



2012

# Environmental stress in the correctional workplace

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# **Environmental Stress in the Correctional Workplace**

By

Jeff Brummel

Accepted in Partial Completion  
Of the Requirements for the Degree  
Master of Arts

Moheb A. Ghali, Dean of the Graduate School

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## **MASTER'S THESIS**

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Jeff Brummel

February 17, 2012

# **Environmental Stress in the Correctional Workplace**

A Thesis  
Presented to  
The Faculty of  
Western Washington University

In Partial Fulfillment  
Of the Requirements for the Degree  
Master of Arts

by  
Jeff Brummel  
February 2012

## **Abstract**

Experiencing stress in the work environment is common for most occupations, and some occupations experience more work-related stress than others. Environmental factors including lighting, temperature, air quality and noise, can affect workers' stress levels in subtle ways often overlooked during typical work-related stress evaluations. The present study examines the relationship between these environmental factors and their effects on the stress levels of corrections officers. Survey respondents (N=45) evaluated two correctional facilities in the Pacific Northwest for environmental quality and the incidence of Sick Building Syndrome (SBS) symptoms such as headache, fatigue, nausea, lethargy and other health-related issues. Baseline environmental measurements and facility environmental standards were compared with survey results to evaluate officers' experience of stress from the workplace environment. Results indicate that environmental factors may affect officers' stress levels and their experience of SBS symptoms to a greater degree than is currently discussed in the literature. Future studies should attempt to further refine these relationships, as a better understanding of them will help correctional administrators decrease workplace stress, absenteeism and attrition.

## **Acknowledgements**

I wish to express my appreciation to the following people for their assistance in completing this thesis: Viva Barnes, Phil Everson, Michael Grimes, Joyce D. Hammond, Wendy Jones, Joan C. Stevenson, and the Whatcom County Corrections Officers.

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## **Chapter 1: Introduction**

Experiencing stress in the work environment is common for most occupations, and some occupations experience more work-related stress than others. Schaufeli and Peeters (2000) define job stress as the interaction between an individual and his/her work environment. Johnson et al. (2005) note five main sources of stress which can occur in the work environment: built-in stressors within a job, an employee's positional ranking in a given organization, an employee's level of career achievement, coworker interaction and the specifics of how an organization is structured. Additionally, stress can result from the demands of project deadlines, pressure from management, and from interacting with the physical environment. Burge (2004) notes that there is an association between the physical work setting and the physical and psychological symptoms experienced by workers. Lethargy, fatigue, headache and nausea among others can cause job stress to increase and job satisfaction to decrease. Prolonged exposure to stressors can have a negative impact on both physical and mental health, and may result in heart disease, anxiety, depression and other health-related maladies (Brightman and Moss 2001; Burge 2004; Clements-Croome and Baizhan 2000; Johnson et al.. 2005; Lahtinen et al.. 2004; Lahtinen et al. 2002; McCraty et al. 2009; Mendelson et al. 2000; Paoline et al. 2006; Schaufeli and Peeters 2000; Schell and Denham 2003; Thorn 2000; Wargocki et al. 2002).

Work related stressors can be confounded by the level of emotional response required by a given occupation. Additionally, individual responses to stress vary and

include mediating genetic components (Gunnar and Quevedo 2007; Majewska 2002). Occupations lie on a continuum in relation to the level of emotional response they require, and too much stress can lead to depersonalization and negative self-evaluation known as emotional burnout (Lachterman and Meir 2004; Mikkelsen et al. 2000; Nikolaou and Tsaousis 2002; Schaubroeck and Merritt 1997; Schaufeli and Peeters 2000; Tewksbury and Higgins 2006; Van Vegchel et al. 2005; Westman 2001). Stress can also cause imbalances in one's personal life and can affect the amount of satisfaction felt in relation to both personal and professional goals (Finn 2000). It is difficult to make generalizations, however, about the negative impacts induced by a given occupation because individuals respond and adapt uniquely to given stressors.

The inmate correction aspect of law enforcement is a uniquely stressful occupation. Corrections Officers book, release and transfer approximately 13 million offenders every year with roughly 800,000 inmates housed in jail facilities at any given moment (Bureau of Labor Statistics 2010-11 Edition). The demands of correctional work and the utilitarian work environment of a jail facility increase an officer's exposure to a variety of stressors, including emotional overload, conflicting role expectations and little say about how they respond to the demands of the job, among others (Finn 2000; Morgan 2009; Paoline et al. 2006; Perrewe and Ganster 1989; Schaufeli and Peeters 2000). These stressors can cause anxiety, depression and job dissatisfaction which can lead to additional health problems including alcohol and drug abuse.

The objective of a correctional institution is to physically limit the movement of inmates with little consideration for creating a comfortable place for the inmates or correctional staff (Dilani 2008). The drab, no-frills environment has a strictly utilitarian function which does not afford much in the way of individual comfort. This can add to the stress levels of both prisoners and staff by creating a psychologically isolating environment devoid of mental stimulation (Nurse et al. 2003). When coupled with the perception of the lack of administrative support, the mental and physical negative impacts on the health of prisoners and staff can be doubly detrimental.

There have been considerable changes in the correctional setting in recent years, both in the makeup of prison inmate populations as well as in the demands placed on the correctional officers who watch over them. The days of the key-toting, tough-talking prison guard have been replaced with the modern, situationally adaptive correctional officer whose job now encompasses both keeping order and providing care (Dilani 2008). Policies have been reworked to reflect the current demands of corrections, and incoming officers are expected to toe the line of professionalism in terms of knowledge, skill and efficacy. Changes in the correctional setting have had many positive results such as improvements in pay and benefits for officers. The increase in job demands, however, have also created significant increases in work load and stress levels, as well as required adherence to laws and procedures.

The impetus for the present study stems from the year I worked as a corrections officer in the early 2000s. I experienced relatively little stress that could be attributed to interacting with the inmates, which I assumed would be the most significant stressor in the correctional workplace. The organizational hierarchy and coworker relationships were not a significant problem for me either. Most of the stress I experienced reflected my interaction with the physical environment. I began to get regular headaches and clogged sinuses soon after being hired. The unrelenting headaches were devastating but would lessen after leaving work. My assumption was that relaxing after work was responsible for their diminished presence. However, the headaches returned within approximately 30 minutes of being inside the jail which was well before any contact with inmates or fellow officers. I started to study the environmental conditions inside the jail to try to understand my ailments. The lighting was mostly artificial, the temperature varied from one area to another; and the odors in the air were often stagnant and unpleasant. Noise levels varied in ways that could not be anticipated. This unpredictability was most apparent when one officer would need to go through a locked door which was operated by another officer in the control booth. The time between requesting a door to be unlocked and the moment the door was actually unlocked varied and the noise created by the activation of the lock and the slamming of the door to relock it was much louder than ambient noise levels. These little noise shocks were unpleasant and also likely contributed to the stressors of this job. Thus I concluded that my ailments were likely to be at least partially due to the physical

discomforts of the job. This conclusion provided the stimulus to learn more and to find ways to improve conditions for future correction officers.

The theoretical framework for my research is based on Edward O. Wilson's (1984) Biophilia hypothesis. Biophilia, which literally translates as "life affinity", is the notion that humans have an innate attraction to nature and living things. Wilson argues that biophilia is partially genetic and partially cultural in nature because of hominid biocultural co-evolution. Biophilia is a blend of "learning rules", a biocentric collection of evolutionarily-derived behaviors based on learned positive/approach and negative/avoidance stimuli (Ulrich 1993). Examples of positive associations inherited from our primate ancestors, as discussed by Ulrich, include fruit, berries, still or slow moving water, and open savannah-like areas. Recognizing each afforded evolutionary advantages (food, water, safety through visual proximity). Examples of negative associations discussed by Ulrich include snakes, spiders, fast moving water, and closed in areas. Failing to recognize each had the potential to be harmful or fatal. Individuals who were better able to learn and remember what was beneficial and what was harmful in their environment survived and passed along that knowledge to their offspring.

The significance of the evolutionary processes that have helped shape human interactions with their environment in relation to present day buildings is that aversive conditions/stimuli are more evident in artificial settings, particularly in poorly lit and highly compartmentalized buildings such as jails. Ulrich (1993) speculates that our hominid ancestors developed learning rules that equated shadows and

closed-in spaces with increased danger because predators are less likely to be detected if they have access to hiding places. This assumption is based on the functional evolutionary perspective of risk versus reward regarding spaciousness in the natural environment. Learning to be cautious of dark, closed in spaces would have been beneficial for survival so long as the learned caution was not so strong as to be maladaptive. Moderately cautious behavior in response to dark, confined spaces would have afforded our hominid ancestors the ability to temper the risk of exploration with the potential reward of discovering new food sources or safe habitats.

The modern built environment is akin to the heavily forested environment where danger could be waiting just out of sight. Psychologically, although buildings afford a measure of safety against dangers like crime and inclement weather, they also create the potential for anxiety due to their dark corners and lack of escape routes. The correctional workplace combines the built-environment anxiety discussed above with the known threat of danger from inmates which may also contribute to increased stress among corrections officers but will not be addressed in this thesis.

This thesis will detail the negative relationship that exists between the collective environmental conditions of lighting, temperature, noise level and air quality, and the correctional workplace at two correctional facilities (the Main Jail and the Work Center) in a Pacific Northwest college town. Both facilities are operated by the same county government. One facility is approximately 27 years old; the other is

approximately 10 years old. Comparing the two facilities provides contrasting environmental conditions which affect corrections officers who work at both facilities. I will begin with a synopsis of the correctional setting as a workplace and a description of Sick Building Syndrome, followed by an overview of the environmental conditions found in the correctional workplace. I will describe my data collection methods and detail the results I obtained, and finally I will discuss my findings in the context of the available literature. I will conclude with a brief discussion of my study's implications and the direction future studies may take to further the knowledge base of correctional workplace environmental conditions in relation to stress.

## **Chapter 2: Stress in the Correctional System**

To date, the studies of correctional officer stress have focused mainly on job demands and the level of control that officers have in the performance of their duties (Dowden and Tellier 2004; Lambert et al. 2006; Lambert et al. 2002; Paoline et al. 2006; Schaufeli and Peeters 2000; Tewksbury and Higgins 2006; Finn 2000). Other notable sources of correctional officer stress include interactions and conflicts with fellow officers, the threat of violence from inmates and inmate manipulation, a negative public image of correctional work, and a perceived lack of administrative support among others (Finn 2000; McCraty et al. 2009; Morgan 2009). Job dissatisfaction due to workplace stress is among the highest complaints by correctional officers (Schaufeli and Peeters 2000; Finn 2000). Their experiences with alienation and occupational monotony leave many correctional officers feeling powerless and cynical. The demands of correctional work require that officers perform a wide variety of tasks with varying levels of authority, including enforcer, janitor, counselor, waiter and other personas (Schaufeli and Peeters 2000). The notion among correctional officers that they are merely paid prisoners is a common sentiment, resulting from a perceived lack of efficacy in the performance of their jobs.

Correctional officers are at risk for job burnout, which is defined as psychological and emotional exhaustion, a reduced sense of personal accomplishment and a negative or detached response to both inmates and fellow officers (Finn 2000; Mikkelsen et al. 2000; Schaufeli and Peeters 2000). Burnout is



a process that affects correctional officers in different ways and at different points in their careers, and symptoms can be experienced both acutely and chronically.

Officers often cope with burnout symptoms by psychologically distancing themselves from their work environment, which is an ineffective solution because it weakens their relationships with their fellow officers (Finn 2000; Schaufeli and Peeters 2000; Tewksbury and Higgins 2006). Weakened interpersonal relationships, and a lack of reliance on coworkers as backup, can then lead to low efficacy and a heightened danger potential for all correctional staff (Finn 2000; Paoline et al. 2006).

Workplace stress and job burnout in the correctional setting leads to high turnover rates (Finn 2000; Paoline et al. 2006; Schaufeli and Peeters 2000; Tewksbury and Higgins 2006). In the United States, correctional officers have a turnover rate of between 12% and 38% annually, with most correctional officers leaving their jobs within the first six months of employment (Schaufeli and Peeters 2000; Tewksbury and Higgins 2006). Frequent attrition increases the stress felt by those officers remaining on the job because of continual understaffing and administrative pressure to do the same work with less help. High turnover rates increase overtime, increase the use of sick days, and decrease morale (Finn 2000).

