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Overtime Work Hours, Health Behaviors and Health Outcomes for Correctional Officers: An
Examination of Moderated Effects

Diana C. Tubbs

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Presented by

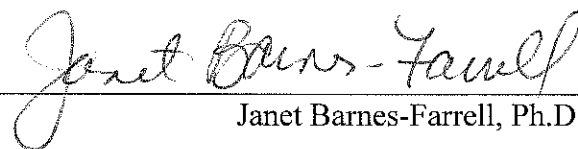
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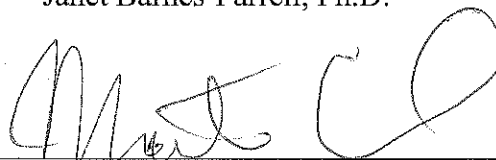
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Abstract

Most of the existing research on corrections officers (COs) has focused on stress and burnout as well as the organizational factors that contribute to these outcomes. Recent studies have also revealed that COs are more likely to be obese and hypertensive than the general population. Studies not specific to corrections provide evidence that overtime hours are associated with poor employee health, and the present study aimed to address this general lack of research on the potential health impacts of overtime hours for COs. More specifically, this study investigated whether the effect of healthy behaviors on health and wellness outcomes changed, depending on how much overtime work COs engaged in. Health and wellness data were collected for COs ($N=202$) at two correctional facilities using three different methods: surveys, physical assessments and continuous overtime data. The use of continuous overtime data is rare in the overtime literature, particularly when the data are collected objectively rather than through self-report methods. Therefore, this study used a measure of overtime that is both more accurate and precise than that typically found in earlier studies of overtime.

Hierarchical linear regression models were used to test the hypotheses that the amount of overtime hours worked would moderate the beneficial effect of healthy behaviors on health outcomes. The healthy behaviors examined were physical activity, healthy eating and healthy sleep hygiene. The assessed health outcomes were physical strength, body fat composition, depressive symptoms, and burnout.

The beneficial effect of healthy sleep hygiene on burnout was moderated by the number of overtime hours worked in a typical week. Essentially, the effect of healthy sleep hygiene on burnout lost its beneficial impact when COs worked on average more than three shifts of overtime in a week. No other moderated relationship between healthy behaviors and health

outcomes was found, in large part because many of the healthy behaviors examined had significant direct effects on health. Surprisingly, overtime did not have a direct effect on any of the health outcomes, nor was it associated with any of the healthy behaviors. More research is needed to replicate these findings and also to determine how to limit overtime or schedule overtime in ways that will allow COs to fully benefit from healthy sleep hygiene as a means to prevent burnout.

Overview

Corrections officers (COs) are an employee population who experience high levels of stress, burnout, depression, work-family conflict and poor physical health outcomes such as obesity, hypertension, and diabetes (Faghri & Mignano, 2013; Obidoa, Reeves, Warren, Reisine, et al, 2011; Morse, Dussetschleger, Warren & Cherniack, 2011; Lambert, Hogan & Altheimer, 2010; Brough & Williams, 2007; Schaufeli & Peeters, 2000). Some of the reasons for these negative health outcomes in COs that are commonly cited across studies include: social stigma, understaffed facilities, officer-inmate interaction, role ambiguity, shift work, and overtime hours (Finney, Stergiopoulos, Hensel, Bonato, & Dewa, 2013, Osborne, 2014; Finn, 1998; Cheek & Miller, 1983). The topic of working excessive overtime hours for COs has also made headlines in many non-scholarly publications (Thompson, 2016; Crowe, K.C., 2016; Boehm, J., 2015; Pawlaczyk, G., 2015), which is not unlike the manner in which the same topic for police officers has been made prominent (Vila, 2006). The main message these publications promote is that officers can double their salaries if they do enough overtime, with the implication that the state's budget is mismanaged. An issue not addressed is that excessive overtime work for a group that is already at risk could worsen COs' health and wellness outcomes. As of this writing, there is only one published empirical study that investigated overtime hours as a possible explanatory variable for CO stress in jails (Castle & Martin, 2006), and no relationship was found. The authors mentioned that the reason for the lack of a relationship might have been due to the facility studied not being overcrowded and functioning at or below capacity for inmates.

Outside of the corrections environment, there is no lack of support for the finding that overtime hours predict health declines in employees, as summarized below. For all workers,

overtime, work beyond a 40-hour workweek (i.e. long work hours), represents a critical job exposure. One aspect of work organization is the work conditions employees are subjected to; and how a workplace regulates the availability and allocation of overtime hours, creates a particular condition and exposure to long work hours. Yet, in practice, overtime is simply perceived as time worked beyond one's scheduled working hours with the possibility of increased pay (Overtime Pay, *n.d.*), rather than an exposure that is known to be associated with many negative health outcomes (Johnson & Lipscomb, 2006; Caruso, Hitchcock, Dick, Russo & Schmit, 2004). In the United States, there are no legal limits for work hours for the majority of workers, the only exception is in transportation (Caruso, 2006). The Boston Police Department is one example of an organization that independently regulates overtime hours as they impose a restriction on total work hours at 96 hours per week (Johnson & Lipscomb, 2006), an amount that is roughly equivalent to working two full-time jobs and one part-time job—a limit that is not likely to be protective from a health and wellbeing perspective.

Overtime work, however, is a highly context-specific variable because, depending on the nature of one's job, there are a number of different ways workers can experience overtime. For example, employees may or may not receive hourly pay at an increased rate if they are paid a fixed salary, overtime work may involve high levels of physical or mental demands, there might be options to work remotely, and the degree to which workers have autonomy in overtime hours can vary widely. Given that overtime has been mentioned as one factor that leads to several negative health consequences, it is justified to empirically test this relationship in CO populations to understand its effect in a corrections context. In fact in 2002, The National Institute Of Safety and Health (NIOSH) Sauter, et al. (2002) recommended that researchers focus on “populations most likely to work long hours” (p. 12) in order to understand overtime

as a work condition that is necessarily linked to other job-specific factors. Such research could indicate if overtime is something for COs and their workplaces to more proactively manage so as to reduce the health risks known to be associated with this job.

Nevertheless, the direct association between overtime and health and wellness leaves explanatory variables unclear since hours worked alone have not been found to account for poor health outcomes (Johnson & Lipscomb, 2006). Overall, published work that investigates the association between overtime and health shows some support for behavior as a contributing factor either by a decrease in healthy behaviors or an increase in unhealthy behaviors, or a combination of both (Caruso, Hitchcock, Dick, Russo & Schmit, 2004; Geiger-Brown, Lee, & Trinkoff, 2012), although some findings are inconclusive due to methodological weaknesses (Van der Hulst, 2003). Indeed, without the complication of overtime work, there is much agreement and extensive evidence showing that positive health behaviors prevent negative health outcomes and predict positive health in longitudinal studies (Lafortune, Martin, Kelly, Kuhn, Remes, Cowan, & Brayne, 2016; Burton, Chen, Li, Schultz, & Abrahamsson, 2014).

It is possible that the established relationship between health behaviors and health could be weakened when overtime is taken into account. In other words, proactive efforts to stay healthy could be undermined when exposure to overtime increases. According to the Effort-Recovery Model (Meijman & Mulder, 1998), when a worker experiences insufficient recovery from continued exposure to work demands (i.e. overtime hours), he will subsequently experience physiological and psychological negative load effects which bring about negative changes to his physiological and psychological functions. Essentially, the combination of excessive work exposures and inadequate recovery can be expected to negatively impact health regardless of attempts to stay healthy. This is particularly true if an effort-recovery deficit has been sustained

over a long period of time (Meijman & Mulder, 1998). In the present study, overtime hours are conceptualized as being a combination of increased work demands that are accompanied by incomplete recovery, which together, have a negative effect on the normally positive relationship between healthy behaviors and health outcomes. The more overtime hours, the less impact healthy behaviors are expected to have on health and wellness outcomes.

This possible moderator relationship has not been studied in the overtime literature to date. Scholarly works investigating the relationship among these three variables (overtime, health and health behaviors) usually model them instead in terms of the association between two of them (e.g. ‘overtime and health behaviors’ or ‘overtime and health outcomes’) (Taris, Ybema, Beckers, Verheijden, Geurts & Kompier, 2011), and other studies infer that health behaviors mediate the relationship between overtime hours and health outcomes (Bannai & Tamakoshi 2014). Therefore, the purpose of the present study is to examine whether the effect of CO’s healthy behaviors on health outcomes changes depending on how much overtime they perform.

In sum, COs endure numerous health and wellness concerns and also experience many opportunities to work overtime in an already challenging job role and work setting. Some evidence already suggests that long work hours are associated with both poor health outcomes and changes in health behaviors. This thesis project examines whether COs’ attempts to stay healthy through engaging in healthy behaviors are undermined by how much overtime they work.

Literature Review

In their landmark longitudinal study in 2005, Dembe and colleagues analyzed the association between overtime work schedules and the incidence of work-related injuries or illnesses. Their study covered a large variety of jobs as they collected data from 110,236

employees in the U.S. across 13 years. (Dembé, Erickson, Delbos & Banks, 2005). They calculated hazard ratios using Cox proportional methods and found that individuals who work overtime had the worst injury hazard rates as they were 61% more likely to endure occupational injuries and illnesses (e.g. musculoskeletal conditions, cuts and bruises, fractures and other traumatic injuries) when compared to employees who did not work overtime. The results held true even when factors like age, gender, occupation, industry and region were controlled for. The authors also scored all workers' risk of injury/illness by using a common denominator so that if a group of employees worked more hours, they wouldn't score higher simply due to their increased time spent at work. Dembé and colleagues' results suggest that jobs with overtime hours are not more risky simply because they are concentrated in inherently hazardous jobs, but that across many jobs, overtime predicts the highest relative risk of occupational injuries and illnesses when compared to schedules with no overtime or extended shifts (2005). A weakness of this study is that the authors did not investigate explanatory variables that bring about an increase in workplace hazards for those who work overtime. In their discussion, the authors speculate that fatigue and/or stress could be intermediary factors but neglect to mention the possibility of variables outside of work that may increase health risks for employees.

