Sin NL, Almeida DM, Crain TL, Kossek EE, Berkman LF, Buxton OM. Bidirectional, temporal associations of sleep with positive events, affect, and stressors in daily life across a week. *Ann Behav Med*. 2017;51(3):402-415. https://doi.org/10.1007/s12160-016-9864-y PMID:28188584
36. Miller J, Lee A, Obersky N, Edwards R. Implementation of a better choice healthy food and drink supply strategy for staff and visitors in government-owned health facilities in Queensland, Australia. *Public Health Nutr*. 2015;18(9):1602-1609. https://doi.org/10.1017/S1368980013003455 PMID:24476797
37. Neuhaus M, Eakin EG, Straker L, et al. Reducing occupational sedentary time: a systematic review and meta-analysis of evidence on activity-permissive workstations. *Obes Rev*. 2014;15(10):822-838. https://doi.org/10.1111/obr.12201 PMID:25040784