Stress in the correctional workplace also contributes to officers experiencing notably higher rates of psychosomatic and physical disorders (Dilani 2008; McCraty et al. 2009; Paoline et al. 2006; Schaufeli and Peeters 2000). Schaufeli and Peeters (2000) note that 17% of correctional officers have visited their physicians for hypertension, versus 10% of police officers, and 3.5% of correctional officers have

suffered from heart disease, versus 1.4% of police officers. A recent study discussed by McCraty et al. (2009) highlights a significant association of workplace stress and cardiovascular disease: 32% of the effect of workplace stress has a direct relationship to health-related decisions and on the incidence of the metabolic syndrome, which is a group of medical disorders that lead to increased risk for cardiovascular disease and diabetes.

In an effort to address correctional officer stress, the U. S. Department of Justice created a publication for correctional administrators to help develop site-specific stress prevention and reduction programs (Finn 2000). The publication highlights several existing programs as case studies and discusses techniques including counseling, incident debriefing, training, and supporting families of correctional officers, among other methods. Initiating and maintaining stress prevention and reduction programs for correctional officers is important for several reasons beyond the primary goal of keeping correctional staff healthy. These include financial stewardship to reduce overtime and health benefit costs, increasing job performance and workplace safety, and improving relations with employee unions and with employees directly.

More recently, the Institute of HeartMath in Boulder, CO, has developed a stress reduction program called the Power to Change Performance, which uses emotion-focused methods to decrease the negative effects of stress, increase the positive effects of self regulation, and improve health and cognitive performance (McCraty et al. 2009). Based on clinical research, Power to Change Performance

techniques are specifically shown to have a positive effect on stress hormone levels and immune system activity, as well as lessening sympathetic nervous system stimulation and improving parasympathetic nervous system stimulation.

Additionally, Power to Change Performance methods are shown to improve job performance, communication, goal orientation and job satisfaction, and lessen the rate of employee turnover.

### **Chapter 3: The Physiology of Stress**

Effectively addressing correctional officer stress can only be accomplished by understanding the causes of stress and their effects on health. Occasional exposure to acute stress is part of everyday life, and as a part of the maintenance of homeostasis acute stress can be beneficial for normal physiological function (Gunnar and Quevedo 2007; Kudielka and Kirschbaum 2005; Tsigos and Chrousos 2002). Chronic stress exposure, however, has deleterious effects on the body and can lead to dysregulation of the hypothalamic-pituitary-adrenal (HPA) and sympathetic-adrenomedullary (SAM) axes and cause physical and psychosomatic disorders.

Physical and emotional stressors trigger the activation of the SAM and HPA systems, which work to ensure an organism's survival by diverting energy to the central nervous system, muscles, and other areas of the body, to facilitate behavioral and physical changes (Chrousos 2000; Greenberg 2002; Gunnar and Quevedo 2007; Jameison and Dinan 2001; Kudielka and Kirschbaum 2005; Majewska 2002; Majzoub 2006; O'Connor et al. 2000; Pacak and Palkovits 2001; Tsigos and Chrousos 2002, 1994). The SAM system is part of the autonomic nervous system (ANS) and during stressful events the SAM system releases the catecholamines epinephrine (E) and norepinephrine (NE) which increases metabolism and facilitates the classic fight or flight reaction (Chrousos 2000; Goldstein 2010; Greenberg 2002; Gunnar and Quevedo 2007; Jameison and Dinan 2001; Majewska 2002; O'Connor et al. 2000; Tsigos and Chrousos 2002; Yehuda

and Giller et al. 1991a). E and NE increase heart rate and cardiac output, cause vasodilation in muscle tissue and vasoconstriction in the skin, digestive tract and other organs, and stimulate hepatic glycogenolysis to increase the amount of glucose available in the bloodstream. Additionally, NE is released in the brain from the Locus Coeruleus which increases arousal and awareness.

In response to stressors, the HPA system releases glucocorticoids (GC) including corticotrophin releasing hormone (CRH) and arginine vasopressin (AVP) from the adrenal cortex, and adrenocorticotrophic hormone (ACTH) from the pituitary (Greenberg 2002; Gunnar and Quevedo 2007; Jameison and Dinan 2001; Kudielka and Krischbaum 2005; Majewska 2002; O'Connor et al. 2000; Tellam et al. 2000). The HPA also releases aldosterone, a mineralocorticoid (MC), to help regulate the balance of sodium and potassium (Greenberg 2002). GC helps E and NE to perform optimally by interfacing with two kinds of receptors inside cells: mineralocorticoid receptors (MR) and glucocorticoid receptors (GR) (Gunnar and Quevedo 2007). The interface of GC with MR is particularly critical in sustaining both the HPA system and blood pressure. In the body, GC interface with GR readily but are inhibited from interfacing with MR because of the presence of the enzyme 11-beta hydroxysteroid dehydrogenase (11 $\beta$ -HSD). In the brain however, 11 $\beta$ -HSD is minimally present which allows GC to interface readily with MR as well as GR.

Physical ailments as a result of chronic stress can range from inflammatory reactions including asthma (Buske-Kirschbaum et al. 2010), rheumatoid arthritis (O'Connor et al. 2000) and psoriasis (Evers et al. 2010), to the metabolic syndrome

(Chrousos 2000; Moller-Leimkuhler 2010) which is a group of medical disorders that lead to increased risk for cardiovascular disease and diabetes. Psychosomatic disorders as a result of chronic stress can range from attention deficit hyperactivity disorder and antisocial personality disorder (Majewska 2002) to obsessive-compulsive disorder and panic anxiety (Tsigos and Chrousos 1994), depression (Haddad 2004; O'Connor et al. 2000; Yehuda and Giller et al. 1991a) and posttraumatic stress disorder (Pace and Heim 2011; Yehuda and Giller et al. 1991a; Yehuda and Lowy et al. 1991b). Additionally, chronic stress can increase the risk for substance abuse and dependence (Haddad 2004; Majewska 2002; Tsigos and Chrousos 1994), eating disorders (Haddad 2004; Tsigos and Chrousos 1994) and suicide (McGirr et al. 2010). Chronic stress can also adversely affect memory, cognitive function (Jameison and Dinan 2001; Majzoub 2006; Tellam et al. 2000) and disrupt sleep, which can exacerbate HPA axis dysregulation as well as physical and psychosomatic problems (Buckley and Schatzberg 2005). Early evidence in the literature suggested that men are at greater risk for cardiovascular disease and women are at greater risk for psychosomatic and inflammatory disorders (Kudielka and Kirschbaum 2005). Recent studies suggest that women's risk for cardiovascular disease may outweigh men's (Moller-Leimkuhler 2010).

## **Chapter 4: The Correctional Environment and Sick Building Syndrome**

A correctional facility is essentially an enclosed, self-contained ecosystem, where the lighting, temperature, noise level and air quality make up the environmental microclimate of the facility. Subtle variations in the microclimate between the individual areas of the facility interact with and affect each other (Nurse et al. 2003). Because of this, the correctional setting is an ideal location for studying how air quality, noise, temperature and lighting affect physical and mental health, and for showing the significance of sick building syndrome as a major industrial health concern. Sick building syndrome (SBS) is the term applied to the negative health impacts caused by the physical environment in artificial settings and is a workplace stressor (Burge 2004; Hansen et al. 2008; Lahtinen et al. 2002; Lahtinen et al. 2004; Marshall et al. 2002; Mendelson et al. 2000; Spengler et al. 2001a; Thorn 2000). SBS is a multifaceted issue, and includes consideration of microbiologic, chemical, physical and psychological mechanisms all of which likely have different impacts on different individuals. SBS can include a variety of non-specific symptoms which often affect the respiratory tract and skin, and which can include headaches, fatigue, concentration impairment and nausea among others. Burge (2004) and Thorn (2000) note that there are a multitude of factors that can contribute to the experience of sick building syndrome, including off-gassing from volatile organic compounds (VOCs), as well as the quality of ambient lighting and the adequacy of ventilation among others. Burge (2004) also identified the connection between physical and psychological symptoms, which suggest that the

skeptical notion that perceived environmental conditions can't make a person sick, are incorrect. He notes that while lethargy is a psychological symptom experienced by an affected person, lethargy is not excluded from having an organic etiology.

### **Environmental Factors: Air Quality**

Air quality is a highly complex issue referring to the perceived cleanliness of the air in a given location, and understanding the perceived qualities requires a multidisciplinary approach utilizing both objective and subjective measurements. The indoor environment, and in particular indoor air quality, is closely tied with the outdoor environment because of building ventilation requirements (Breen et al., 2010; MacIntosh et al. 2010; Meng et al. 2005; Polidori et al. 2006; Spengler et al. 2001b; Weisel et al. 2005). This is an especially salient point in urban environments where outdoor air quality is poor due to pollution (Mendelson et al. 2000; Schell and Denham 2003; Spengler et al. 2001a; Wargocki et al. 2002). Schell and Denham (2003) note that the relationship between air pollution and reduced pulmonary function is observed even in urban areas which do not exceed air quality standards. It is estimated that chronic exposure to air pollution can shorten one's life expectancy by as much as two years.

Ventilation can occur naturally by opening windows, as well as mechanically through heating, ventilation and air conditioning (HVAC) systems. The purpose of ventilation is to create an environment beneficial to the health, productivity and comfort of building occupants, though its use can be a double edged sword. Ventilation dilutes ambient airborne substances making occupied spaces healthier,



more comfortable and more conducive to productivity, while simultaneously exposing building occupants to a wide variety of other harmful airborne substances (Bearg 2001; Spengler et al. 2001b). The use of air conditioning is associated with an increase in SBS, because of the use of humidifiers to control the moisture level (Mendell et al. 2008; Spengler et al. 2001b). Humidifiers used in conjunction with an HVAC system provide an environment well-suited for microbes to flourish. Biocides are used to help minimize the infestation of microbes, though the use of biocides increases exposure to chemicals such as isothiazolinones, glutaraldehyde and chlorhexidine, which are allergens that contribute to SBS (Zuraimi 2010). Increased ventilation rates above 10 liters/second/person are associated with a decrease in Sick Building Syndrome symptoms (Burge 2004; Spengler et al. 2001a; Wargocki et al. 2002).

### **Environmental Factors: Temperature**

The physiological, behavioral and cognitive effects that result from exposure to air quality are tied to other environmental factors such as temperature (Lan et al. In Press; Mendell and Mirer 2009). Gomez et al. (2002) and Mendell and Mirer (2009) note that environments with significant thermal ranges have adverse effects on physical health, and that elevated temperature environments in particular increase the risk for physical reactions such as muscle cramping. Additionally, workers operating in warm environments report a decrease in perceived air quality and an increase in their experience of sick building syndrome symptoms (Lan et al. In Press; Wyon 2001). Thermal comfort is characterized by four environmental

factors: ambient air temperature, radiant temperature, relative humidity and air speed (Burge 2004; Kwok 2001; Morris 1995; Kwok 2001), as well as by individuals' metabolism and their clothing (Morris 1995; Kwok 2001). Additionally, gender, physical ability, age, level of acclimatization and health can influence the perception of thermal comfort (Lee and Brand 2005; Morris 1995). There is an optimum temperature range that humans are able to function in – their personal comfort zone – and excessive deviation from that range can result in increased stress and decreased productivity and reported satisfaction (Yang and Zhang 2008). The American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) terms this comfort zone *thermal neutrality* (Kwok 2001). It refers to experimentally-derived temperature in the static model of comfort, where humans are passive actors in the thermal environment. Passivity does not imply a lack of control, however: control or at least the perception of control is important in determining one's preferred comfort zone (Lee and Brand 2005; Kim et al. In Press). The ability to maintain thermal neutrality is important because thermal comfort affects behavior, productivity, satisfaction and well-being. Kwok (2001) notes that in order to maintain thermal homeostasis, the human body must regulate heat gain and loss in the ambient environment.

This balance is expressed as the equation:

$$M - W = E + R + C + K + S$$

Where M = Metabolic energy gained

W = Work performed

E = Evaporation

R = Radiation

C = Convection

K = Conduction

S = Stored heat energy (heat balance is achieved when S = 0).

This equation is calculated for the standard person using watts/second/m<sup>2</sup> of total body surface area. Thermal balance is achieved by a combination of voluntary and involuntary means. Sweating and vasodilation are the two physiological ways the human body gets rid of excessive heat, and piloerection, vasoconstriction and shivering are the three physiological ways the human body retains or increases body temperature.