Parkes (1999) took a similar approach to Dembé and colleagues analytically with her study of oil industry personnel by examining the association between work schedules (i.e. shift work) and health outcomes. Although not a study of overtime per se, because all employees worked 12-hours shifts, Parkes' study has important implications for COs. This is because CO's overtime hours automatically entail shift work since an overtime shift (typically 8-hours), usually occurs consecutively with their regular 8-hour shift (discussed further below). When Parkes accounted for shift differences (day vs. night), and seven different job types, calculation

of relative risks ratios showed that shift work and job type predicted six health outcomes differentially. Namely, shift workers were more likely to report intestinal (36% more likely) and sleep (81% more likely) problems than those working day shifts. Job type, on the other hand, predicted headaches, muscular pain, and work-related injuries. Specifically, individuals in management, construction and drilling were almost twice as likely to report headaches; drillers were 68% more likely to report muscular pain; and construction workers were nearly three times as likely to endure a work-related injury (Parkes, 1999). The results of this study suggest that isolating the effects of job type and work schedule in one particular industry can reveal differential health effects on employees. Although it's possible that Dembe et al.'s study above, because of its impressive sample size, would reveal statistically significant results even if job type was controlled for, Parkes' study on the other hand, had just over 1300 workers and was also able to detect differences that implicate *when* work hours occur and for *whom*, and the particular health concerns for each group.

The fact that particular employee groups are differentially affected by work schedules is evidenced in the published literature, although disentangling the effects of shift work and overtime remains a major challenge. Caruso (2014) distinguished between the health impacts of shift work versus overtime in her review of studies specific to nurses. Caruso notes that although studies examining the influence of overtime on health have been increasing in recent years, in comparison, there is substantially more published work on the effect of shift work on health; so more research on overtime and health is needed (2014). The evidence from this paper suggests that shift work and overtime both predict negative effects on sleep, namely: sleep disturbances, shorter sleep duration, and insomnia. These impacts on sleep in turn have a negative effect on numerous other aspects of health, for example: irritable mood, depression,

anxiety, decreased cognitive functioning, musculoskeletal disorders, obesity, diabetes, gastrointestinal symptoms, cardiovascular disorders, breast, prostate and colon cancer, as well as adverse reproductive outcomes. Even though Caruso aims to delineate differences between shift work and overtime, her review indicates that there is considerable overlap in the health risks associated with each. Not surprisingly, there is less evidence clarifying the particular risks of overtime and also more inconclusive results across studies for overtime specifically.

There was another systematic review that assessed peer-reviewed literature and investigated the link between overtime and epidemiological evidence, which was conducted by Bannai and Tamakoshi (2014). The authors intentionally omitted shift work studies in order to control for the detrimental effects of shift work. Their review concluded that overtime is associated with depression, anxiety, sleep issues and coronary heart disease. The authors inferred, but do not examine, three sequential causal pathways for the associations found between overtime and adverse health, as: 1) insufficient recovery time, 2) poor sleep, and 3) harmful health-related behaviors (e.g. alcohol consumption and tobacco use). Bannai and Tamakoshi noted that at the time of their review (2014) the majority of existing studies on overtime and health used self-report instruments to measure long work hours instead of objective measures such as timecards or human resources records. Between the years 1995-2012, the authors found 19 studies that examined overtime only (not shift work), with only two of them using objective work hours in their analyses. The remaining 17 studies used self-report measures to estimate overtime hours, which can lack the accuracy of objective measures.

Another important aspect of measuring overtime is the level of precision of the data, in addition to the method of data collection (i.e. self report vs. objective). For instance, researchers could collect objective or self-report data that provide categorical-level overtime data such as a

dichotomous (“yes” or “no”) variable that indicates whether an employee has worked overtime (for a specific example see, Dembe et al., 2005). Continuous data represent a more precise measure, which can also be gathered through self-report or objective methods. Continuous, or quantitative data consists of variables that represent variation in the amount of overtime over a fixed time period; for example, the length of shifts, and number of hours worked beyond 40 each week (Keppel & Wickens, 2004) (for a specific example, see Gu et al., 2012). Therefore, data that are both objective and continuous provide the most accuracy and precision when conducting scientific studies of overtime.

Given past scholarly efforts to isolate overtime from shift work but their apparent overlap in health impacts, it is unclear if examining associations between health and overtime actually benefits from this distinction. From the standpoint of research, the challenge with isolating shift work from overtime work is that in practice, these two schedule types usually co-occur. Shift work by definition includes a wide variety of schedule types. The only clear-cut rule that omits individuals from shift work is if their shift (whether it includes overtime or not) is completed between 7:00AM and 6:00PM. Methodologically, if researchers want to isolate the effects of overtime from shift work, then the requirement must be that overtime was worked during these 11 hours, which severely restricts how much overtime is worked beyond an 8-hour shift. Individuals working second shift (3:30PM-11:30PM); third shift (11:30PM-7:30AM), rotating shifts (switching from night to day shifts), split shifts (when a person’s work schedule is split into two or more parts instead of one shift), or those that have some irregular schedules (e.g. on call) both during the week and weekends all fit the definition of involving shift work. And so in practice, engaging in overtime can often entail being subject to shift work. This is particularly true for COs because correctional facilities typically require an 8-hour minimum

shift whenever COs perform overtime work. In essence, correctional facilities have an overtime allocation structure in which COs who work overtime will usually work a 16-hour shift—their regularly scheduled shift (e.g. 1st shift; 7:30AM-3:30PM), and an overtime shift before (3rd shift) or after (2nd shift) their regular shift. Regardless of which regular shift a CO has, any officer who works two out of the three shifts because of overtime is automatically subject to shift work in one form or another. Due to overtime availability in corrections being unpredictable, this can therefore involve either shift rotation or irregular schedules, or both.

Therefore, overtime studies are necessarily linked to the specific context in which they take place, and their findings only have practical implications for workers in similar contexts. The enduring distinction between shift work and overtime in published works leaves little guidance for protecting the health of employees for whom overtime is structured in such a way that it involves both shift work and overtime within a five-day workweek. A more promising approach might be to identify and compare work schedules that share similar attributes, for example: duration, work-break frequency and duration, frequency of overtime, length of overtime, time of day, etc.

In comparison to the familiar 16 hour-shift for COs, resident physicians' work hours became prominent in the literature, particularly when recommendations called for their hours to be reduced to no more than 16 hours per day due to patient safety concerns (Levine, Adusumilli, Landrigan, 2010). Levine and colleagues' systematic review found that elimination of shifts beyond 16 hours was associated with improvements in patient safety and care, and resident quality of life (2010). For residents, a reduction to 16-hour shifts is considered an improvement to enforce so the evidence for them does not describe any risk COs may be subject to by working double shifts. Nevertheless, there is evidence that for nurses, the risk of making an

error nearly doubled when they worked more than 12 hours. Despite nurses' shifts being scheduled for 12 hours, the majority of nurses from a study by Scott and colleagues worked overtime (Scott, Rogers, Hwang & Zhang (2006). It is worth noting that the studies mentioned above focus chiefly on avoiding preventable adverse events with patients, and less so on the health and wellbeing of the healthcare professionals themselves.

A prime example of a job-specific overtime study in relation to the health of workers was conducted to determine if cardiovascular strain in firefighters could be linked to working very long shifts, or more than two 24-hour shifts (Choi, Schnall, Dobson, Garcia-Riva, Kim, Zaldivar, Israel, & Baker, 2014). Cardiovascular disease is the most common reason for fatality at work for firefighters, who work extremely long shifts. However, these same firefighters often have dormitories, dining and recreation areas at their workplace to support rest and recovery. These researchers emphasize that very little is known regarding the impact of working more than 48 hours on firefighters' cardiovascular strain, and that there are no standard field methods for assessing cardiovascular strain in firefighters. Choi and colleagues (2014) collected data to answer their research questions by conducting a feasibility study that supported the assessment of several cardiovascular strain biomarkers (e.g. heart rate, heart rate variability, blood pressure, salivary cortisol) while firefighters were doing a 72-hour shift. The Choi and colleagues' study (2014) demonstrates that how overtime is defined and the particular employee experience of those overtime hours depends on the context in which it occurs. It is possible for a CO to work a 24-hour shift (three shifts in a row), but clearly, findings from a study on firefighters does not offer practical implications for employees in drastically different settings because a 24-hour shift for firefighters is not out of the ordinary.

Specific to law enforcement employees, Gu and colleagues (2012) obtained payroll records and BMI data to examine the relationship between overtime and adiposity in police officers. They found that for male officers who work the midnight shift, working longer hours was significantly associated with larger waist circumference and higher body mass index (BMI), even after controlling for age, rank, physical activity, sleep duration and smoking status. However, the researchers measured long work hours as: (1) less than 30 hours per week, (2) 30-39.9 hrs/wk, and (3) 40 hours or more/wk. Hence, their study provides evidence for increased health risks with additional hours worked but our knowledge of negative impacts beyond a 40-hour work week was not improved.

In a recent study of COs, researchers found that they were more likely to be obese and hypertensive compared to the general population (Morse, et. al., 2011). The participants in this study provided reasons for these outcomes which included: schedule limitations (e.g. eating on the run, fixed break schedules), poor quality vending machine food and fast food that is delivered to the job site, job stress (e.g. decreased energy, coping with personal or family issues, risk of assault), physical inactivity and excessive administrative requirements and paperwork. Morse and colleagues' mixed methods study emphasized that workplace health promotion efforts must take into account the specific conditions of an occupation in order to be effective.

In fact, the National Institute of Occupational Safety and Health (NIOSH) has a current research agenda to help organizations integrate efforts that protect and promote employee health, named the Total Worker HealthTM program (NIOSH, 2016; Schill & Chosewood, 2013). In practice, most organizations' safety, wellness and health resources function independently without integration among these efforts so that, for example, workers' compensation, health promotion activities and safety initiatives remain separate despite their common goal to protect

and improve health. One benefit of integration is to create a unified system that protects and promotes the total health, safety and wellbeing of workers (Schill & Chosewood, 2013).

Another form of TWHTM integration is for interventions to involve changes to work organization and personal behaviors, as identified and prioritized through worker involvement (Cherniack, Punnett, Henning & Faghri, 2016). In the case of COs, for example, a workplace dietician who typically creates meal plans for individuals with special conditions (e.g. overweight, allergies) through referrals, could also provide expert help to employee meal planning by advising about vending machine offerings, ensuring that there is plenty of food storage and facilities for meal preparation, advising whether 30-minute breaks are adequate for meal times, and providing general information on nutrition to help individuals make better food choices. The TWHTM approach is also unique in that it integrates traditional workplace safety and health efforts, as well as psychosocial aspects of work that affect these aspects, for example: leadership commitment to health, worker empowerment, employee engagement, and social support (NIOSH, 2016).