### **Environmental Factors: Noise**

The American Speech-Language-Hearing Association (ASHA) (2008) notes that noise levels above 80 dB are potentially hazardous to people's physical health. Spengler et al. (2001a) notes that average noise levels in an office setting can reach 80 dB. 80 dB is roughly equivalent to the noise of a freight train 100 feet away (Extech Instruments Corporation 2004). HVAC systems generate noise in frequencies at the lower end of the audible sound range for human hearing, as well

as in the infrasound range which is just below the audible range (Burt 2001). Infrasound is implicated as a factor in Sick Building Syndrome symptoms such as fatigue, dizziness and nausea. In addition to physical health issues, noise can also affect workers' psychosocial health by adversely affecting job performance, disrupting speech and increasing annoyance. Gomes et al. (2002) studied the effects that environmental conditions play on the amount of stress workers experienced in industrial settings. They found that exposure to heat and noise can adversely affect workers' physical health. When workers operated in elevated thermal environments, their risk for physical reactions such as cramping increased. Workers who operated in high or continuous noise environments demonstrated increased hearing deficits when compared to workers in quieter environments. In each case, the use of personal protective equipment would have aided the workers in avoiding some of the workplace stresses, though none of the workers in their study utilized auditory or thermally protective devices. The implications for how long-term health and experienced stress levels would be affected by loud, hot environments were not discussed by Gomes et al., though, given the literature on physical discomfort as it affects job satisfaction (not discussed here), it can be inferred that stress levels would increase.

### **Environmental Factors: Lighting**

Lighting in the workplace is a complex and difficult environmental factor to measure because its quality is both objective and subjective. Two terms important for describing the quality of light are *luminance* which is the perceived brightness of

a given surface and *illuminance* which is the intensity of light in all directions by a given light source (Tiller 2001). For people operating in the workplace, illuminance is the more important measure of lighting adequacy because it relates to the functional perception of light by the human eye in a given environment. Variables affecting adequate illuminance include a person's age, the visual difficulty of a given task, and the speed and accuracy necessary for completing a given task among others.

The color of the lighting, measured in degrees Kelvin, is as important a factor as lighting intensity. The Kelvin color temperature scale describes an imaginary black metal bar that changes color from black to red to blue and then to white as it is heated. This scale is used to describe the visible light emitted from various light sources. For example, incandescent light bulbs emit light at approximately 2,900°K and fluorescent light bulbs emit light at approximately 3,000-4,000°K. By comparison, light from an overcast sky emits light at approximately 7,000°K and a clear sky emits light at approximately 10,000°K. The higher the color temperature, the more natural an illuminated object appears because higher color temperatures include more color range. Objects appear more vibrantly colorful when lit with a color temperature that includes more of the color of the object itself.

The significance of lighting intensity and color in the workplace is that good visibility of given tasks is necessary for successful, accurate task completion (Tiller 2001). Success and accuracy decrease when it is more difficult it is to see an object, to coordinate hand-eye movements, to effortlessly think about the task at

hand and to maintain the motivation to complete given tasks. Mills et al. (2007) studied the effect of color temperature on worker productivity and found that increasing the correlated color temperature (CCT) of fluorescent lighting to 17,000°K had a significant positive effect on wellbeing, functioning and performance when compared to controls. Others have noted similar positive effects of increased wellbeing and productivity due to improvements in lighting quality and other indoor environmental qualities (Dilani 2008; Kawamura et al. 2007; Paevere and Brown 2008; van Bommel and van de Beld 2004; Veitch et al. 2008).

The environmental conditions within an enclosed building can affect the physical and mental health of workers, and the non-specific symptoms identified by Burge (2004) and Thorn (2000) as factors in Sick Building Syndrome, can cause job stress to increase and job satisfaction to decrease. There is ample evidence in the literature concerning the effects that adverse environmental conditions including temperature (Clements-Croome and Baizhan 2000; Gomez et al. 2002; Lan et al. In Press; Mendell et al. 2008; Mendell and Mirer 2009; Morris 1995; Paevere and Brown 2008; Yang and Zhang 2008), noise (Clements-Croome and Baizhan 2000; Gomez et al. 2002; Paevere and Brown 2008), lighting (Clements-Croome and Baizhan 2000; Paevere and Brown 2008; van Bommel and van de Beld 2004; Veitch et al. 2008), and air quality (Kawamura et al. 2007; Kim et al. In Press; Lan et al. In Press; Mendell et al. 2008; Meng et al. 2005; Paevere and Brown 2008; Polidori et al. 2006; Wargocki et al. 2002; Weisel et al. 2005) have on workers at various workplaces, as well as discussion of the various types of stressors that correctional

officers deal with daily (Johnson et al. 2005; Nurse et al. 2003; Paoline et al. 2006; Schaufeli and Peeters 2000; Tewksbury and Higgins 2006). However, there is limited information examining environmental conditions and the correctional workplace jointly. It is my contention that the environmental conditions of the correctional workplace exacerbate the stress levels of corrections officers beyond what is suggested in the literature and that repeated exposure to unpredictable noise, fluctuating temperatures, variable intensity lighting and poor air quality will adversely affect their interpersonal interactions. Based on the provided descriptions of the aforementioned environmental factors, in combination with Sick Building Syndrome and the correctional workplace, my hypotheses are:

1. The environmental conditions including lighting, temperature, noise, and air quality within the correctional workplace negatively affect Corrections Officers' perception of stress.
2. Environment-mediated stress will be greater at the Main Jail compared to the Work Center because the Main Jail is an older building.

## **Chapter 5: Study Facilities and Methods**

The present study addresses workplace stress experienced by the corrections officers working at two related jail facilities in a Pacific Northwest college town. Both facilities are operated by the same county government. One is used to house inmates held for full time incarceration (the Main Jail); the other is for part time work release incarceration (the Work Center). It is important to compare the two facilities because some corrections officers work at both locations and may experience stress differently in each building. At the time of data collection there were 86 staff members working at the two correctional facilities.

The Main Jail (MJ) is a three story building constructed in the early 1980's of mostly reinforced concrete and cinder block. The MJ is approximately one city block in length and one half of a city block in width. Each floor of the MJ is divided into several compartments, separated by heavy steel doors, and each compartment was measured independently. The compartments on the first floor of the MJ included the break room area, the booking area, the first floor cell and visitors booth area and the -456" area which is the women's general population tank. The compartments on the second floor of the MJ included the control booth area, the men's general population area and the court/medical side area. The compartments on the third floor of the MJ included the E, F and isolation tank hall side and the G – K tank side. The individual inmate tanks were excluded for measurement for this study because they aren't areas where corrections officers spend most of their work shifts.



The Work Center (WC) is a single story building constructed in the early 2000's of concrete and steel, similarly to a large warehouse. The WC is approximately one city block in length and one half of a city block in width. The WC is separated into several compartments, separated by heavy steel doors, and each compartment was measured independently. The compartments at the WC included the office area, the control booth, the common area and the central hallway. The individual inmate tanks were excluded for measurement for this study because they aren't areas where corrections officers spend most of their work shifts.

I contacted the Chief of Corrections for the facilities I intended to use and discussed my research intentions. Upon gaining verbal approval, I drafted a detailed proposal and sent it to the Institutional Review Board (IRB) at Western Washington University and to the Chief of Corrections. After approval was granted by the IRB, the Chief then contacted the correctional staff, asking them to review the details of the study outlined in an attached letter, and encouraged their participation. Copies of the study questionnaire and informed consent letter were then given to each staff member (see Appendices 1 and 2). Those who chose to participate in the study were asked to return the completed questionnaire and a signed copy of the informed consent letter within two weeks.

Corrections Officers participating in the study (N=45: 11 female, 32 male) completed a 40 question survey (see Appendix 1) which addressed officer's demographics, employment, and personal health, as well as their perceptions of the environmental conditions (temperature, lighting, noise and air quality) at both the

Main Jail and the Work Center. Statistical analysis of respondents' answers was done using SPSS software.

### **Objective Data**

On-site environmental data measurements of lighting, noise and temperature were collected at the Main Jail and at the Work Center over two days, at three similar times each day, to provide data ranges for the specific environmental conditions at each location during each of three shifts. Measurements were taken twice in each area at two different locations in each area, and those measurements were then averaged. Baseline measurements of the environmental conditions are necessary for qualifying the subjective responses collected with the study questionnaire. Briefly, a comparison of the two facilities shows that the Work Center was warmer by 1.56°C and noisier by 0.54 dB than the Main Jail when averaged across all three shifts, while the Main Jail was brighter by 3.64 lux than the Work Center when averaged across all three shifts. These measured differences likely aren't significant in and of themselves. Additional discussion of these measures and their implications is covered in the discussion section below.

### **Lighting**

Lighting data for each facility was collected using the Extech Instruments Digital Light Meter, model 401025, to measure illuminance (lux). Factory calibration of the light meter is set for a "standard tungsten light source of 2856°K" (Extech Instruments Corporation 2001). Per the manufacturer, measurements of light sources other than tungsten require a multiplied conversion factor. The fluorescent

bulbs used at both jail facilities operate at 3500°K, which required a multiplication of the data figures by 1.226 to achieve correct lighting measurements. Additionally, lighting was measured by holding the light meter horizontally at eye level to simulate a person's angle of view relative to the light source, rather than pointing the meter directly at the light source. This effectively lowered the meter-observed light measurements but was done to approximate real world light perception by a person operating in the given environments. Average lighting was brightest at each facility on the day shift, measuring 22.99 lux at the Main Jail and 20.30 lux at the Work Center. Average lighting was lowest at each facility on the night shift, measuring 13.58 lux at the Main Jail and 9.76 lux at the Work Center. For comparison, Pears (1998) described lighting in a typical family living room at 50 lux.

### **Temperature**

Temperature data for each facility were collected using the Amprobe Relative Humidity and Temperature Meter, model THWD-3. The meter was configured to display temperature readings in degrees Celsius. Relative humidity was not taken into consideration for this study. Average temperatures were highest at each facility on the night shift and lowest at each facility on the evening shift, with highs and lows measuring 31.33°C and 28.25°C at the Main Jail and 31.22°C and 30.14°C at the Work Center. Temperature readings were collected at shoulder height to approximate the temperatures experienced by people operating in the given environments.

## **Noise**

Noise data for each facility were collected using the Extech Digital Sound Level Meter, model 407730. The meter was configured to measure ambient noise in the dBA scale which approximates the response of the human ear (Extech Instruments 2004). Average noise levels were highest at each facility on the evening shift, measuring 56.33 dB at the Main Jail and 57.03 dB at the Work Center. Average noise levels were lowest at the Main Jail on the night shift, measuring 54.89 dB, and lowest at the Work Center on the day shift, measuring 55.43 dB.

## **Air Quality**

Air quality data for each facility were not collected with instrumentation due to the immense complexity of the airborne environment and the high cost of appropriate measuring equipment. Instead, air quality data was collected solely through subjective interpretations in the questionnaire.

## **Facility Environmental Standards**

To understand how environmental conditions at each facility are managed, how problems are addressed, and how the environmental data I collected relates to facility maintenance standards, I contacted the maintenance department and interviewed a representative who explained environmental control operations and maintenance. The heating, ventilation and air conditioning (HVAC) controls for each jail facility are remotely monitored and can be remotely adjusted using computerized monitoring equipment. This allows maintenance personnel to troubleshoot environmental quality complaints from a central location and form plans of action

before making repairs or adjustments on site. Additionally, remotely controlling the HVAC system means that maintenance personnel rarely physically disturb the system, which decreases the chances that built up dust and other contaminants in the ducting enters the jail facilities. The HVAC controls also monitor outside air temperature, which can affect the indoor environment. Warm external temperatures and sunshine affect internal temperatures on the 2<sup>nd</sup> and 3<sup>rd</sup> floors of the main jail in particular. The County Executive has mandated that energy conservation is a high priority for budgetary reasons as well as environmental consciousness, and has specified that the indoor temperature range is to be set at 71-74°F (21-23°C). Temperatures falling below 71°F activate the heating system; temperatures above 74°F activate the cooling system.

Each jail facility is compartmentalized for environmental control which allows maintenance personnel to fine tune the indoor environment. Multiple air handling units (AHU) are used to control each of the compartmentalized areas in each jail facility. Filters in the AHUs are changed twice per year, on a schedule. Other extensive maintenance is performed on the AHUs at that time as well. There have been a few complaints that employees could smell mold or mildew, though no specific locations have been identified and no mold or mildew has been found. Though compartmentalized, there is some cross flow or “compartmental drift” between each separate area. This is an unavoidable complicating factor, especially in reference to the drift between the inmate housing areas and the rest of the jail. There is a given airflow which is supposed to be maintained in each cell block.

Inmates continually clog the airflow vents in their cells with toothpaste, wetted toilet paper and other debris which restricts airflow. The resulting strain on the entire HVAC system wears out mechanical parts more quickly and causes facility-wide environmental imbalances which in turn cause a decrease in comfort of occupants in areas other than the one affected by clogged venting.

Humidification of the HVAC system does not occur. Local climatic conditions were evaluated when the jail facilities were built and determined to not be extreme enough to require humidification. There has been no identified need to install a humidification system since then either. Additionally, the amount of cooling required is achievable with a water cooling system only. The Main Jail has undergone some upgrading to its HVAC system in the years since it was built, though only in the electronic controls. The ducting is original. The Main Jail was designed to house approximately 150 inmates. Currently, the Main Jail houses an average of twice as many inmates, which causes serious strain on the environmental systems.

Lighting in the jail facilities is via fluorescent bulbs, 735 spectrum (grade 7, 3500°K bulb temperature, halfway between warm and cool color rendering). Bulbs are changed every 3-4 years regardless of need (though burnouts are addressed as needed) and the light fixtures are cleaned at that time as well. The attempt is made to standardize all of the lighting to the 735 spectrum for all county facilities though that has not always been achievable due to incorrect ordering of bulbs.

No amount of sound deadening has been applied to either jail facility. The Work Center in particular was described by several employees as having a lot of echo, and my assessment of the building agrees with that description.

## Chapter 6: Results

A total of 45 respondents (11 female, 32 male, 2 unspecified) completed a 40 question survey regarding the perception of environmental qualities (lighting, temperature, noise and air quality) in two jail facilities (the Main Jail and the Work Center). Respondents ranged from 20 years to more than 60 years of age, with 66% of respondents falling between 30 and 59 years of age. Some respondents work at both facilities while some work solely at one specific location: 73.7% of respondents identified the Main Jail as their primary workplace and 45.8% identified the Work Center as their primary workplace. As a measure of respondents' general health in relation to the survey questions, 71.1% identified themselves as non-smokers and 73.3% identified themselves as not sensitive to scents or odors. More than half of respondents (55.5%) identified themselves as wearing some form of vision correcting lenses and more than three quarters of respondents (82.2%) denied any known hearing loss.

Overall, environmental quality scores for the Main Jail were rated as inadequate in 75% of the environmental factors surveyed. In contrast, environmental quality scores for the Work Center were rated as inadequate in only 25% of the environmental factors surveyed.

	<b>Overall Lighting</b>	<b>Overall Temperature</b>	<b>Overall Air Quality</b>	<b>Overall Noise</b>
<b>Main Jail</b>	<b>Inadequate: 67.6%</b> Adequate: 32.4% <i>Impression: Too bright or glaring</i>	<b>Inadequate: 70%</b> Adequate: 30% <i>Impression: Too warm</i>	Inadequate: 11.1% <b>Adequate: 88.9%</b> <i>Impression: Good</i>	<b>Inadequate: 87.1%</b> Adequate: 12.9% <i>Impression: Too noisy</i>
<b>Work Center</b>	Inadequate: 34.5% <b>Adequate: 65.5%</b> <i>Impression: Good</i>	Inadequate: 39.1% <b>Adequate: 60.9%</b> <i>Impression: Good</i>	Inadequate: 45.5% <b>Adequate: 54.5%</b> <i>Impression: Good</i>	<b>Inadequate: 57.1%</b> Adequate: 42.9% <i>Impression: Too noisy</i>

*Table 1: Overall Environmental Quality Comparison*



Comparing quality scores between individual areas at the Main Jail and Work Center are problematic because the two facilities are not set up exactly the same. The exception to this is the Control Booths at each facility, which can be directly compared. Generalized comparisons can be made with respect to the other areas at each facility.

Lighting quality scores for the Main Jail Control Booth (MJCB) and Work Center Control Booth (WCCB) were both rated as inadequate by respondents nearly equally, measuring 58.1% and 56% respectively, with quality ratings generally described as “too dim”. Temperature quality scores for the MJCB were rated as inadequate by 69% of respondents, with quality ratings generally described as “too cold”. In contrast, temperature quality scores for the WCCB were rated as inadequate by only 26.1% of respondents, with quality ratings generally described as “good”. Air quality scores for the MJCB were rated as inadequate by 78.1% of respondents, with quality ratings generally described as “too stuffy or smelly”. In contrast, air quality scores for the WCCB were rated equally adequate/inadequate by respondents. Noise quality scores for the MJCB were rated as inadequate by 73.3% of respondents, with quality ratings generally described as “too noisy”. In contrast, noise quality scores for the WCCB were rated as inadequate by only 28% of respondents, with quality ratings generally described as “good”.

	Lighting	Temperature	Air Quality	Noise
<b>Main Jail Control Booth</b>	Adequate: 41.9% Inadequate: <b>58.1%</b> <i>Impression: Too dim</i>	Adequate: 31% Inadequate: <b>69%</b> <i>Impression: Too cold</i>	Adequate: 21.9% Inadequate: <b>78.1%</b> <i>Impression: Too stuffy or smelly</i>	Adequate: 26.7% Inadequate: <b>73.3%</b> <i>Impression: Too noisy</i>
<b>Work Center Control Booth</b>	Adequate: 44% Inadequate: <b>56%</b> <i>Impression: Too dim</i>	<b>Adequate: 73.9%</b> Inadequate: 26.1% <i>Impression: Comfortable</i>	Adequate: 50% Inadequate: 50% <i>Impression: Equally rated</i>	<b>Adequate: 72%</b> Inadequate: 28% <i>Impression: Comfortable</i>

*Table 2: Control Booth Environmental Quality Comparison*

Apart from the Control Booths, the various compartmentalized areas at each facility in the study make for difficult direct comparisons because they differ in layout and physical complexity. Generally speaking, however, the size and use of the areas specified below are reasonably similar which allows for relative comparison. For the Main Jail, these locations are described as: the First Floor Visitors Booth area (MJFFVB), the Booking area (MJB), the Break Room area (MJBR), the 156 area (MJ156), the Second Floor General Population area (MJGP), the Second Floor Court and Medical area (MJCM), the Third Floor E, F and Isolation area (MJEFI), and the Third Floor G through K area (MJGK). For the Work Center, these locations are described as: the Central Hallway area (WCCH), the Common area (WCC), and the Offices area (WCO). Table 3 below outlines the survey results for the areas described above.

The Main Jail First Floor Visitors Booth area (MJFFVB) is a single large multipurpose room with the Booking Area at one end, the Visitors Booths roughly at the other end, and inmate cells, elevators, and a shower in between. Lighting quality scores for the MJFFVB were rated as inadequate by 60.6% of respondents, with quality ratings generally described as “too dim”. Temperature quality scores for the MJFFVB were rated as inadequate by 64.5% of respondents, with quality ratings

generally described as “too warm”. Air Quality scores for the MJFFVB were rated as inadequate by only 9.4% of respondents, with quality ratings generally described as “good”. Noise quality scores for the MJFFVB were rated as inadequate by 80.6% of respondents, with quality ratings generally described as “too noisy”.

	Lighting	Temperature	Air Quality	Noise
Main Jail First Floor Visitors Booth Area	Adequate: 39.4% Inadequate: <b>60.6%</b> Impression: <i>Too dim</i>	Adequate: 35.5% Inadequate: <b>64.5%</b> Impression: <i>Too warm</i>	<b>Adequate: 90.6%</b> Inadequate: 9.4% Impression: <i>Good</i>	Adequate: 19.4% Inadequate: <b>80.6%</b> Impression: <i>Too noisy</i>
Main Jail Booking Area	Adequate: 42.1% Inadequate: <b>57.9%</b> Impression: <i>Too dim</i>	Adequate: 45.5% Inadequate: <b>54.5%</b> Impression: <i>Too warm</i>	<b>Adequate: 82.9%</b> Inadequate: 17.1% Impression: <i>Good</i>	Adequate: 28.1% Inadequate: <b>71.9%</b> Impression: <i>Too noisy</i>
Main Jail Break Room Area	<b>Adequate: 82.1%</b> Inadequate: 17.8% Impression: <i>Good</i>	<b>Adequate: 81.3%</b> Inadequate: 18.7% Impression: <i>Good</i>	Adequate: 45.7% <b>Inadequate: 54.3%</b> Impression: <i>Too stuffy or smelly</i>	<b>Adequate: 84.4%</b> Inadequate: 15.6% Impression: <i>Good</i>
Main Jail 156 Area	Adequate: 45.5% Inadequate: <b>54.5%</b> Impression: <i>Too dim</i>	<b>Adequate: 53.6%</b> Inadequate: 46.4% Impression: <i>Good</i>	<b>Adequate: 83.9%</b> Inadequate: 16.1% Impression: <i>Good</i>	Adequate: 33.3% Inadequate: <b>66.7%</b> Impression: <i>Too noisy</i>
Main Jail General Population Area	<b>Adequate: 54.5%</b> Inadequate: 45.5% Impression: <i>Good</i>	Adequate: 44.8% Inadequate: <b>55.2%</b> Impression: <i>Too warm</i>	<b>Adequate: 80.6%</b> Inadequate: 19.4% Impression: <i>Good</i>	Adequate: 13.3% Inadequate: <b>86.7%</b> Impression: <i>Too noisy</i>
Main Jail Court and Medical Area	<b>Adequate: 60.6%</b> Inadequate: 39.4% Impression: <i>Good</i>	<b>Adequate: 58.6%</b> Inadequate: 41.4% Impression: <i>Good</i>	<b>Adequate: 64.5%</b> Inadequate: 35.5% Impression: <i>Good</i>	<b>Adequate: 53.3%</b> Inadequate: 46.7% Impression: <i>Good</i>
Main Jail E, F and Isolation Area	<b>Adequate: 60.6%</b> Inadequate: 39.4% Impression: <i>Good</i>	Adequate: 48.3% Inadequate: <b>51.7%</b> Impression: <i>Too warm</i>	<b>Adequate: 87.1%</b> Inadequate: 12.9% Impression: <i>Good</i>	Adequate: 29% Inadequate: <b>71%</b> Impression: <i>Too noisy</i>
Main Jail G through K Area	<b>Adequate: 51.5%</b> Inadequate: 48.5% Impression: <i>Good</i>	Adequate: 43.3% Inadequate: <b>56.7%</b> Impression: <i>Too warm</i>	<b>Adequate: 80.6%</b> Inadequate: 19.4% Impression: <i>Good</i>	Adequate: 30% Inadequate: <b>70%</b> Impression: <i>Too noisy</i>
Work Center Central Hallway Area	<b>Adequate: 62%</b> Inadequate: 38% Impression: <i>Good</i>	<b>Adequate: 69.2%</b> Inadequate: 30.8% Impression: <i>Good</i>	<b>Adequate: 59.3%</b> Inadequate: 40.7% Impression: <i>Good</i>	Adequate: 33.3% Inadequate: <b>66.7%</b> Impression: <i>Too noisy</i>
Work Center Common Area	<b>Adequate: 75%</b> Inadequate: 25% Impression: <i>Good</i>	<b>Adequate: 85.2%</b> Inadequate: 14.8% Impression: <i>Good</i>	<b>Adequate: 58.6%</b> Inadequate: 41.4% Impression: <i>Good</i>	<b>Adequate: 70%</b> Inadequate: 30% Impression: <i>Good</i>
Work Center Offices Area	<b>Adequate: 75.9%</b> Inadequate: 24.1% Impression: <i>Good</i>	<b>Adequate: 70.4%</b> Inadequate: 29.6% Impression: <i>Good</i>	<b>Adequate: 60.7%</b> Inadequate: 39.3% Impression: <i>Good</i>	<b>Adequate: 69%</b> Inadequate: 31% Impression: <i>Good</i>

Table 3: Compartmentalized Environmental Quality Comparison

The Main Jail Booking area (MJB) is a large compartmentalized area at the end of the MJFFVB area. Lighting quality scores for the MJB were rated as

inadequate by 57.9% of respondents, with quality ratings generally described as “too dim”. Temperature quality scores for the MJB were rated as inadequate by 54.5% of respondents, with quality ratings generally described as “too warm”. Air Quality scores for the MJB were rated as inadequate by only 17.1% of respondents, with quality ratings generally described as “good”. Noise quality scores for the MJB were rated as inadequate by 71.9% of respondents, with quality ratings generally described as “too noisy”.