As mentioned previously, individual health behaviors are theorized to be the causal link between overtime and health. A longitudinal study tested this mediated relationship and found that overtime at *Time 1* predicted fewer beneficial behaviors (exercise and healthy eating) two years later, but there was no change in harmful behaviors (smoking and alcohol consumption) (Taris, Ybema, Beckers, Verheijden, Geurts & Kompier, 2011). Overtime at *Time 1* also predicted a decrease in subjective health two years later, but interestingly, there was no relationship with changes in body mass index. In addition, harmful behaviors at *Time 1* predicted increases in body mass index two years later, and beneficial behaviors predicted increases in subjective health. Taris and colleagues' (2011) study had two waves of data, and so

they could not conclude that health behaviors mediated the relationship between overtime and health, but their findings suggest that a mediated relationship could emerge given the right study design. Nonetheless, this study indicates that overtime has unfavorable effects on health behaviors and health.

The present study is designed to substantively address some of the gaps apparent in the overtime literature. Since the role of health behaviors is implicated but inconclusive, I adopt the Effort-Recovery Model (Meijman & Mulder, 1998) to model the relationship between overtime, healthy behaviors and health outcomes, in order to examine whether the effect of an individual's healthy behaviors on health outcomes changes in relation to how much overtime is performed. If overtime lessens the benefits of physical activity on body fat percentage when a CO averages eight hours of overtime per week, for example, then these findings could indicate whether overtime hours contribute uniquely to COs' health. In addition, the analyses for this study will shed light on whether behaviors like physical activity, healthy eating, and healthy sleep hygiene have any direct effects on the health of COs working overtime. These relationships will be examined differentially through several health indicators. Finally, by examining these variables with continuous overtime data, it can be possible to delineate the effects of complex work schedules that entail both shift work and overtime hours on CO health and wellbeing.

Hypotheses

As noted above, the overarching framework for this study is the Effort-Recovery Model, which is used to guide analyses on whether overtime moderates the beneficial effects of

healthy behaviors on health outcomes. In their book chapter, Meijman and Mulder (1998) explain the Effort-Recovery Model, which posits that under normal work demands, workers experience load reactions such as accelerated heart rate and fatigue that return to baseline levels after adequate recovery. But in cases of continued exposure to workload and incomplete recovery, more chronic load reactions can develop. Particularly if the worker is persistently in the suboptimal state of incomplete recovery (e.g. tired from the previous work period), then the worker needs to exert compensatory effort in order to perform adequately. Such compensatory effort results in more negative load reactions affecting the worker both physically and mentally, which then places an even higher demand for a subsequent recovery process (Geurts & Sonnentag, 2006). Therefore, overtime can result in a process of accumulating negative effects that can then lead to health problems because of harmful physiological and psychological changes in the worker who is essentially trapped in an effort-recovery deficiency bind.

In the present study of corrections workers, excessive overtime hours are likely to involve a combination of high effort and incomplete recovery, as predicted by the Effort-Recovery Model, and this is hypothesized to weaken the beneficial effect of a healthy behavior on health. For example, high levels of physical activity will normally lead to lower levels of body fat, but this relationship will be weaker if an employee is working a considerable amount of overtime. This idealized relationship is shown in Figure 1, where overtime moderates the beneficial effect of physical activity on body fat by weakening this relationship. In this example, physical activity and body fat are substitutes for a healthy behavior and a health outcome, respectively. Thus, despite the specific variables included in Figure 1 for explanatory purposes, the idealized plot represents the hypothesized moderated effect that is central to all hypotheses, as stated above.

What follows are four groups of hypotheses representing each of the four independent variables/healthy behaviors of the study, along with respective sub-hypotheses regarding each dependent variable/health outcome for a given healthy behavior.

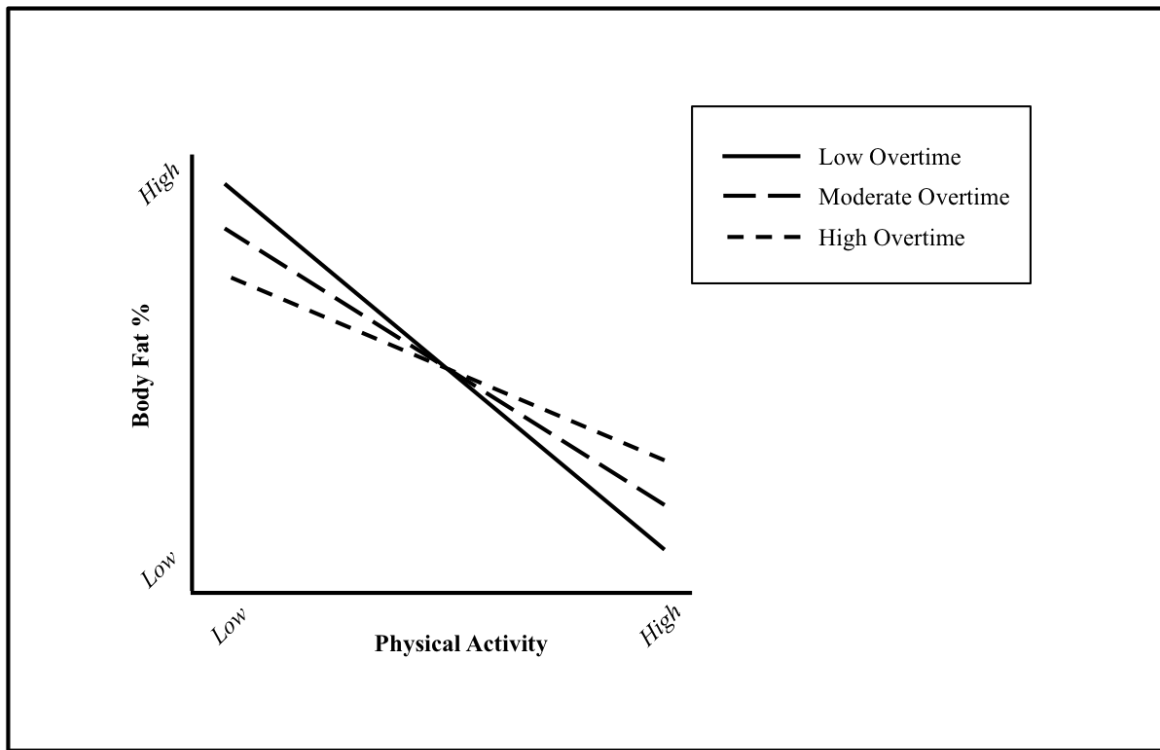


Figure 1. Idealized plot of hypotheses showing overtime moderating the beneficial effect of overtime on body fat percentage.

1. Physical Activity

Physical activity has long been known to provide many health benefits (Warburton, Nicol, Bredin, 2006). Leisure activities that increase heart rate (e.g. a brisk walk) can increase muscular strength, decrease body fat, (Haskell, Lee, Pate, Powell, Blair, Franklin. et al., 2007), and reduce the likelihood that one will experience depressive symptoms and job burnout (Fox, 1999; Dunn, Trivedi, O'Neal, 2001; Toker, Biron, 2012). For those who work long hours,

research indicates that they engage in substantially less physical activity compared with those who do not work long hours (Sparks, Cooper, Fried & Shirom, 1997; Caruso, 2014). Still, it remains unclear whether a concerted effort to engage in physical activity outside of work is simply a matter of the availability of time (working overtime or not), or if the benefits that are commonly attained through physical activity are diminished by the effects of prolonged effort expenditure at work as predicted by the Effort-Recovery Model (Meijman & Mulder, 1998). Therefore the following set of hypotheses were tested to determine if the association between COs' physical activity and the following four health outcomes (*a-d*) depends on the amount of overtime they have worked.

Hypothesis 1a: Overtime hours will moderate the beneficial effect of physical activity on overall physical strength. Higher levels of physical activity will predict more overall physical strength, but this relationship will be weakened with more overtime worked.

Hypothesis 1b: Overtime hours will moderate the beneficial effect of physical activity on percentage of body fat. Higher levels of physical activity will predict less body fat, but this relationship will be weakened with more overtime worked.

Hypothesis 1c: Overtime hours will moderate the beneficial effect of physical activity on depressive symptoms. Higher levels of physical activity will predict fewer depressive symptoms, but this relationship will be weakened with more overtime worked.

Hypothesis 1d: Overtime hours will moderate the beneficial effect of physical activity on burnout. Higher levels of physical activity will predict less burnout, but this relationship will be weakened with more overtime worked.

2. Healthy Eating

Nutrient rich, low-calorie foods are the recommended choices for weight loss and weight maintenance, particularly over the long term (US Department for Health and Human Services, 2005). In the most basic sense, nutritional guidelines are based on the concept of

energy balance whereby energy intake equals energy expenditure. For example, if you consume more energy than you expend, you are considered to have positive imbalance, which leads to energy storage and weight increase. In order to achieve energy balance, or even weight loss, a low-calorie dense and nutrient-rich diet is recommended by the National Institutes of Health (2005). Moreover, dietary guidelines provide recommendations on food substitutions so that calorie-dense foods (e.g. high-fat and sweetened foods) are replaced with nutrient-rich foods that offer whole grains, fiber, unsaturated fats, and dairy. In addition, calories from a meal should be derived from different sources so that the least amount of calories are from protein (10-35%), a moderate amount of calories from fat (20-35%) and the most calories from carbohydrates (45-60%) (Kumanyika, Obarzanek, Stettler, Bell, Field, et al., 2008).

Empirical work has found evidence to suggest that individuals who work overtime are at risk of higher BMIs and larger waist circumferences. Still, the associations found were weak or only applicable to males because females who worked overtime ate more nutritious foods. (Nakamura, Shimai, Kicuchi, Takahashi, Nakano, et al., 1997; Escoto, French, Harnack, Toomey, Hannan & Mitchell, 2010). Overall, the studies converge on the idea that food choices explain this relationship, and that overtime usually entails more meals consumed in a work setting which severely limits accessibility to healthy foods and increases dependence on more inferior food choices based on their easy availability (e.g. vending machines, drive-through/fast food restaurants, and take-out restaurants that are open late at night). As noted previously, the Effort-Recovery Model posits that increased efforts at work and decreased recovery produce unfavorable constitutional changes so that healthier choices, in this example about food, may no longer lead to the same beneficial outcomes (Meijman & Mulder, 1998). In essence, the Effort-

Recovery Model indicates that those benefits are less so for those working overtime than those who work regular 40-hour weeks. Based on this, I plan to test the following:

Hypothesis 2: Overtime will moderate the beneficial effect of healthy eating on percentage of body fat. Higher levels of healthy eating will predict less body fat, but this relationship will be weakened with more overtime worked.

3. Sleep Hygiene

Disengagement and exhaustion, the two factors that describe burnout, have been associated with poorer sleep quality independent of other mood disorders like depression (Miró, Solanes, Martínez, Sánchez, & Rodríguez, 2007; Sonnenschein, Sorbi, van Doornen, Schaufeli, & Maas, 2007a). In essence, the additional individual effort that healthy sleep hygiene requires (e.g. minimizing alcohol and caffeine consumption, following a regular sleep-wake schedule), is too much of a burden for the person experiencing job burnout to accomplish. In fact, studies of energy depletion that compared individuals who were and were not burned out, those who were not burned out experienced significantly better recovery through sleep than those who were burned out (Sonnenschein, Sorbi, van Doornen, Schaufeli, & Maas, 2007b). Meijman and colleagues (1998) examined differences between employees with regular workloads that afforded them rest breaks, versus employees with excessive workloads that afforded them no rest breaks when both groups worked the same amount of hours. The researchers found that adrenaline levels during workdays were the same for both conditions. However, several hours after the workday was over, the individuals with intense workloads had adrenaline levels that were statistically significantly higher than those with regular workloads. They concluded; “Apparently, the organism remains activated for quite some time after a period of intensive load, even if it is not exposed to any special loads during the recovery period. This condition of

increased activation caused the [employees] to be troubled by sleep complaints, in particular falling asleep, during the nights after intensified working days” (p.26). From the perspective of the Effort-Recovery Model (Meijman & Mulder, 1998), this evidence suggests that a prolonged period of high effort coupled with poor recovery requires a long recovery period, and so adoption of healthy habits may not yield the expected benefits in the short term.

In addition, overtime hours, rotating shifts and extended work hours have been associated with decrements in sleep hygiene behaviors, particularly for nurses (Suzuki, Ohida, Kaneita, Yokoyama, & Uchiyama, 2005; Zenciri & Arslan, 2011). Although no such empirical work exists for COs, based on the evidence it is reasonable to hypothesize that a concerted effort to practice healthy sleep habits could be blunted when the number of overtime hours is higher. Therefore, the following hypothesis was tested:

Hypothesis 3: Overtime will moderate the beneficial effect of healthy sleep hygiene on burnout. Better sleep hygiene will predict less burnout, but this relationship will be weakened with more overtime worked.

Method

Procedure and Participants

The present study used data from the Health Improvement Through Employee Control 2 (HITEC 2) project (Cherniack, Dussetschleger, Dugan, Farr, Namazi, El Ghaziri & Henning, 2016), a field research project on TWHTM conducted by the Center for the Promotion of Health in the New England Workplace (CPH-NEW, *n.d.*). CPH-NEW is one of four national Centers for Excellence of the NIOSH TWHTM program (Total Worker HealthTM Centers of Excellence to Promote a Healthier Workforce, *n.d.*).

HITEC 2 established a participatory action research program that assesses work and non-work hazards impacting employee wellbeing and work life, and engages employees in the design of interventions to improve health, safety or wellbeing (Cherniack, Punnett, Henning & Faghri, 2016). The survey instrument for HITEC 2 was developed over many years of research in corrections settings through CPH-NEW (CPH-NEW, *n.d.*). HITEC 2 focused on correctional staff, predominantly correctional officers, at two correctional facilities in the Northeast U.S. Participants were recruited during roll call at the beginning of each shift. During roll call, a research team member described the research briefly, and provided information on the research team's location and scheduled time to be at the site. Each participant provided informed consent prior to receiving a survey or physical assessment. Data were collected in June and July of 2013 at Site A and Site B, respectively. During each data collection phase, three members of the research team remained on site for several hours to distribute surveys, administer physical assessments and pay the participants an incentive of \$25 for a completed survey and \$25 for a completed physical assessment; each required about 40 minutes to complete. Both sites provided the research team with a private room so that participants could discretely fill out their surveys and/or complete a physical assessment. The data collection schedule was intentionally staggered so that members of the research team were in attendance during each of the three shifts. The main purpose of the survey and physical assessments was to determine the baseline measures for employees who would later be asked to participate in the same exact the data collection efforts two years later. After the baseline measures were collected, the TWHTM interventions began. In addition to the above data collection, continuous overtime data for COs for the six months prior to survey and physical assessment administration were made available by the state Department of Correction. The final data set comprised 113 COs from Site A and

89 COs from Site B, for a total of 202 COs with survey, physical assessment and continuous overtime data. Their mean age was 40.5 years ($SD = 8.7$), and the mean tenure in corrections was 11.3 years ($SD = 6.4$). On average, participants worked 14 hours of overtime per week ($SD = 7.1$), and 86% were male.

Measures

Descriptive statistics for all measures are provided in Table 1.

Physical activity. Physical activity was measured with a 4-item scale that was adapted from the EPIC-Norfolk Physical Activity Questionnaire (Wareham, Jakes, Rennie, Mitchell & Hennings, 2002). The question stem read, “Outside of work, in an average week during the past year, how many hours did you spend on each of the following activities?” The four items were: (1) “Walking, including walking to work, shopping, and leisure time?” (2) “Gardening, yard work, and do-it-yourself activities at home?” (3) “Housework, such as cleaning, washing, cooking, child care, etc.?” and, (4) “Physical exercise such as fitness, aerobics, swimming, jogging, cycling, tennis, etc.?” Respondents responded to each item on a 6-point scale to indicate the amount of time spent on each activity each week: 1 (*0 hours per week*), 2 (*1-3 hours week*), 3 (*4-6 hours per week*), 4 (*7-9 hours per week*), 5 (*10-12 hours per week*), and 6 (*> 12 hours per week*). These response options are the modified part of the original measure, in which the response choices are formatted as open text. A unit-weighted composite score was created for this set of items so that a single mean score represented a participant’s level of physical activity (a minimum of 2 out of the 4 completed items were required). On average, COs physical activity outside of work was spent on household work (3.26 hours per week) and the least amount on exercise (2.69 hours per week) (Table 1).

Healthy Eating. Healthy eating was measured by a battery of items from the U.S. Food and Drug Administration's health and diet survey (2008), which is based on dietary guidelines. The question stem read, "Thinking of a typical seven-day week, how many days per week do you do the following activities?" The scale included five items: (1) "Keep track of the calories you eat" (2) "Get at least 30 minutes of exercise or physical activity" (3) "Eat at least five servings of fruits or vegetables" (4) "Eat whole grain breads or cereals" and, (5) "Have three servings of milk, yogurt, or cheese." Participants responded to each item on a 5-point scale to specify how many days per week those activities were performed: 1 (*0 days*), 2 (*1-2 days*), 3 (*3-4 days*), 4 (*5-6 days*), and 5 (*7 days*). A unit-weighted composite score was created for this set of items so that a single mean score represented a participant's level of healthy eating (a minimum of 3 out of the 5 completed items were required). On average, COs spent the most days per week consuming three servings of dairy (3 days) and the least days per week keeping track of calories consumed (about 1.5 days) (Table 1).

Sleep Hygiene. Sleep hygiene was assessed with a single-item measure of sleep quality from the Pittsburgh Sleep Quality Index (Buysse, Reynolds, Monk, Berman, Kupfer & 1989). There is ample empirical support that sleep quality and sleep hygiene measures are highly correlated, allowing them to be used as proxy measures for each other (Brown, Buboltz & Soper, 2002; LeBourgeois, Giannotti, Cortesi, Wolfson & Harsh, 2005; Mastin, Bryson & Corwyn, 2006). Support for single-item use of sleep quality is also evident (Cappelleri, Bushmakina, McDermott, Sadosky, Petrie & Martin, 2009). Total sleep hours were not included as part of this measure in order to operationalize the aspects of sleep that could be attributed to participant behavior, and to preserve the variance in the dependent variable (please refer to Hypotheses, Section 3, for further clarification on the definition of sleep hygiene). The question

stem read, “How would you describe the quality of your sleep on a typical night?” and the 4-point scale response choices were: 1 (*Poor*), 2 (*Fairly poor*), 3 (*Fairly good*), and 4 (*Good*).

Depressive symptoms. Depression was measured with the widely used CES-D 10-item scale (Radloff, 1977). The directions read as follows: “Please indicate how often you have felt this way during the past week by checking the appropriate box for each question.” The items were: (1) “I was bothered by things that usually don’t bother me”, (2) “I had trouble keeping my mind on what I was doing”, (3) “I felt depressed”, (4) “I felt that everything I did was an effort”, (5) “I felt hopeful about the future” (reverse scored), (6) “I felt fearful”, (7) “My sleep was restless”, (8) “I felt happy” (reverse scored), (9) “I felt lonely,” and (10) “I could not ‘get going’”. The scale options were: 1 (*Rarely or none of the time (less than 1 day per week)*), 2 (*Some or a little of the time (1-2 days per week)*), 3 (*Occasionally or a moderate amount of the time (3-4 days per week)*) and, 4 (*All of the time (5-7 days per week)*). A unit-weighted composite score was created for this set of items so that a single mean score represented a participant’s level of depressive symptoms (a minimum of 5 out of the 10 completed items were required).