The Main Jail Break Room area (MJBR) is a large room at one end of the first floor of the Main Jail, which shares a common wall with the MJB area. Lighting scores for the MJBR were rated as inadequate by only 17.9% of respondents, with quality ratings generally described as “good”. Temperature scores for the MJBR were rated as inadequate by only 18.7% of respondents, with quality ratings generally described as “good”. Air Quality scores for the MJBR were rated as inadequate by 54.3% of respondents, with quality ratings generally described as “too stuffy or smelly”. Noise quality scores for the MJBR were rated as inadequate by only 15.6% of respondents, with quality ratings generally described as “good”.

The Main Jail 156 area (MJ156) is a small hallway that includes an access port into the women’s general population inmate tank. Lighting quality scores for the MJ156 were rated as inadequate by 54.6% of respondents, with quality ratings generally described as “too dim”. Temperature quality scores for the MJ156 were rated as inadequate by only 46.4% of respondents, with quality ratings generally described as “good”. Air Quality scores for the MJ156 were rated as inadequate by

only 16.1% of respondents, with quality ratings generally described as “good”. Noise quality scores for the MJ156 were rated as inadequate by 66.7% of respondents, with quality ratings generally described as “too noisy”.

The Main Jail Second Floor General Population area (MJGP) is an access hallway roughly ten feet wide and roughly one city block in length. It shares a common wall on one side with the Court and Medical area and has access ports on the other side into six men’s general population inmate tanks. Lighting quality scores for the MJGP were rated as inadequate by only 45.5% of respondents, with quality ratings generally described as “good”. Temperature quality scores for the MJGP were rated as inadequate by 55.2% of respondents, with quality ratings generally described as “too warm”. Air Quality scores for the MJGP were rated as inadequate by only 19.4% of respondents, with quality ratings generally described as “good”. Noise quality scores for the MJGP were rated as inadequate by 86.7% of respondents, with quality ratings described as “too noisy”.

The Main Jail Court and Medical area (MJCM) is an access hallway roughly ten feet wide by half a city block in length. It has a large court room on one end, an outdoor recreation area on the other end, medical examination rooms on one side and visitor booths on the other side. Lighting quality scores for the MJCM were rated as inadequate by only 39.4% of respondents, with quality ratings generally described as “good”. Temperature quality scores for the MJCM were rated as inadequate by only 41.4% of respondents, with quality ratings generally described as “good”. Air Quality scores for the MJCM were rated as inadequate by only 35.5% of

respondents, with quality ratings generally described as ~~good~~". Noise quality scores for the MJCM were rated as inadequate by only 46.7% of respondents, with quality ratings generally described as ~~good~~".

The Main Jail Third Floor E, F and Isolation area (MJEFI) is an access hallway roughly six feet wide and one third of a city block in length. It has elevators and a shared access doorway with the Main Jail Third Floor G through K area on one end, individual inmate cells on one side, and small group inmate tanks on the other side. Lighting quality scores for the MJEFI were rated as inadequate by only 39.4% of respondents, with quality ratings generally described as ~~good~~".

Temperature quality scores for the MJEFI were rated as inadequate by 51.7% of respondents, with quality ratings generally described as ~~too warm~~". Air Quality scores for the MJEFI were rated as inadequate by only 12.9% of respondents, with quality ratings generally described as ~~good~~". Noise quality scores for the MJEFI were rated as inadequate by 71% of respondents, with quality ratings generally described as ~~too noisy~~".

The Main Jail Third Floor G through K area (MJGK) is an access hallway roughly ten feet wide and two thirds of a city block in length. It has a shared access doorway with the Main Jail Third Floor E, F, and Isolation area on one end, a storage room on the other end, and small group inmate tanks on both sides. Lighting quality scores for the MJGK were rated as inadequate by only 48.5% of respondents, with quality ratings generally described as ~~good~~". Temperature quality scores for the MJGK were rated as inadequate by 56.7% of respondents, with quality ratings

generally described as ~~too~~ warm". Air Quality scores for the MJGK were rated as inadequate by only 19.4% of respondents, with quality ratings generally described as ~~good~~". Noise quality scores for the MJGK were rated as inadequate by 70% of respondents, with quality ratings generally described as ~~too~~ noisy".

The Work Center Central Hallway area (WCH) is an access hallway roughly 15 feet wide and half a city block in length. It has the Control Booth at one end, the Work Center Common Area at the other end, and general population inmate tanks on both sides. Lighting quality scores for the WCH were rated as inadequate by only 38% of respondents, with quality ratings generally described as ~~good~~".

Temperature quality scores for the WCH were rated as inadequate by only 30.8% of respondents, with quality ratings generally described as ~~good~~". Air Quality scores for the WCH were rated as inadequate by only 40.7% of respondents, with quality ratings generally described as ~~good~~". Noise quality scores for the WCH were rated as inadequate by 66.7% of respondents, with quality ratings generally described as ~~too~~ noisy".

The Work Center Common Area (WCC) is a large multipurpose room located at the end of the Work Center Central Hallway. Lighting quality scores for the WCC were rated as inadequate by only 25% of respondents, with quality ratings generally described as ~~good~~". Temperature quality scores for the WCC were rated as inadequate by only 14.8% of respondents, with quality ratings generally described as ~~good~~". Air Quality scores for the WCC were rated as inadequate by only 41.4% of respondents, with quality ratings generally described as ~~good~~". Noise quality

scores for the WCC were rated as inadequate by only 30% of respondents, with quality ratings generally described as “good”.

The Work Center Offices area (WCO) is a large compartmentalized area located at the end of the Work Center opposite the Common area and across the public hallway from the Control Booth, but does not share any common walls with any other areas highlighted in this study. Lighting quality scores for the WCO were rated as inadequate by only 24.1% of respondents, with quality ratings generally described as “good”. Temperature quality scores for the WCO were rated as inadequate by only 29.6% of respondents, with quality ratings generally described as “good”. Air Quality scores for the WCO were rated as inadequate by only 39.3% of respondents, with quality ratings generally described as “good”. Noise quality scores for the WCO were rated as inadequate by only 31% of respondents, with quality ratings generally described as “good”.



## **Chapter 7: Discussion**

The research for the present study was guided by two hypotheses:

1. The environmental conditions including lighting, temperature, noise, and air quality within the correctional workplace negatively affect corrections officers' perception of stress.
2. Environment-mediated stress will be greater at the Main Jail compared to the Work Center because the Main Jail is an older building.

I developed the hypotheses based on my experiences working as a corrections officer at the Main Jail, as well as on outcomes that seemed logical after reviewing the literature. The following paragraphs discuss each hypothesis and the findings pertaining to them, as well as the potential implications that the environmental measurements had on survey responses.

Hypothesis #1: *The environmental conditions within the correctional workplace negatively affect corrections officers' perception of stress.* Stress is in large part an individualized, subjective perception, based on a person's particular coping style, life experiences, health and many other factors. I was well aware before beginning work as a corrections officer that I would encounter many stressful situations. Some of my original ideas of where I would encounter stressors ultimately proved unfounded, although some of them held true. Surprisingly, those estimations I predicted correctly, such as conflicts with inmates and pressure from supervisors, usually had less of an impact that I expected. I also realized that no single stressor dominated my experience of stress, though there did seem to be an

overarching connection in my experiences. I hypothesized that the ubiquitous connection was the environmental conditions because they were the factors always present no matter where I was in the jail and no matter what task I was performing. Because stress is so subjective, I worded the survey questions (Appendix 1) to focus on individual environmental factors at various locations in the jail to see if other corrections officers had reactions to the environmental conditions similar to my own. This hypothesis was a dominant factor affecting how I formed the survey I used to collect the subjective data for my study.

The overall results from the survey (Table 1) highlight a clear distinction between the Main Jail and the Work Center in terms of perceived environmental quality. The Main Jail environmental quality scores were rated as “inadequate” in three of the four measures surveyed (lighting, temperature and noise) and each “inadequate” rating was noted by at least two thirds of the survey respondents. In contrast, the Work Center environmental quality scores were rated as “inadequate” in only one of the four measures surveyed (noise) and the “inadequate” rating was noted by more than half of the survey respondents. Comparing the “inadequate” percentage differences between the two facilities alone speaks volumes to the perceived environmental problems at the Main Jail. Remarkably, quality scores for lighting, temperature and noise at the Main Jail were rated as “inadequate” by 67.6%, 70% and 87.1% of respondents respectively. In contrast, quality scores for lighting, temperature and air quality at the Work Center were rated by respondents as “adequate” by 65.5%, 60.9% and 54.5% of respondents respectively. Looking

closer, however, suggests that the perceived environmental quality at the Work Center isn't completely without fault as "adequate" scores were only moderately positive.

Examining the compartmentalized results for perceived environmental quality (Tables 3 and 4) reveals fairly consistent support for overall ratings at the Main Jail, and inconsistencies with overall ratings at the Work Center.

	Lighting	Temperature	Air Quality	Noise
<b>Main Jail Overall</b>	67.6% Inadequate	70% Inadequate	11.1% Inadequate	87.1% Inadequate
<b>Main Jail Compartments</b>	44% Inadequate	60% Inadequate	25% Inadequate	70% Inadequate
<b>Work Center Overall</b>	34.5% Inadequate	39.1% Inadequate	45.5% Inadequate	57.1% Inadequate
<b>Work Center Compartments</b>	0% Inadequate	0% Inadequate	0% Inadequate	33% Inadequate

*Table 4: Overall vs. Compartmentalized Quality Comparison*

At the Main Jail, compartment-related "adequate" ratings for lighting, temperature and noise were lower than overall "adequate" ratings by about 10-17%, meaning that the rated environmental quality levels were perceived less negatively when areas were considered individually compared to the facility as a whole (Table 4). Air quality at the Main Jail was rated as "adequate" about 16% more negatively when areas were considered individually, compared to the facility as a whole. The percentage differences for each environmental factor do not dramatically change the perception of quality, however. Lighting, temperature and noise were each rated as "adequate" by at least half of survey respondents when areas were considered both individually and wholly, and air quality was rated as "adequate" by only 25% of survey respondents when areas were considered both

individually and wholly. Clarifying questions that may account for these differences were not specifically addressed in the survey and should be addressed in future studies. However, given that “inadequate” scores at the Main Jail remained fundamentally negative for lighting, temperature and noise, and “adequate” scores remained fundamentally positive for air quality suggests that improvements to the negatively perceived environmental conditions should be considered by jail administrators.

In contrast, Work Center compartment-related “inadequate” ratings differed significantly compared to overall “inadequate” ratings (table 4). Lighting, temperature and air quality ratings were deemed as “adequate” by 100% of survey respondents when considered compartmentally, but were rated as “inadequate” by 35-45% of survey respondents when considered on the whole, depending on the specific factor in question. Clarifying questions that may account for these differences were not specifically addressed in the survey and should be addressed in future studies. Of specific consideration is that noise quality ratings were deemed as “inadequate” by 33% of survey respondents when considered compartmentally and 57% of survey respondents when considered on the whole. A discussion of the significance of the negative noise ratings is discussed below.

Jail administrators should be aware of the importance of improving environmental conditions within the workplace. Improving lighting intensity and color in the workplace has a positive effect on successful, accurate task completion, as well as on wellbeing, functioning and job performance (Dilani 2008; Kawamura et al.

2007; Mills et al. 2007; Paevere and Brown 2008; Tiller 2001; van Bommel and van de Beld 2004; Veitch et al. 2008). Success and accuracy decrease when it is more difficult it is to see an object, to coordinate hand-eye movements, to effortlessly think about the task at hand and to maintain the motivation to complete given tasks. Mills et al. (2007) in particular notes that increasing the correlated color temperature (CCT) of fluorescent lighting to 17,000°K has a significant positive effect on when compared to controls. Currently, lighting color temperature at the Main Jail is 3500K which may be sub-optimal for worker productivity and health due to its relative inaccuracy for rendering the color and naturalness of objects, and thereby making task completion more difficult.

Administrators should also consider the effects of poor thermal quality. Workers operating in warm environments report an increase in their experience of sick building syndrome symptoms, including headache, nausea, fatigue and other symptoms (Lan et al. In Press; Wyon 2001), and results from my study suggest similar findings. There is an optimum temperature range that humans are able to function in – their personal comfort zone – and excessive deviation from that range can result in increased stress and decreased productivity and reported satisfaction (Yang and Zhang 2008). The American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) terms this comfort zone *thermal neutrality* (Kwok 2001). More than half (60%) of survey respondents rated the compartmental temperature quality at the Main Jail as “inadequate” (specifically, too warm). The incidence of “inadequate” (specifically, too warm) ratings increased to 70% when

respondents rated the Main Jail temperature overall. Both the Main and Work Center jail facility's indoor temperature range is mandated to be set at 21-23°C (71-74°F). When I measured each facility for an objective baseline, the temperature readings for the two facilities ranged approximately 28-30°C (82-86°F). The difference between mandated temperature range and actual temperature range suggests there may be inaccuracies in either the measuring equipment I used, inaccuracies in the measuring equipment used by facility maintenance personnel, or both. In either case, most survey respondents reported thermal discomfort which should prompt jail administrators to investigate further and take corrective action. Additional discussion of thermal discrepancies is included below.