Burnout. Burnout was assessed with an adapted version of the Oldenburg Burnout Inventory (OLBI) (Demerouti, Bakker, Nachreiner, Schaufeli, 2001). The two subscales in this 5-item response set were intended to identify exhaustion and disengagement. Exhaustion refers to an individual’s reaction to intense and prolonged exposure to physical, emotional or cognitive demands. Disengagement refers to distancing oneself from one’s work and experiencing negative attitudes toward the work object, work content and work in general (Demerouti, et al., 2001). The directions read as follows: “To what extent do you agree or disagree with the following statements?” The items were (1) “More and more often I talk about my work in a

negative way”, (2) “Sometimes I feel really disgusted with my work”, (3) “After work, I have enough energy for leisure activities” (reverse scored), (4) “At work, I often feel emotionally drained” and, (5) “After work, I usually feel worn out and weary.” The 7-point response scale options were: 1 (*Strongly Disagree*), 2 (*Disagree*), 3 (*Somewhat Disagree*), 4 (*Neutral*), 5 (*Somewhat Agree*), 6 (*Agree*) and, 7 (*Strongly Agree*). A unit-weighted composite score was created for this set of items so that a single mean score represented a participant’s level of burnout. The mean score for burnout was calculated by adding both composite scores for the subscales and dividing by two. Items 1 and 2 measured disengagement; and a composite score for this subscale averaged the two items (at least 1 completed item was required). Items 3, 4 and 5 measured exhaustion; and a composite score for this subscale averaged the three items. A minimum of 2 out of the 5 completed items were required.

Physical strength. Physical strength was evaluated by a handgrip dynamometer (Bellace, Healy, Besser, Byron & Hohman, 2000) because it is a widely used proxy for overall physical strength (Bohannon, 2001). The dominant hand was used for testing (hand dominance was ascertained from the participant). The position used was 90° of shoulder flexion with the elbow also flexed to 90°. After one practice trial of a firm grip, the participant was asked to grip firmly with maximal effort for three seconds, and release. The measurement was recorded in kg.

Body fat composition. Bioelectrical Impedance Analysis (BIA) was used to measure the composition of body fat (Lukaski, Johnson, Bolonchuk, Lykken & 1985). Participants were asked to remove the shoe and sock from one foot, and any heavy jewelry. Two disposable surface electrodes were adhered lightly to the wrist and joint of middle finger as well as the ankle and base of second toe of the same side of the body. Impedance and reactance measures were

provided by a specialized handheld computer, and a research team member divided these two estimates to calculate the percentage of body fat composition for each participant.

Overtime hours. Overtime hours for six months prior to survey administration were obtained for participants who completed the survey in order to objectively assess overtime activity. The total hours over six months were used to calculate average hours per week as an indication of an individual's typical overtime activity.

Control variables. Age and gender were controlled on the basis that age could be an explanatory variable for health-related outcomes, and that gender could be biased for health outcomes such as body fat and physical strength. In addition, gender could account for variability in overtime due to dependent care responsibilities and subsequent unavailability to work additional hours.

Analysis

Analyses were conducted using SPSS (version 20). Hierarchical linear regression models were used to test whether overtime moderates the beneficial effects of healthy behaviors on health outcomes, as well as the direct effect of these healthy behaviors on the same health outcomes. Each model had four steps: the control variables were entered in Step 1 (*age* and *gender*), the main effect of the healthy behavior in Step 2, the main effect of overtime in Step 3, and the interaction (*healthy behavior x overtime*) in Step 4, which tests the moderation effect (all predictors were centered at their means). This sequence provides regression weights at each step along with estimates of whether there is any significant improvement to variance explained in the outcomes through each progressive step.

Results

Means, standard deviations, zero-order correlations and alpha reliabilities of the study variables are shown in Table 2. It is noteworthy that all three healthy behaviors are significantly correlated, and that none are related to overtime hours. Similarly, all five outcomes are significantly correlated with the exception of handgrip strength, and they are not related to overtime hours. The only variable strongly associated with overtime is age. This is expected as, in both correctional facilities, a CO's pension payment was based on an average of his three highest earning years. As a result, COs tend to put in many more overtime hours as they get closer to retirement.

Physical Activity

A hierarchical linear model was used to determine whether overtime moderated the beneficial effect of physical activity on physical strength. The analysis revealed that physical strength was predicted by the control variables with about 38% of the variance in physical strength explained by age and gender (Table 3). Younger males predict higher levels of physical strength compared to older males and females of any age. There were no significant main effects from physical activity on physical strength, and no main effects from overtime on physical strength as well. Finally, the moderation effect was statistically non-significant and did not yield a significant R^2 increase. Thus, Hypothesis 1a was not supported.

A hierarchical linear model was used to determine whether overtime moderated the beneficial effect of physical activity on body fat composition. Gender was the main explanatory factor in this analysis, which accounted for about 27% of the variance explained in body fat; females had higher levels of body fat percentage. There were no significant main effects from

physical activity on body fat, and no main effects from overtime on body fat as well. The moderation effect was not statistically significant as there were no significant R^2 changes from any of the models beyond the control variables, as summarized in Table 4. Thus, Hypothesis 1b was not supported.

A hierarchical linear model was used to determine whether overtime moderated the beneficial effect of physical activity on depression. The analysis yielded one predictor, namely, the direct effect of physical activity explained 5.7% of the variance in depression. For every unit increase in physical activity, there was an expected decrease of .12 ($p < .05$) on depressive symptoms. This resulted in a significant R^2 change improvement beyond the control variables ($F = 10.61, p < 0.01$). It is noteworthy that even though physical activity was the sole predictor in these models, the majority of the variance in depression was still unexplained. Neither the control variables nor overtime, nor the moderation contributed significantly to the variance explained (summarized in Table 5). Thus, Hypothesis 1c was not supported.

A hierarchical linear model was used to determine whether overtime moderated the beneficial effect of physical activity on burnout. Results revealed no significant contribution to the variance of burnout in any of the models. There was no significant incremental improvement in burnout from the effects of control variables, physical activity, overtime, or the moderation effect (summarized in Table 6). Therefore, Hypothesis 1d was not supported.

Healthy Eating

A hierarchical linear model was used to determine whether overtime moderated the beneficial effect of healthy eating on body fat composition. Results revealed two significant predictors, specifically, gender and healthy eating. Females had higher levels of body fat. For

every unit increase in healthy eating, there was a corresponding 1.78 unit decrease in body fat percentage. Combined, these two variables explained 31% of the variance in body fat (summarized in Table 7), as indicated by the significant change in R^2 ($F = 10.41, p < 0.01$). Neither the main effect of overtime nor the moderation effect predicted body fat composition, thus Hypothesis 2 was not supported.

A follow-up analysis on Hypothesis 2 was conducted by changing the dependent variable (body fat) for two other similar adiposity measures; body mass index (BMI) and waist circumference. Overtime emerged as a significant predictor of BMI, however, waist circumference and body fat composition retained no relationship with overtime. As might be expected, BMI was being strongly affected by fat-free muscle mass and physical strength—both of which had significant correlations with BMI. Not surprisingly, BMI has been described frequently as a poor measure of body fat in scholarly work because individuals who weigh more are not necessarily overweight for unhealthy reasons (Burkhauser & Cawley, 2008). This minor yet important follow-up point is one reason why the HITEC 2 study did not rely on BMI alone (Cherniack, et al. 2016). Given that 86% of participants for this study were relatively young ($M=40.5$) men, it is not surprising fat free muscle mass and physical strength contributed to higher BMI scores, and thus the BIA measure proved superior to BMI for this population.

Healthy Sleep Hygiene

A final hierarchical linear model was used to determine whether overtime moderated the beneficial effect of healthy sleep hygiene on job burnout. Results (summarized in Table 8) indicated that the direct effect of healthy sleep hygiene predicts burnout. For every unit increase in sleep hygiene, there was a corresponding .37 unit decrease in burnout; which explained about

12% of the variance in burnout. In addition, the interaction term resulted in a significant R^2 change ($F= 3.92, p < 0.049$) above and beyond the other models in the analysis, indicating that about 14% of the variance in burnout was predicted uniquely by the moderation effect of overtime after controlling for the direct effects of sleep hygiene and overtime.

This moderation effect is depicted in Figure 2 through simple slopes analysis. When a CO worked 1 overtime shift or less per week, there was a significant negative relationship between healthy sleep hygiene and burnout ($B = -.504, 95\% \text{ CI } [-.861, -.146], t = -2.56, p = .007$). When a CO worked between 1 to 2 overtime shifts per week, there was a significant negative relationship between healthy sleep hygiene and burnout ($B = -.435, 95\% \text{ CI } [-.643, -.227], t = -4.16, p < .001$). When a CO worked between 2 to 3 overtime shifts per week, there was a significant negative relationship between healthy sleep hygiene and burnout ($B = -.478, 95\% \text{ CI } [-.783, -.170], t = -3.13, p = .003$). However, when a CO worked 3 overtime shifts or more per week, there was a non-significant positive relationship between healthy sleep hygiene and burnout ($B = .175, 95\% \text{ CI } [-.385, .735], t = .686, p = .507$).

In sum, the results for Hypothesis 3 indicate that when a CO worked 3 overtime shifts or less per week, her sleep hygiene behaviors contributed to lower levels of burnout. However, this relationship was moderated when a CO worked more than 3 overtime shifts a week, indicating that increased levels of healthy sleep habits no longer resulted in less burnout. Thus, Hypothesis 3 was supported.

Discussion

Few empirical studies exist regarding the health of COs and aspects of their particular work conditions, despite their exceedingly poor health and decreased life expectancy. This

study sought to examine the effects of healthy behaviors on health outcomes for COs, and specifically, whether overtime hours moderated the beneficial effect of healthy behaviors on health outcomes. Through separate analyses, both the direct and moderation effects were examined for physical activity, healthy eating, and sleep hygiene, for the following outcomes: physical strength, body fat, burnout and depression.

The analyses revealed support for Hypothesis 3 in which the average overtime hours per week moderated the beneficial effect of healthy sleep hygiene on burnout. When COs work three overtime shifts or less in a week, healthy sleep behaviors predict less burnout, as would be expected. In contrast, when COs work more than three overtime shifts in a week, the beneficial effects of healthy sleep hygiene on burnout disappear. This finding is in line with what is predicted to occur by the Effort-Recovery Model (Meijman & Mulder, 1998). Workers who experience continued exposure to excessive overtime and are persistently in a state of incomplete recovery will very likely experience negative health-related effects that persist in spite of individual attempts to stay healthy.

The moderation effect described above provides evidence that increasing the number of overtime hours can diminish the benefits of healthy sleep hygiene, implicating inadequate recovery despite efforts to sleep well. This pattern of negative impacts is an example of an effort-recovery deficiency bind, in which the employee who works a lot of overtime is in a suboptimal state of recovery and consequently needs to exert compensatory effort to perform well at work, which then places higher need for recovery over what is likely to be an inadequate time period (Meijman & Mulder, 1998). And thus, one can ask, what is adequate recovery so that workers can avoid falling into an effort-recovery deficiency bind, and how can this be attained? In their Effort-Recovery Model, Meijman and Mulder (1998) recommend that, in

order to avoid negative health effects, recovery periods must be both quantitatively and qualitatively sufficient. This recommendation is based on the idea that, during recovery, no special demands are placed on the individual so that the physiological and psychological processes activated previously while expending effort will return to baseline levels. Therefore, it is possible in the present study that the COs who worked the most overtime were managing to get good quality sleep, but the number of hours spent sleeping was still insufficient for complete recovery.

While the Effort-Recovery model does not provide precise recommendations for attaining adequate recovery, research on shift work system design specifies actionable guidelines. For correctional facilities scheduling overtime shifts as described in this study, a minimum of 16 hours time off between shifts is recommended (Akerskedt, 2003). Although this may not be feasible in some cases, limiting overtime shifts to four hours instead of eight, and allowing the possibility for naps at least one half-hour in duration at work are two ways to enable proper recovery (Akerskedt, 2003). From a different perspective, Popkin and colleagues recommend that time the amount of time off between shifts should allow workers enough time to relax, socialize, sleep, and travel to and from work (Popkin, Howarth & Tepas, 2006). In essence, quick shift changeovers that only provide eight hours off, should be avoided whenever possible and only resorted to when absolutely necessary (Popkin et al., 2006). Furthermore, the amount of time off should increase in proportion to the number of additional consecutive work days and work hours (Popkin et al., 2006). This recommendation indicates that if time off stays consistent across workers (e.g. two days off) regardless of the amount of overtime they have worked, then those working overtime can be at risk of incomplete recovery. Requiring time off, of course, might be challenging in practice particularly for correctional facilities in which

workers can earn additional income above their base pay, and insufficient employee coverage could create dangerous circumstances.

Compensatory time off is a type of pay administration that states that employees can earn paid time off in lieu of overtime pay. The important trade off is that instead of receiving premium pay, for every one hour of overtime the employee receives one and a half hours of paid time off (State and Local Governments Under the Fair Labor Standards Act (FLSA), 2011). This practice only applies to state and local government employers, which would cover state correctional facilities. Still, compensatory time off is not mandatory, with the only limitation being that those in law enforcement, fire protection and emergency response accrue a limit of 480 hours of compensatory time off; an equivalent of 60 work days. Based on the findings of the interaction in this study, correctional facilities should seriously consider changing compensation for overtime from premium pay to compensatory time off for overtime work beyond three shifts (or 24 hours). However, this approach would also require sufficient staffing, and so compensatory time off would not be feasible for organizations in which overtime is being used to compensate for an understaffing problem – something that is unfortunately often the case in the corrections workplace.

Thus far, the findings in the present study suggest that overtime moderates the beneficial effect of sleep hygiene on burnout, which is consistent with an effort-recovery deficit being present, as predicted by the Effort-Recovery Model. Meijman and Mulder (1998) explain that these deficits represent negative load effects that eventually culminate in poor worker health, which can also be expected to lead to even more serious or chronic health issues. This is similar to how stress reactions can lead to burnout, which then is associated with other negative health outcomes. As mentioned previously, the Effort-Recovery Model posits that stressful reactions

from work demands are normal, and will “reverse” themselves to nonthreatening levels once recovery is complete. However, when reactions like accelerated heart rate, increased adrenaline levels, rumination and cynicism fail to “return to baseline,” over a long period of time these frequent negative load effects will accumulate and their consequences are less transitory, and can then become permanent impairments of health and wellbeing through physical and psychological changes (Meijman and Mulder, 1998). Similarly, burnout is a long-term stress reaction that gradually develops over time that can be described as an imbalance of job demands (too many) and job resources (too few) (Demerouti et. al, 2001; Schaufeli & Peeters, 2000).

Empirical support indicates that the two subscales of the OLBI measure used in this study, exhaustion and disengagement, align well with indicators of job demands and resources, respectively, as described in the Job Demands-Resources Model (JD-R) (Demerouti et. al, 2001), which shares some similarities with the Effort-Recovery Model. Specifically, job demands refer to those physical, psychological, social, or organizational aspects of the job that require sustained physical or psychological (cognitive and emotional) effort and are therefore associated with certain physiological and/or psychological costs. “Although job demands are not necessarily negative, they may turn into job stressors when meeting those demands requires high effort from which the employee has not adequately recovered” (p.312, Bakker & Demerouti, 2007). In the case of excessive demands and inadequate recovery, an employee can develop physiological and psychological exhaustion through sustained mental and physical efforts. Interestingly, Demerouti and colleagues (2001) describe this taxing dynamic as resulting from an individual’s compensatory strategies (e.g. narrowing of attention) for handling excessive demands, which in the long-term can lead to a state of exhaustion because these strategies drain the individual’s energy. This conceptualization is strikingly similar to Meijman

and Mulder's explanation on how physical and psychological load reactions are a normal process for individuals at work, and which would only become problematic in the case of continued demands and inadequate recovery (1998).

Furthermore, job resources refer to those physical, psychological, social and organizational aspects of the job that may do any of the following: (1) support the employee in achieving work goals, (2) reduce job demands and the associated physiological and psychological costs, or (3) stimulate personal growth, learning and development (Demerouti et al., 2001). Demerouti and colleagues explain that a lack of resources is associated with disengagement, or psychologically distancing oneself from work, because it doesn't allow the worker to constructively cope with job demands (2001).

Again, there is a noticeable similarity between Demerouti and colleagues' understanding of how sufficient job resources can reduce the negative effects of work demands, and the explanation provided by the Effort-Recovery Model that adequate recovery can prevent imminent negative load effects. The key difference, however, is that while there could be a lack of job resources, employees could also proactively develop their own personal resources, for instance, through skill development in order to improve their ability to manage job demands, and thereby avoid disengagement. Demerouti and colleagues base the rationale for this subscale of burnout on how individuals can stay healthy despite their encounter with high workloads (2001). Meijman and Mulder, conversely, describe a more passive approach to regaining one's capacity for work demands and this is through a period of recovery in which no special demands are placed on the individual (1998).

It is noteworthy that even though the Effort-Recovery Model was used as the main theoretical framework of this study, all hypotheses were modeled about an active attempt at

healthy behavior to recover despite the increasing demands of overtime, and the only supported Hypothesis (3) pertained to burnout. It is possible that proactive behaviors that build one's resources combined with a stressful work environment are more suitable for preventing burnout than other health outcomes. Specifically, the findings suggest that when it comes to avoiding burnout through long work hours, active attempts to build one's resources through healthy sleep habits are, indeed, successful as long as overtime does not exceed three shifts per week (or 24 hours).

Results from this study also showed support for the direct effect of: (1) physical activity on depression and (2) healthy eating on body fat, both of which yielded negative coefficients indicating that higher levels of the healthy behavior predicted lower levels of negative health outcomes, as would be expected. As discussed in the literature review, studies have found some support that fewer healthy behaviors or more unhealthy behaviors can explain why long work hours predict poor health and wellbeing. If this were the case, however, it would be expected that the data show that healthy behaviors change in accordance with overtime hours; and Table 2 shows no significant correlations between any of the healthy behaviors and overtime hours.

It is also notable that the expected beneficial relationships between healthy behaviors and health outcomes, which were tested as direct effects in Step 2 of the hierarchical models for Hypotheses 1b and 1d, were both trending toward significance at the $p < .1$ level. Even though the p -value set for this study is .05, the direction of these two trends, physical activity affecting (1) body fat and (2) burnout, yielded negative beta coefficients as would be expected; higher levels of physical activity were associated with lower levels of body fat and burnout. The combination of the two significant direct effects plus these two trend-level effects provides a pattern of results that suggest that physical activity and healthy eating are associated with better

health outcomes on body fat, depression and burnout, independent of the amount of overtime worked.

Implications

The finding that overtime moderates the beneficial effect of healthy sleep hygiene on burnout has important implications. First, this result implies that avoiding negative health outcomes is not the sole responsibility of the individual worker. Semmer (2006) describes that intervention studies aimed to reduce work stress are usually directed towards people rather than their work environment. Indeed, the ways in which either the availability or scheduling of overtime can be managed at an organizational level so as to be aligned with shift work recommendations, are rarely mentioned in the overtime literature. In other words, management in organizations could make efforts toward health protection and promotion at work by proactively avoiding work schedules that greatly challenge worker efforts to stay healthy and allow for proper rest and coverage (Dembe et al., 2005). This would be in line with integrated TWHTM interventions designed to support worker safety and health simultaneously (Schill & Chosewood, 2013).

As mentioned previously, currently there are no guidelines for limiting overtime hours or ways to schedule work that would ensure proper recovery after a period of excessive demand on its workers. Given the finding that overtime moderates the beneficial effect of healthy sleep hygiene on burnout, it is important to note that even if employees make concerted efforts to practice healthy sleep habits, they are likely to experience burnout due to excessive overtime hours in corrections settings. Moreover, because mental exhaustion is part of burnout, COs in particular cannot afford to work with decreased alertness given the threatening nature of their

job. It is in the best interest of all organizations to prevent workers from reaching a burnout state as it can lead to other and more severe health concerns. Studies of burnout indicate that it is a growing public health concern with considerable economic, social and psychological costs to employees and employers (Shirom, 2005). The consequences of burnout include absenteeism, intentions to turnover, increased use of pain medication, increased workers' compensation claims, depression and even cardiovascular diseases (Shirom, 2005).

Additionally, the findings of the direct effects of healthy behaviors on health outcomes imply that individual behaviors such as lifestyle and health habits do matter. Specifically, physical activity predicts less depression, and healthy eating predicts less body fat composition; regardless of the overtime worked. These unexpected findings imply that some healthy behaviors are independent of overtime hours. Even though these findings suggest that COs should try to maintain proper levels of physical activity and healthy eating, it is still important to consider what organizations can do to positively impact these employee behaviors, as described in the TWHTM approach previously (NIOSH, 2016). The Employee Assistance Program (EAP) responsible for health promotion at the two study sites was rarely accessed and its resources seldom used by COs because of its reputation to be a service only for those who are in desperate need of help. Therefore, even organizations with support systems in place to address challenges their employees face need to consider if those services are being utilized.