At both locations, noise was identified by survey respondents as a negative environmental quality. The American Speech-Language-Hearing Association (ASHA) (2008) notes that noise levels above 80 dB are potentially hazardous to people's physical health. Spengler et al. (2001a) notes that average noise levels in an office setting can reach 80 dB. 80 dB is roughly equivalent to the noise of a freight train 100 feet away (Extech Instruments Corporation 2004). Objective measurements of ambient noise levels at the Main Jail and the Work Center with an Extech Instruments Digital Sound Level Meter reveal that average noise levels are roughly equal at each location, measuring about 56 dB. Noise in this range is below hazardous levels according to the ASHA. Sound measuring instruments such as the one used for this study are not sensitive enough to account for low frequencies and infrasound, however. HVAC systems generate noise in frequencies at the lower end

of the audible sound range for human hearing, as well as in the infrasound range which is just below the audible range (Burt 2001). HVAC systems can produce infrasound that reaches 80 to 90 dB. Infrasound is implicated as a factor in Sick Building Syndrome symptoms such as fatigue, dizziness and nausea. The negative identification of noise by survey respondents in this study may be a reflection of the combination of both audible and sub-audible noise which may be reaching hazardous decibel levels. Accurate identification of specific noise sources and levels can be achieved using a sound level meter with an octave band filter, coupled with an integrating sound level meter (Burt 2001). These two instruments can identify the distinction between the steady noise produced by HVAC systems and fluctuating noises produced by other sources such as speech, slamming doors and office machinery among others.

Another aspect which should be considered relating to the negative perception and rating of noise at both the Main Jail and the Work Center is the noise annoyance factor. Noise in the workplace that is constant and unpredictable, even at non-hazardous levels, can increase the perceived stress of workers by increasing their annoyance level (Burt 2001). Annoyance can be described as a feeling of being bothered or disturbed during the performance of job duties, as being an invasion of privacy, and as a contributing factor to Sick Building Syndrome symptoms such as headache, lethargy and irritability. Additionally, it is surprising to me that correctional facilities discussed in the literature, as well as the facilities in my study, do not utilize sound deadening to reduce ambient noise and echo. Several

officers I spoke with while collecting my objective measurements mentioned their dissatisfaction of the constant noise at both the Main Jail and the Work Center. Increasing worker's perception of control over noise, as well as installing durable forms of sound deadening, can help offset negative outcomes in an otherwise noisy environment.

Hypothesis #2: *Environment-mediated stress will be greater at the Main Jail compared to the Work Center because the Main Jail is an older building.* This hypothesis is particularly difficult to quantify because of the great number of confounding variables involved, including the age and construction quality of each building, the adequacy of the environmental systems (HVAC) at each building, the age and health of respondents, and respondents' length of employment at the jail facilities, among others. Additionally, the age of a building isn't necessarily a determining factor in the incidence of environmental quality issues, which makes correlating reported issues with an older building problematic (Spengler et al. 2001). Older buildings and buildings constructed improperly *can* develop Sick Building Syndrome issues more readily than newer, properly constructed buildings, and older buildings *can* also require greater maintenance than newer buildings which increases the potential for the prevalence of SBS issues. It is important to remember, however, that older buildings aren't automatically poorer in environmental quality, more maintenance dependent, and greater in SBS issues. Regardless, the age, construction quality and environmental systems of buildings



should be considered as circumstantial evidence, in conjunction with SBS symptoms, in the evaluation of environment-mediated stress.

The adequacy and efficiency of the heating, ventilation and air conditioning (HVAC) systems for each building must be scrutinized to ensure they are providing the best possible environmental conditions. Existing HVAC systems may or may not be correctly sized or be optimally configured relative to the size of each building and the number of occupants. Maintenance personnel noted that each jail facility is compartmentalized for environmental control which allows for fine tuning of the indoor environment. Multiple air handling units (AHU), similar to those described by Bearg (2001), are used to control each of the compartmentalized areas in each jail facility. HVAC controls are remotely computer monitored, allowing maintenance personnel to troubleshoot environmental quality complaints from a central location. The HVAC controls also monitor outside air temperature, which can affect the indoor environment.

Maintenance personnel also noted that the Main Jail was designed to house approximately 150 inmates. Current census averages roughly twice as many inmates, which causes serious strain on the environmental systems. Additionally, inmates continually clog the airflow vents in their cells with toothpaste, wetted toilet paper and other debris which restricts airflow. The resulting strain on the entire HVAC system wears out mechanical parts more quickly and causes facility-wide environmental imbalances which, in turn, cause a decrease in comfort of occupants in areas other than the one affected by clogged venting. The Main Jail has

undergone some upgrading to its HVAC system in the years since it was built, though only in the electronic controls. The ducting is original. It would be beneficial for everyone operating inside both jail facilities, as well as reduce maintenance costs, for administrators to explore different options for ventilation grates, such as ones that provide an acceptable level of adjustment control while still providing the necessary level of security and tamper resistance required for a correctional facility.

Levin (2001) describes an acceptable range of air exchange rates at 28-100 cfm/person, depending on the number of occupants of a building, the level of activity, the type and load of pollutants, and other factors. Specific air exchange rates for the jail facilities were not obtained for this study and should be evaluated in future studies. Interestingly, survey respondents rated air quality at both facilities as adequate in every area studied with the exception of the Main Jail break room area, which was rated as inadequate by roughly half of respondents as “too stuffy or smelly”. The break room area has several large south facing windows. Solar radiation and the subsequent increase in temperature may explain the inadequate air quality rating for this area and should be examined further.

Energy conservation is mandated for the jail facilities for budgetary and environmental consciousness reasons. Consequently, the indoor temperature range for the jail facilities is set at 71-74°F (21-23°C). Temperatures falling below 71°F (21°C) activate the heating system; temperatures above 74°F (23°C) activate the cooling system. Objective data I collected for temperature reveal a disparity between the mandated temperature range and real world temperatures. On site

temperature readings ranged approximately 28-30°C (82-86°F), well above the mandated temperature range. The doubling of inmates from what the Main Jail was originally designed for has increased the thermal load from body heat and results in increased facility temperature. Increased thermal load, coupled with the fact that inmates continually clog the airflow vents in their cells which cause facility-wide environmental imbalances and a decrease in occupant comfort, may explain the difference in temperature data. The difference observed also suggests inaccuracies may exist in either the measuring equipment I used, the measuring equipment used by facility maintenance personnel, or both. In any case, most survey respondents reported thermal discomfort which should prompt jail administrators to investigate further and take corrective action.

Several symptoms associated with SBS were included in the study survey (Table 5). More than half of respondents reported incidence with half of the SBS symptoms surveyed (dry eyes, itchy/watery eyes, stuffy nose and lethargy), and half of respondents reported symptom relief away from work for the same SBS symptoms.

	Dry Eyes	Itchy/ Watery Eyes	Stuffy Nose	Runny Nose	Dry Throat	Lethargy	Headache	Dry Skin
<b>Respondent Answers (Yes)</b>	25	29	33	21	15	28	20	21
<b>Yes %</b>	58.1%	67.4%	76.7%	48.8%	34.8%	65.1%	46.5%	48.8%
<b>Symptom Relief Away From Workplace (Yes %)</b>	51.1%	53.5%	58.1%	25.6%	25.6%	51.1%	34.9%	34.9%

*Table 5: Reported Sick Building Syndrome Symptoms*

Of particular note is the incidence of stuffy nose while at work, especially when considered by location (Table 6). Of the total study population 19 respondents identified their primary work location as the Main Jail; 24 respondents identified their primary work location as the Work Center; and 2 respondents identified their primary work location as “other”. By location, 84.2% of respondents at the Main Jail confirmed the incidence of stuffy nose, and 63.1% confirmed the incidence of stuffy nose at least 3 days per week.

Primary Work Location	Respondents by Location	Stuffy Nose at Work by Location (Y)	Percentage of Stuffy Nose at Work by Location	Stuffy Nose at Least 3 Days/Week by Location	Percentage of Stuffy Nose at Least 3 Days/Week by Location
Main Jail	19	16	84.2%	12	63.1%
Work Center	24	17	70.8%	7	29.1%

*Table 6: Reported Stuffy Nose at Work by Location*

Many SBS symptoms can be tied to air quality because of the nature of the human response to chemicals and odors. The upper respiratory tract, which includes the nose and sinuses, is the initial contact and filtration point for chemicals and odors which are detected by the human body (Rohr 2001). When inhaled, chemicals and other allergens can cause irritation in the upper respiratory tract causing inflammation, pain, increased mucous production and other symptoms. That respondents rated air quality as adequate in nearly every location, despite the high percentage of respiratory symptoms reported, suggests that the perception of environmental quality as it relates to SBS symptoms may be misunderstood. Future studies should address this probable disjunction.

## **Chapter 8: Conclusion**

Stress is in large part an individualized, subjective perception, based on a person's particular coping style, life experiences, health and many other factors. The subjectivity of stress makes identifying and defining stress-inducing factors difficult. Nevertheless, people's reportage of perceived stress might well be expected if an environment deviates from standardized measures of healthy environmental conditions. The hypotheses for this study concerned the effect that environmental conditions in the workplace, and the age of the workplace facility, have on the perception of stress among corrections officers. Study results suggest that environmental conditions and facility age do contribute to stress.

The objective environmental measurements for lighting, temperature and noise at both the Main Jail and the Work Center, the building foci of this study, when compared to administrative-mandated environmental standards, suggests suboptimal environmental conditions at both facilities. The survey data obtained for the environmental conditions confirms this evaluation, most notably at the Main Jail. Lighting, temperature and noise were all rated as "inadequate" by survey respondents for the Main Jail. They described the facility as too dim, too warm and too noisy. Additionally, noise was described as excessive at both facilities, which is in contrast to the measured noise levels I obtained with a decibel meter and to the ASHA hazardous noise level threshold. The negative environmental ratings detailed in the survey results also suggest that all environmental qualities may be poorer than

the measuring equipment used was able to capture. Future studies should attempt to correct for this.

Successful, accurate task completion is highly dependent on lighting intensity and color which provide for good visibility of given tasks and objects (Tiller 2001). Appropriate lighting was a particularly difficult factor to quantify, however, because there are so many factors affecting the perception of lighting in a given area by someone performing a given task. Coupled with survey results which describe lighting as “too dim”, especially at the Main Jail, the conclusion is that lighting is indeed inadequate and should be addressed by jail administrators.

Gomez et al. (2002) and Mendell and Mirer (2009) note that environments with significant thermal ranges have adverse effects on physical health, and that elevated temperature environments in particular increase the risk for physical reactions such as muscle cramping. Additionally, workers operating in warm environments report a decrease in perceived air quality and an increase in their experience of sick building syndrome symptoms including headache, nausea, fatigue and other symptoms (Lan et al. In Press; Wyon 2001). Mandated temperature ranges for the study facilities are set at 21-23°C (71-74°F), which are in contrast to measured temperature readings which ranged approximately 28-30°C (82-86°F). Coupled with survey results which describe temperature as “too warm”, especially at the Main Jail, the conclusion is that temperature is also inadequate and should be addressed by jail administrators.

The American Speech-Language-Hearing Association (ASHA) (2008) notes that noise levels above 80 dB are potentially hazardous to people's physical health. Spengler et al. (2001a) notes that average noise levels in an office setting can reach 80 dB. The average noise level range for the Main Jail was 54.89-56.33 dB, and the average noise level range for the Work Center was 55.43-57.03 dB. Burt (2001) notes that while typical environmental noise levels exceed recommended levels by as much as 10 dB, noise levels can be considered unacceptable even when measured levels are below recommended thresholds. Survey respondents rated noise levels at both study facilities as too loud, which is dissonant with measured levels I obtained in relation to the noise level threshold described by the ASHA. Regardless, survey results confirm that noise at both facilities is inadequate and should be addressed by jail administrators.

The age of a building isn't necessarily a determining factor in the incidence of environmental quality issues (Spengler et al. 2001). Rather, construction quality and proper engineering are greater factors affecting environmental quality. Regardless, survey results indicate that the older Main Jail does seem to have poorer environmental qualities compared to the newer Work Center. The Main Jail was rated as "inadequate" in 75% of surveyed environmental factors overall, compared with the Work Center which was rated as "inadequate" in only 25% of surveyed environmental factors overall. Additionally, 58.1% of survey respondents overall confirmed that they believed the environmental conditions at their workplace increase their stress level. When considered by facility, 73.7% of respondents

believe that the environmental conditions at the Main Jail increase their stress level, compared with 45.8% of respondents who believe the environmental conditions at the Work Center increase their stress level. This reinforces the possibility that the older Main Jail building does contribute more readily to the stress of corrections officers than the newer Work Center building. There are numerous confounding variables that may affect the significance of the effect of building age on stress, however, such as length of employment. Corrections officers with longer employment histories will have spent more time at the older Main Jail over the course of their career than at the newer Work Center. Longer employment times allow for greater materialization of the negative effects that environmental conditions have on officer's perceptions of stress. Future studies should address this variable, and any other potential confounding variables, in more depth than was addressed in my study.

The complexity and range of stressors on corrections officers make difficult any attempt to isolate any one particular stressor. Several factors which are difficult to control for but which may have affected the results of my study nonetheless include the misreporting of environmental stress effects and a small sample size, among others. Survey responses were likely skewed due to both under and over reporting of environment-mediated stress, and future studies should attempt to account for this factor. The sample size was smaller than I had hoped for which reduced the accuracy and weight of answers given for the survey. This is a difficult factor to control for because participation in surveys such as the one use for this



study is voluntary. Regardless, clear trends were noted regarding poor environmental quality and the negative effects it has on officers' perceptions of stress.

The data obtained in my study suggest that the environmental conditions at the Main Jail and the Work Center are of poorer quality than perhaps they were designed for or intended. Finding an appropriate balance between security, utility and a healthful environment is, without question, a difficult task. Still, it begs the question: Why aren't correctional facilities designed to be both durably secure and reasonably pleasant? The answer to this question may lie in the transition that the field of corrections has undergone; jails that were once places of punishment for offenders are now facilities charged with offender rehabilitation. It seems this transition hasn't fully completed, however, because while programs and processes have changed and become more progressive, the design of the facilities themselves have remained largely reminiscent of the standards of the past. Jail administrators should consider more fully the purpose of corrections in relation to the physical facilities when planning facility upgrades as well as when designing entirely new jails. The resulting improvement to the correctional workplace will be beneficial to both officers and inmates, and will reduce the incidence of workplace stress, absenteeism and attrition.

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## Appendices

### Appendix 1: Survey Questionnaire

#### WORKPLACE ENVIRONMENTAL QUALITY SURVEY

This survey is being conducted to determine the environmental quality at your workplace. The questions will ask about your opinion of the environmental conditions at your workplace, including lighting, temperature, air quality and noise, and how they affect you. There are also a few questions about the appearance of your workplace, as well as a few general, non-identifying background questions. The intent of this survey is to help identify aspects of your working conditions that may need improvement.

Please **DO NOT** put your name, personnel number, or any other identifying information on this survey.

Please answer the questions as accurately and completely as you can, regardless of how satisfied or dissatisfied you are with the environmental conditions at your workplace.

**ALL OF YOUR ANSWERS WILL BE TREATED IN THE STRICTEST CONFIDENCE.**

1. I think the environmental conditions (lighting/glare, temperature, air quality, noise) at my workplace make it difficult to concentrate on my work.

Strongly Agree	_____	(1)
Agree	_____	(2)
Neutral	_____	(3)
Disagree	_____	(4)
Strongly Disagree	_____	(5)

2. I think that the overall environmental conditions (lighting/glare, temperature, air quality, noise) at my workplace adversely affect my health.

Strongly Agree	_____	(1)
Agree	_____	(2)
Neutral	_____	(3)
Disagree	_____	(4)
Strongly Disagree	_____	(5)

3. I think that the environmental conditions (lighting/glare, temperature, air quality, noise) at my workplace increase my stress level.

Strongly Agree	_____	(1)
Agree	_____	(2)
Neutral	_____	(3)
Disagree	_____	(4)
Strongly Disagree	_____	(5)

4. On average, how many employees do you work with daily?

1	_____	(1)
2 – 3	_____	(2)
4 – 7	_____	(3)
8+	_____	(4)

5. On average, how many inmates do you work with directly on a daily basis?

1 – 29	_____	(1)
30 – 89	_____	(2)
90 – 149	_____	(3)
149+	_____	(4)

6. Do you notice any change in any of the environmental factors (lighting, temperature, noise, air quality) when working around greater numbers of people?

Yes	_____	(1)
No	_____	(2)

If “Yes,” please describe

### Lighting

7. Please rate the overall lighting at your workplace.

#### 7a. Main Jail

Too Bright/Glaring	_____	(1)
A Little Bright/Glaring	_____	(2)
Adequate	_____	(3)
A Little Dim	_____	(4)
Too Dim	_____	(5)
N/A	_____	(6)

**7b. Work Center**

Too Bright/Glaring	_____	(1)
A Little Bright/Glaring	_____	(2)
Adequate	_____	(3)
A Little Dim	_____	(4)
Too Dim	_____	(5)
N/A	_____	(6)

**Please rate the lighting in the following areas:**

**8a. Break area**

Too Bright/Glaring	_____	(1)
A Little Bright/Glaring	_____	(2)
Adequate	_____	(3)
A Little Dim	_____	(4)
Too Dim	_____	(5)
N/A	_____	(6)

**8b. Booking area**

Too Bright/Glaring	_____	(1)
A Little Bright/Glaring	_____	(2)
Adequate	_____	(3)
A Little Dim	_____	(4)
Too Dim	_____	(5)
N/A	_____	(6)

**8c. First floor cell & visitor booth area**

Too Bright/Glaring	_____	(1)
A Little Bright/Glaring	_____	(2)
Adequate	_____	(3)
A Little Dim	_____	(4)
Too Dim	_____	(5)
N/A	_____	(6)

**8d. First floor 156 area**

Too Bright/Glaring	_____	(1)
A Little Bright/Glaring	_____	(2)
Adequate	_____	(3)
A Little Dim	_____	(4)
Too Dim	_____	(5)
N/A	_____	(6)

**8e. Main Jail Control**

Too Bright/Glaring	_____	(1)
A Little Bright/Glaring	_____	(2)
Adequate	_____	(3)
A Little Dim	_____	(4)
Too Dim	_____	(5)
N/A	_____	(6)

**8f. Second floor general population side**

Too Bright/Glaring	_____	(1)
A Little Bright/Glaring	_____	(2)
Adequate	_____	(3)
A Little Dim	_____	(4)
Too Dim	_____	(5)
N/A	_____	(6)

**8g. Second floor court/medical side**

Too Bright/Glaring	_____	(1)
A Little Bright/Glaring	_____	(2)
Adequate	_____	(3)
A Little Dim	_____	(4)
Too Dim	_____	(5)
N/A	_____	(6)

**8h. Third floor E, F & Iso hall side**

Too Bright/Glaring	_____	(1)
A Little Bright/Glaring	_____	(2)
Adequate	_____	(3)
A Little Dim	_____	(4)
Too Dim	_____	(5)
N/A	_____	(6)

**8i. Third floor G – K side**

Too Bright/Glaring	_____	(1)
A Little Bright/Glaring	_____	(2)
Adequate	_____	(3)
A Little Dim	_____	(4)
Too Dim	_____	(5)
N/A	_____	(6)

**8j. Work Center office area**

Too Bright/Glaring	_____	(1)
A Little Bright/Glaring	_____	(2)
Adequate	_____	(3)
A Little Dim	_____	(4)
Too Dim	_____	(5)
N/A	_____	(6)

**8k. Work Center control**

Too Bright/Glaring	_____	(1)
A Little Bright/Glaring	_____	(2)
Adequate	_____	(3)
A Little Dim	_____	(4)
Too Dim	_____	(5)
N/A	_____	(6)

**8l. Work Center common area**

Too Bright/Glaring	_____	(1)
A Little Bright/Glaring	_____	(2)
Adequate	_____	(3)
A Little Dim	_____	(4)
Too Dim	_____	(5)
N/A	_____	(6)

**8m. Work Center central hallway**

Too Bright/Glaring	_____	(1)
A Little Bright/Glaring	_____	(2)
Adequate	_____	(3)
A Little Dim	_____	(4)
Too Dim	_____	(5)
N/A	_____	(6)

Please include any additional comments, suggestions or concerns about your workplace lighting.

## Temperature

8. Please rate the overall temperature at your workplace.

### 9a. Main Jail

Too warm \_\_\_\_\_ (1)  
A Little warm \_\_\_\_\_ (2)  
Comfortable \_\_\_\_\_ (3)  
A little cold \_\_\_\_\_ (4)  
Too cold \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)

### 9b. Work Center

Too warm \_\_\_\_\_ (1)  
A Little warm \_\_\_\_\_ (2)  
Comfortable \_\_\_\_\_ (3)  
A little cold \_\_\_\_\_ (4)  
Too cold \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)

9. Please rate the temperature in the following areas:

### 10a. Break area

Too warm \_\_\_\_\_ (1)  
A Little warm \_\_\_\_\_ (2)  
Comfortable \_\_\_\_\_ (3)  
A little cold \_\_\_\_\_ (4)  
Too cold \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)

### 10b. Booking area

Too warm \_\_\_\_\_ (1)  
A Little warm \_\_\_\_\_ (2)  
Comfortable \_\_\_\_\_ (3)  
A little cold \_\_\_\_\_ (4)  
Too cold \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)



**10c. First floor cell & visitor booth area**

Too warm \_\_\_\_\_ (1)  
A Little warm \_\_\_\_\_ (2)  
Comfortable \_\_\_\_\_ (3)  
A little cold \_\_\_\_\_ (4)  
Too cold \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)

**10d. First floor 156 area**

Too warm \_\_\_\_\_ (1)  
A Little warm \_\_\_\_\_ (2)  
Comfortable \_\_\_\_\_ (3)  
A little cold \_\_\_\_\_ (4)  
Too cold \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)

**10e. Main Jail Control**

Too warm \_\_\_\_\_ (1)  
A Little warm \_\_\_\_\_ (2)  
Comfortable \_\_\_\_\_ (3)  
A little cold \_\_\_\_\_ (4)  
Too cold \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)

**10f. Second floor general population side**

Too warm \_\_\_\_\_ (1)  
A Little warm \_\_\_\_\_ (2)  
Comfortable \_\_\_\_\_ (3)  
A little cold \_\_\_\_\_ (4)  
Too cold \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)

**10g. Second floor court/medical side**

Too warm \_\_\_\_\_ (1)  
A Little warm \_\_\_\_\_ (2)  
Comfortable \_\_\_\_\_ (3)  
A little cold \_\_\_\_\_ (4)  
Too cold \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)

**10h. Third floor E, F & Iso hall side**

Too warm \_\_\_\_\_ (1)  
A Little warm \_\_\_\_\_ (2)  
Comfortable \_\_\_\_\_ (3)  
A little cold \_\_\_\_\_ (4)  
Too cold \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)

**10i. Third floor G – K side**

Too warm \_\_\_\_\_ (1)  
A Little warm \_\_\_\_\_ (2)  
Comfortable \_\_\_\_\_ (3)  
A little cold \_\_\_\_\_ (4)  
Too cold \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)

**10j. Work Center Office Area**

Too warm \_\_\_\_\_ (1)  
A Little warm \_\_\_\_\_ (2)  
Comfortable \_\_\_\_\_ (3)  
A little cold \_\_\_\_\_ (4)  
Too cold \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)

**10k. Work Center Control**

Too warm \_\_\_\_\_ (1)  
A Little warm \_\_\_\_\_ (2)  
Comfortable \_\_\_\_\_ (3)  
A little cold \_\_\_\_\_ (4)  
Too cold \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)

**10l. Work Center Common Area**

Too warm \_\_\_\_\_ (1)  
A Little warm \_\_\_\_\_ (2)  
Comfortable \_\_\_\_\_ (3)  
A little cold \_\_\_\_\_ (4)  
Too cold \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)

**10m. Work Center Central Hallway**

- Too warm \_\_\_\_\_ (1)
- A Little warm \_\_\_\_\_ (2)
- Comfortable \_\_\_\_\_ (3)
- A little cold \_\_\_\_\_ (4)
- Too cold \_\_\_\_\_ (5)
- N/A \_\_\_\_\_ (6)