Furthermore, based on the findings of this study, integrated workplace programs that aim to improve employee TWHTM could be designed to simultaneously improve overtime practices and individual health behaviors. For example, an organization that aims to reduce worker fatigue can consider providing private nap rooms for individuals working the night shift or more than 12 consecutive hours. In addition, the organization can consider providing

workshops on healthy ways to relax after work that would facilitate one's recovery during time off.

Voluntary vs. Mandatory Overtime

A possible explanation for the lack of direct effects between overtime and health behaviors is that, in the period that the data were collected, overtime was relatively manageable because it was largely under the control of the employee. The data show that the majority of overtime performed during this time period was voluntary rather than mandatory. Concerning voluntary overtime, 13% of COs reported they worked no voluntary overtime in a typical week, with the remaining 87% working at least 1-8 hours of voluntary overtime per week. Concerning mandatory overtime, 47% of COs reported they worked no mandatory overtime in a typical week, with the remaining 53% working at least 1-8 hours of mandatory overtime per week. Based on this evidence of the period under study, it seems that COs opted to perform the amount of voluntary overtime hours they felt they could handle, and also were not unduly pressured to perform a lot of mandatory overtime in a typical week.

A landmark study investigating the different impacts of involuntary versus voluntary overtime found that worker fatigue and decreased job satisfaction were significantly associated with employees working overtime involuntarily. The effect was even more pronounced for involuntary overtime workers who received no rewards (i.e. compensatory time off or premium pay), or as the authors termed them, the "burnout risk group" (Beckers, van der Linden, Smulders, Kompier, Taris & Geurts, 2008). Conversely, employees working voluntary overtime with no rewards tended to have more favorable job characteristics and also scored higher on job satisfaction and lower on fatigue measures. Another study examined the

psychological effects of high versus low rewards (i.e. a single score showing high and low scores for: opportunities for promotion and increased job security) and overtime, with and without external pressures to work additional hours (Van Der Hulst & Geurts, 2001). This study found that involuntary overtime hours were predictive of a number of negative outcomes: work-family conflict, slow recovery, and emotional exhaustion. However, these findings were only true for involuntary overtime workers with low rewards. In addition, the combination of involuntary overtime, low rewards and high external pressure to work additional hours resulted in elevated risks of poor recovery, increased cynicism and negative work-family conflict. In relation to rewards, COs are non-exempt employees which means that they earn at least 50% more per hour than their hourly rate when they work overtime. It is possible that for this group of COs, working a couple of extra shifts a week provided more advantages (e.g. ability to pay off bills, afford purchases otherwise unaffordable) than disadvantages (e.g. higher risk of burnout, worse sleep quality). During the HITEC 2 study, some COs also considered the camaraderie they felt by being at work and around those who understood the unique stressors of being a CO as a distinct benefit of working overtime.

Another possible explanation for the lack of direct effects between overtime and health behaviors could be due to employee self-regulation of behavior. Behavioral cybernetic theory posits that human behavior is guided through execution of movement to control sensory feedback from the environment (Smith & Smith, 1987), and that sources of sensory feedback can be greatly influenced by design factors in the environment. In essence, it is possible that when amassing overtime hours COs receive sensory feedback from a variety of sources that promote self regulation. One source of feedback from overtime hours is fatigue, which then provokes compensatory or proactive behavior to control that feedback such as opting for time

off. Other sources of sensory feedback that COs could be receiving that would help them regulate overtime hours are: feelings of frustration from family and friends due to the CO being at work, a lack of personally fulfilling activities outside of work due to a lack of time or energy, a strong feeling about the need to avoid workaholism, and discomfort with the idea of becoming financially dependent on overtime income and then losing the ability to turn down overtime opportunities. Interaction with other COs during the HITEC 2 study provides another source of feedback that was reported to influence COs efforts to limit their overtime. Some COs openly expressed contempt toward overtime hours because of the increased amount of taxes that were deducted from their paychecks due to the additional income placing them into a higher tax bracket.

Study Strengths and Limitations

One strength of this study is that it provides empirical support for a behavioral model that can help explain certain negative health outcomes for COs, an employee group that is underrepresented in scholarly work despite their high health risks. Building on previous related research that has established the role of overtime in determining health outcomes, results reported in the current study show that overtime moderates the beneficial effect of healthy sleep hygiene on burnout. Results also show that physical activity predicts less depression, and healthy eating predicts less body fat. Another strength of this study is the dataset, which includes more than 200 COs' self-report data, objective physical assessments (administered by a study team member), and the continuous overtime hours data from six months prior to survey administration. These three forms of data collection address concerns about common method variance apparent in many self-report studies. In addition, most overtime studies rely on self-

report measures of overtime hours, which can compromise the level of accuracy in these estimates. Even objectively collected data has risks, particularly if the data are categorical such as when frequency counts are used to indicate the number of employees that worked 41-50 hours, and 51-60 hours. Hence, continuous overtime data offers more precision because it provides the exact amount of overtime for each participant. The overtime data used for this study were both objective and continuous, offering a superior measure in terms of accuracy and precision that is rare in overtime studies given the challenges involved in gaining access to these types of data.

Also, given the difficulty accessing this employee group as well as their limited availability, the availability of a comprehensive data for this study can be considered a milestone for occupational safety and health research in corrections. As such, this appears to be the first study to investigate whether the amount of overtime hours moderates the beneficial effects of healthy behaviors on health outcomes.

A study limitation is that this is a cross-sectional study, and that the dataset consisted only of COs who worked overtime. Therefore, there was no comparison group. Of more than 200 COs across both sites, only two people reported that they did not work any overtime hours, which was something verified in the continuous overtime data. These two individuals were removed from the dataset. In addition, although steps were taken to verify that all COs were working a fulltime schedule at that facility with no leave or transfers for the same period in which their overtime data was retrieved, this proved to be impossible to ascertain due to administrative restrictions. Finally, no data were collected on the capacity of the correctional facilities or whether the number of inmates was manageable due to the available space, for example.

It would be worthwhile in future research to address the same research hypotheses in a longitudinal design in order to make causal inferences, and possibly explore antecedents to healthy behaviors, such as perceived stress. Additionally, the number of female COs is far outnumbered by male COs in an already isolated and rarely studied population. Future research efforts ought to take special care to collect a proportional amount of female CO data. Also, corrections environments tend to have a lot of personnel flux, which tends to occur in phases. Understanding these changes in relation to external factors is complicated, and a period of orienting the researcher with the study population might be necessary in order to account for variables that initially seem unrelated to those who are not familiar with corrections.

Conclusions

This study sought to examine whether overtime hours could help explain the poor health and wellbeing outcomes that COs typically experience. In particular, this study investigated whether overtime moderated the beneficial effects of healthy behaviors on health outcomes. One important finding is that overtime can weaken the beneficial relationship between healthy sleep hygiene and burnout. The results also provided some evidence that the healthy behaviors of physical activity and healthy eating benefit health outcomes independent of overtime hours. However, the lack of direct relationships between overtime and health, as well as overtime and healthy behaviors, suggests that more research is needed to determine what factors contribute most to COs' poor health and wellbeing outcomes. Nonetheless, one general implication of the current findings is that organizations may need to consider adopting overtime scheduling practices that ensure adequate recovery for employees. In corrections, providing opportunities

for adequate recovery could reduce the likelihood of COs experiencing burnout due to falling into an effort-recovery deficiency bind.

Table 1
Means and Standard Deviations for Measures of Predictors and Outcomes

Measure	M	SD
Physical activity	(hours per week)	
1. Walking, including walking to work, shopping, and leisure time	2.89	1.28
2. Gardening, yard work, and do-it-yourself activities at home	2.88	1.26
3. Housework, such as cleaning, washing, cooking, child care, etc.	3.26	1.39
4. Physical exercise such as fitness, aerobics, swimming, jogging, cycling, tennis, etc.	2.69	1.30
Healthy eating	(days per week)	
1. Keep track of the calories you eat	1.57	1.11
2. Get at least 30 minutes of exercise or physical activity	2.65	1.15
3. Eat at least five servings of fruits or vegetables	2.60	1.06
4. Eat whole grain breads or cereals	2.67	1.23
5. Have three servings of milk, yogurt, or cheese	3.02	1.19
Sleep hygiene	(good to poor)	
1. How would you describe the quality of your sleep on a typical night?	3.48	1.04
Depressive symptoms	(rarely to all the time)	
1. I was bothered by things that usually don't bother me	1.54	.76
2. I had trouble keeping my mind on what I was doing	1.57	.70
3. I felt depressed	1.32	.63
4. I felt that everything I did was an effort	1.65	.79
5. I felt hopeful about the future (<i>reverse scored</i>)	2.31	1.13
6. I felt fearful	1.23	.52
7. My sleep was restless	2.09	1
8. I felt happy (<i>reverse scored</i>)	1.98	.86
9. I felt lonely	1.33	.67
10. I could not 'get going'	1.68	.8
Burnout	(strongly disagree to strongly agree)	
1. More and more often I talk about my work in a negative way	4	1.59
2. Sometimes I feel really disgusted with my work	3.9	1.6
3. After work, I have enough energy for leisure activities (<i>reverse scored</i>)	3.74	1.46
4. At work, I often feel emotionally drained	3.83	1.56
5. After work, I usually feel worn out and weary	4.19	1.53

Table 2
Means, Standard Deviations, and Zero-Order Correlations

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	11
1. Age	40.53	8.75	(*)									
2. Gender	.86	.35	-.03	(*)								
3. Physical activity	2.93	.95	-.14*	-.08	(.69)							
4. Healthy Eating	2.50	.81	.02	-.03	.34**	(.74)						
5. Sleep Hygiene	3.48	1.04	.16*	-.04	.15*	.17**	(*)					
6. Depression	1.67	.48	-.02	-.05	-.24**	-.31**	-.41**	(.76)				
7. Burnout	3.92	1.17	-.01	-.07	-.16*	-.18**	-.37**	.54**	(.78)			
8. Hand grip strength	52.56	11.11	-.15*	.59**	.06	-.003	.03	-.12	-.07	(*)		
9. Body fat percentage	25.50	7.12	.03	-.49**	-.19**	-.20**	-.08	.20**	.17*	.37**	(*)	
10. Overtime Hours	14	7.1	.16*	-.02	-.07	-.08	.03	.02	.008	-.08	.10	(*)

* $p < .05$ ** $p < .001$

Note: The coefficients in parentheses are Chronbach's alpha for each scale.

The (*) denotes an unavailable Chronbach's alpha coefficient because the measure consists of a single item.

Table 3
Hierarchical Regression for Predictors of Physical Strength

Variable	Model 1		Model 2		Model 3		Model 4	
	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>
Age	-.195*	.080	-.192*	.080	-.184*	.081	-.185*	.082
(95% CI)	(-.352, -.038)		(-.350, -.034)		(-.344, -.023)		(-.346, -.023)	
Gender	19.37**	1.97	19.42**	1.99	19.38**	1.99	19.4*	2.0
(95% CI)	(15.47, 23.26)		(15.50, 23.34)		(15.45, 23.31)		(15.45, 23.35)	
Physical Activity			.258	.719	.220	.723	.224	.725
(95% CI)			(-1.16, 1.68)		(-1.21, 1.65)		(-1.21, 1.65)	
Overtime					-.057	.093	-.061	.096
(95% CI)					(-.242, .127)		(-.252, .129)	
Phys Act x Ovrtn							-.019	.103
(95% CI)							(-.223, .185)	
R^2		.375		.376		.377		.377
R^2 change		.375*		.000		.001		.000

Note: *Physical Activity* and *Overtime* were centered at their means.

** $p < .01$ * $p < .05$

Table 4
Hierarchical Regression for Predictors of Body Fat

Variable	Model 1		Model 2		Model 3		Model 4	
	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>
Age	.013	.055	.024	.055	.013	.056	.014	.056
(95% CI)	(-.078, .141)		(-.085, .133)		(-.097, .124)		(-.097, .125)	
Gender	-10.74*	1.37	-10.94*	1.36	-10.88*	1.36	-10.90*	1.37
(95% CI)	(-13.44, -8.04)		(-13.63, -8.24)		(-13.57, -8.18)		(-13.60, -8.20)	
Physical Activity			-.88 [†]	.50	-.83 [†]	.50	-.84 [†]	.50
(95% CI)			(-1.85, .098)		(-1.81, .148)		(-1.82, .146)	
Overtime					.071	.064	.076	.066
(95% CI)					(-.055, .197)		(-.055, .206)	
Phys Act x Ovrtn							.022	.071
(95% CI)							(-.118, .162)	
<i>R</i> ²		.268		.281		.286		.287
<i>R</i> ² change		.268*		.013 [†]		.005		.000

Note: *Physical Activity* and *Overtime* were centered at their means.

***p* < .01 **p* < .05 [†]*p* < .1

Table 5
Hierarchical Regression for Predictors of Depressive Symptoms

Variable	Model 1		Model 2		Model 3		Model 4	
	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>
Age	-.001	.004	-.003	.004	-.003	.004	-.002	.004
(95% CI)	(-.009, .007)		(-.010, .005)		(-.010, .005)		(-.010, .005)	
Gender	-.088	.100	-.118	.098	-.118	.099	-.124	.099
(95% CI)	(-.286, .110)		(-.312, .076)		(-.313, .077)		(-.313, .077)	
Physical Activity			-.116*	.036	-.116*	.036	-.117*	.036
(95% CI)			(-.186, -.046)		(-.186, -.046)		(-.186, -.046)	
Overtime					.000	.005	.000	.005
(95% CI)					(-.010, .009)		(-.010, .009)	
Phys Act x Ovrtn							.004	.005
(95% CI)							(-.006, .015)	
R^2		.004		.057		.057		.060
R^2 change		.004		.052*		.000		.003

Note: *Physical Activity* and *Overtime* were centered at their means.

** $p < .01$ * $p < .05$ † $p < .1$

Table 6
Hierarchical Regression for Predictors of Burnout

Variable	Model 1		Model 2		Model 3		Model 4	
	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>
Age	-.008	.010	-.010	.010	-.010	.010	-.009	.010
(95% CI)	(-.027, .011)		(-.029, .009)		(-.030, .009)		(-.029, .010)	
Gender	-.300	.250	-.345	.250	-.345	.251	-.362	.251
(95% CI)	(-.794, .194)		(-.838, .148)		(-.839, .149)		(-.858, .134)	
Physical Activity			-.171 [†]	.090	-.170 [†]	.090	-.175 [†]	.090
(95% CI)			(-.348, .006)		(-.348, .008)		(-.352, .003)	
Overtime					.002	.012	.005	.012
(95% CI)					(-.021, .025)		(-.019, .028)	
Phys Act x Ovrtn							.013	.013
(95% CI)							(-.014, .039)	
R^2		.011		.029		.029		.034
R^2 change		.011		.018 [†]		.000		.005

Note: *Physical Activity* and *Overtime* were centered at their means.

** $p < .01$ * $p < .05$ [†] $p < .1$

Table 7
Hierarchical Regression for Predictors of Body Fat

Variable	Model 1		Model 2		Model 3		Model 4	
	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>
Age	.031	.055	.036	.054	.027	.055	.026	.055
(95% CI)	(-.078, .141)		(-.071, .142)		(-.081, .135)		(-.083, .135)	
Gender	-10.74*	1.37	-11.03*	1.34	-10.99*	1.34	-11.00*	1.34
(95% CI)	(-13.44, -8.04)		(-13.67, -8.04)		(-13.63, -8.35)		(-13.65, -8.36)	
Healthy Eating			-1.78*	.551	-1.72*	.556	-1.73*	.557
(95% CI)			(-2.87, -.690)		(-2.81, -.619)		(-2.83, -.632)	
Overtime					.056	.063	.065	.065
(95% CI)					(-.069, .180)		(-.064, .193)	
Hlthy Eat x Ovrtn							.046	.080
(95% CI)							(-.111, .203)	
R^2		.268		.310		.314		.315
R^2 change		.268*		.043*		.003		.001

Note: *Physical Activity* and *Overtime* were centered at their means.

** $p < .01$ * $p < .05$ † $p < .1$

Table 8
Hierarchical Regression for Predictors of Burnout

Variable	Model 1		Model 2		Model 3		Model 4	
	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>
Age	-.008	.010	.000	.009	-.001	.009	-.001	.009
(95% CI)	(-.027, .011)		(-.019, .018)		(-.020, .018)		(-.018, .019)	
Gender	-.300	.250	-.259	.237	-.259	.238	-.237	.236
(95% CI)	(-.794, .194)		(-.726, .209)		(-.728, .210)		(-.702, .229)	
Sleep Hygiene			-.373*	.077	-.375*	.077	-.374*	.076
(95% CI)			(-.524, -.222)		(-.526, -.223)		(-.524, -.223)	
Overtime					.005	.011	.008	.011
(95% CI)					(-.017, .027)		(-.014, .030)	
Sleep Hyg x Ovrtn							.022*	.011
(95% CI)							(.000, .044)	
R^2		.011		.119		.120		.138
R^2 change		.011		.109*		.001		.018*

Note: *Physical Activity* and *Overtime* were centered at their means.

** $p < .01$ * $p < .05$ † $p < .1$

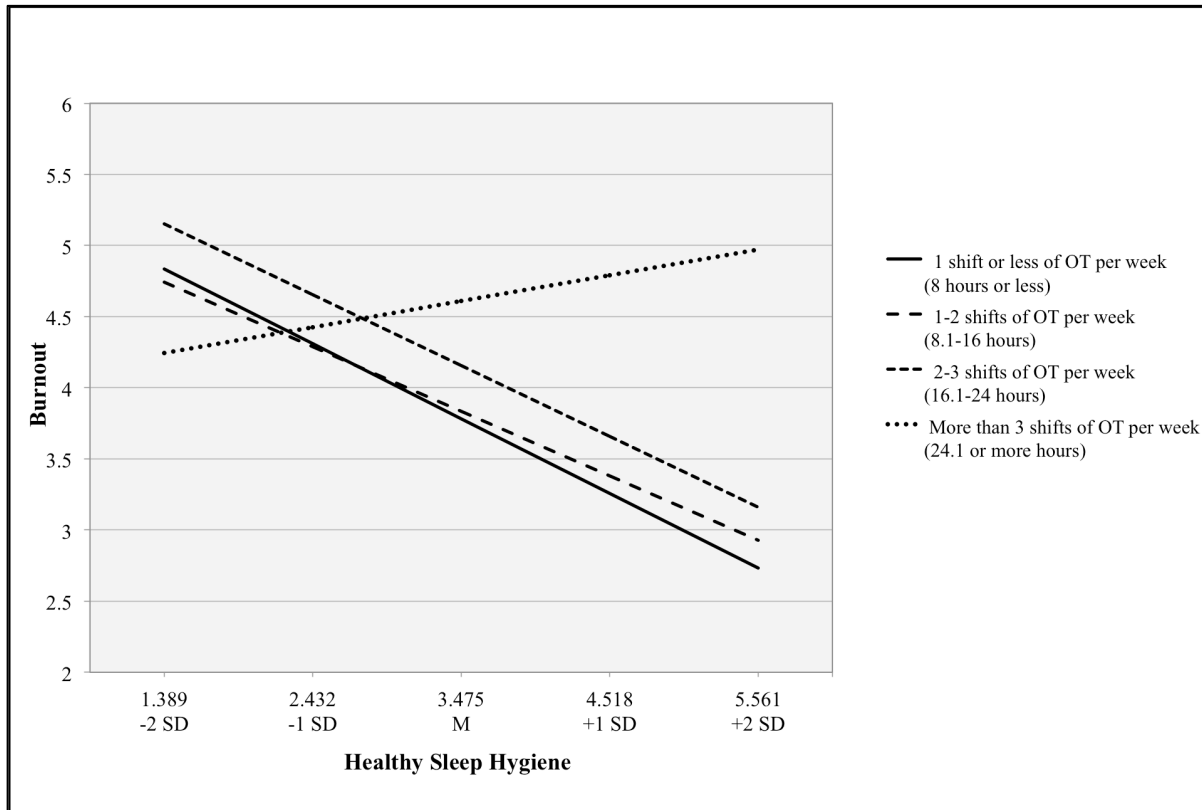


Figure 2. Regression of healthy sleep hygiene on burnout at four levels of overtime. Simple slopes equations are for uncentered data.

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