**Please include any additional comments, suggestions or concerns about your workplace temperature.**

**Air Quality**

**10. Please rate the overall air quality at your workplace.**

**11a. Main Jail**

- Always fresh \_\_\_\_\_ (1)
- Usually fresh \_\_\_\_\_ (2)
- Adequate \_\_\_\_\_ (3)
- A little stuffy or smelly \_\_\_\_\_ (4)
- Always stuffy or smelly \_\_\_\_\_ (5)

**11b. Work Center**

- Always fresh \_\_\_\_\_ (1)
- Usually fresh \_\_\_\_\_ (2)
- Adequate \_\_\_\_\_ (3)
- A little stuffy or smelly \_\_\_\_\_ (4)
- Always stuffy or smelly \_\_\_\_\_ (5)

**11. Please rate the air quality in the following areas:**

**12a. Break area**

- Always fresh \_\_\_\_\_ (1)
- Usually fresh \_\_\_\_\_ (2)
- Adequate \_\_\_\_\_ (3)
- A little stuffy or smelly \_\_\_\_\_ (4)
- Always stuffy or smelly \_\_\_\_\_ (5)
- N/A \_\_\_\_\_ (6)

**12b. Booking area**

Always fresh \_\_\_\_\_ (1)  
Usually fresh \_\_\_\_\_ (2)  
Adequate \_\_\_\_\_ (3)  
A little stuffy or smelly \_\_\_\_\_ (4)  
Always stuffy or smelly \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)

**12c. First floor cell & visitor booth area**

Always fresh \_\_\_\_\_ (1)  
Usually fresh \_\_\_\_\_ (2)  
Adequate \_\_\_\_\_ (3)  
A little stuffy or smelly \_\_\_\_\_ (4)  
Always stuffy or smelly \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)

**12d. First floor 156 area**

Always fresh \_\_\_\_\_ (1)  
Usually fresh \_\_\_\_\_ (2)  
Adequate \_\_\_\_\_ (3)  
A little stuffy or smelly \_\_\_\_\_ (4)  
Always stuffy or smelly \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)

**12e. Control**

Always fresh \_\_\_\_\_ (1)  
Usually fresh \_\_\_\_\_ (2)  
Adequate \_\_\_\_\_ (3)  
A little stuffy or smelly \_\_\_\_\_ (4)  
Always stuffy or smelly \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)

**12f. Second floor general population side**

Always fresh \_\_\_\_\_ (1)  
Usually fresh \_\_\_\_\_ (2)  
Adequate \_\_\_\_\_ (3)  
A little stuffy or smelly \_\_\_\_\_ (4)  
Always stuffy or smelly \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)

**12g. Second floor court/medical side**

Always fresh \_\_\_\_\_ (1)  
Usually fresh \_\_\_\_\_ (2)  
Adequate \_\_\_\_\_ (3)  
A little stuffy or smelly \_\_\_\_\_ (4)  
Always stuffy or smelly \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)

**12h. Third floor E, F & Iso hall side**

Always fresh \_\_\_\_\_ (1)  
Usually fresh \_\_\_\_\_ (2)  
Adequate \_\_\_\_\_ (3)  
A little stuffy or smelly \_\_\_\_\_ (4)  
Always stuffy or smelly \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)

**12i. Third floor G – K side**

Always fresh \_\_\_\_\_ (1)  
Usually fresh \_\_\_\_\_ (2)  
Adequate \_\_\_\_\_ (3)  
A little stuffy or smelly \_\_\_\_\_ (4)  
Always stuffy or smelly \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)

**12j. Work Center Office Area**

Always fresh \_\_\_\_\_ (1)  
Usually fresh \_\_\_\_\_ (2)  
Adequate \_\_\_\_\_ (3)  
A little stuffy or smelly \_\_\_\_\_ (4)  
Always stuffy or smelly \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)

**12k. Work Center Control**

Always fresh \_\_\_\_\_ (1)  
Usually fresh \_\_\_\_\_ (2)  
Adequate \_\_\_\_\_ (3)  
A little stuffy or smelly \_\_\_\_\_ (4)  
Always stuffy or smelly \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)

**12l. Work Center Common Area**

Always fresh \_\_\_\_\_ (1)  
Usually fresh \_\_\_\_\_ (2)  
Adequate \_\_\_\_\_ (3)  
A little stuffy or smelly \_\_\_\_\_ (4)  
Always stuffy or smelly \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)

**12m. Work Center Central Hallway**

Always fresh \_\_\_\_\_ (1)  
Usually fresh \_\_\_\_\_ (2)  
Adequate \_\_\_\_\_ (3)  
A little stuffy or smelly \_\_\_\_\_ (4)  
Always stuffy or smelly \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)

**Please include any additional comments, suggestions or concerns about your workplace air quality.**

**Noise**

**12. Please rate the overall noise at your workplace.**

**12a. Main Jail**

Too noisy \_\_\_\_\_ (1)  
A little noisy \_\_\_\_\_ (2)  
Adequate \_\_\_\_\_ (3)  
A little quiet \_\_\_\_\_ (4)  
Too quiet \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)

**12b. Work Center**

Too noisy \_\_\_\_\_ (1)  
A little noisy \_\_\_\_\_ (2)  
Adequate \_\_\_\_\_ (3)  
A little quiet \_\_\_\_\_ (4)  
Too quiet \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)

**13. Please rate the noise in the following areas:**

**13a. Break area**

Too noisy \_\_\_\_\_ (1)  
A little noisy \_\_\_\_\_ (2)  
Adequate \_\_\_\_\_ (3)  
A little quiet \_\_\_\_\_ (4)  
Too quiet \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)

**13b. Booking area**

Too noisy \_\_\_\_\_ (1)  
A little noisy \_\_\_\_\_ (2)  
Adequate \_\_\_\_\_ (3)  
A little quiet \_\_\_\_\_ (4)  
Too quiet \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)

**13c. First floor cell & visitor booth area**

Too noisy \_\_\_\_\_ (1)  
A little noisy \_\_\_\_\_ (2)  
Adequate \_\_\_\_\_ (3)  
A little quiet \_\_\_\_\_ (4)  
Too quiet \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)

**13d. First floor 156 area**

Too noisy \_\_\_\_\_ (1)  
A little noisy \_\_\_\_\_ (2)  
Adequate \_\_\_\_\_ (3)  
A little quiet \_\_\_\_\_ (4)  
Too quiet \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)

**13e. Control**

Too noisy \_\_\_\_\_ (1)  
A little noisy \_\_\_\_\_ (2)  
Adequate \_\_\_\_\_ (3)  
A little quiet \_\_\_\_\_ (4)  
Too quiet \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)

**13f. Second floor general population side**

Too noisy \_\_\_\_\_ (1)  
A little noisy \_\_\_\_\_ (2)  
Adequate \_\_\_\_\_ (3)  
A little quiet \_\_\_\_\_ (4)  
Too quiet \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)

**13g. Second floor court/medical side**

Too noisy \_\_\_\_\_ (1)  
A little noisy \_\_\_\_\_ (2)  
Adequate \_\_\_\_\_ (3)  
A little quiet \_\_\_\_\_ (4)  
Too quiet \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)

**13h. Third floor E, F & Iso hall side**

Too noisy \_\_\_\_\_ (1)  
A little noisy \_\_\_\_\_ (2)  
Adequate \_\_\_\_\_ (3)  
A little quiet \_\_\_\_\_ (4)  
Too quiet \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)

**13i. Third floor G – K side**

Too noisy \_\_\_\_\_ (1)  
A little noisy \_\_\_\_\_ (2)  
Adequate \_\_\_\_\_ (3)  
A little quiet \_\_\_\_\_ (4)  
Too quiet \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)

**13j. Work Center Office Area**

Too noisy \_\_\_\_\_ (1)  
A little noisy \_\_\_\_\_ (2)  
Adequate \_\_\_\_\_ (3)  
A little quiet \_\_\_\_\_ (4)  
Too quiet \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)



**13k. Work Center Control**

Too noisy \_\_\_\_\_ (1)  
A little noisy \_\_\_\_\_ (2)  
Adequate \_\_\_\_\_ (3)  
A little quiet \_\_\_\_\_ (4)  
Too quiet \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)

**13l. Work Center Common Area**

Too noisy \_\_\_\_\_ (1)  
A little noisy \_\_\_\_\_ (2)  
Adequate \_\_\_\_\_ (3)  
A little quiet \_\_\_\_\_ (4)  
Too quiet \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)

**13m. Work Center Central Hallway**

Too noisy \_\_\_\_\_ (1)  
A little noisy \_\_\_\_\_ (2)  
Adequate \_\_\_\_\_ (3)  
A little quiet \_\_\_\_\_ (4)  
Too quiet \_\_\_\_\_ (5)  
N/A \_\_\_\_\_ (6)

**Please include any additional comments, suggestions or concerns about your workplace noise.**

**14. Is the noise that occurs at your workplace predictable?**

Yes \_\_\_\_\_ (1)  
No \_\_\_\_\_ (2)

**15. Please describe how the noise at your workplace affects your ability to do your job.**

**16. In the past 12 months have you had more than two episodes of the following *while at work*:**

**16a. Dry eyes**

Yes \_\_\_\_\_ (1)  
No \_\_\_\_\_ (2)

If ~~yes~~,” was this better during your time away from work?

Yes \_\_\_\_\_ (3)  
No \_\_\_\_\_ (4)  
N/A \_\_\_\_\_ (5)

How frequent was the symptom?

Every day \_\_\_\_\_ (6)  
3 – 4 days each week \_\_\_\_\_ (7)  
1 – 2 days each week \_\_\_\_\_ (8)  
Every 2 – 3 weeks \_\_\_\_\_ (9)  
Less often \_\_\_\_\_ (10)  
N/A \_\_\_\_\_ (11)

**16b. Itchy or watery eyes**

Yes \_\_\_\_\_ (1)  
No \_\_\_\_\_ (2)

If ~~yes~~,” was this better on days away from work?

Yes \_\_\_\_\_ (3)  
No \_\_\_\_\_ (4)  
N/A \_\_\_\_\_ (5)

How frequent was the symptom?

Every day \_\_\_\_\_ (6)  
3 – 4 days each week \_\_\_\_\_ (7)  
1 – 2 days each week \_\_\_\_\_ (8)  
Every 2 – 3 weeks \_\_\_\_\_ (9)  
Less often \_\_\_\_\_ (10)  
N/A \_\_\_\_\_ (11)

**16c. Blocked or stuffy nose**

Yes \_\_\_\_\_ (1)  
No \_\_\_\_\_ (2)

If ~~yes~~,” was this better on days away from work?

Yes \_\_\_\_\_ (3)  
No \_\_\_\_\_ (4)  
N/A \_\_\_\_\_ (5)

How frequent was the symptom?

Every day	_____	(6)
3 – 4 days each week	_____	(7)
1 – 2 days each week	_____	(8)
Every 2 – 3 weeks	_____	(9)
Less often	_____	(10)
N/A	_____	(11)

**16d. Runny nose**

Yes	_____	(1)
No	_____	(2)

If –yes,” was this better during your time away from work?

Yes	_____	(3)
No	_____	(4)
N/A	_____	(5)

How frequent was the symptom?

Every day	_____	(6)
3 – 4 days each week	_____	(7)
1 – 2 days each week	_____	(8)
Every 2 – 3 weeks	_____	(9)
Less often	_____	(10)
N/A	_____	(11)

**17. In the past 12 months have you had more than two episodes of the following *while at work*:**

**17a. Dry throat**

Yes	_____	(1)
No	_____	(2)

If –yes,” was this better during your time away from work?

Yes	_____	(3)
No	_____	(4)
N/A	_____	(5)

How frequent was the symptom?

Every day	_____	(6)
3 – 4 days each week	_____	(7)
1 – 2 days each week	_____	(8)
Every 2 – 3 weeks	_____	(9)
Less often	_____	(10)
N/A	_____	(11)

**17b. Lethargy and/or tiredness**

Yes	_____	(1)
No	_____	(2)

If –yes,” was this better during your time away from work?

Yes	_____	(3)
No	_____	(4)
N/A	_____	(5)

How frequent was the symptom?

Every day	_____	(6)
3 – 4 days each week	_____	(7)
1 – 2 days each week	_____	(8)
Every 2 – 3 weeks	_____	(9)
Less often	_____	(10)
N/A	_____	(11)

**17c. Headache**

Yes	_____	(1)
No	_____	(2)

If –yes,” was this better during your time away from work?

Yes	_____	(3)
No	_____	(4)
N/A	_____	(5)

How frequent was the symptom?

Every day	_____	(6)
3 – 4 days each week	_____	(7)
1 – 2 days each week	_____	(8)
Every 2 – 3 weeks	_____	(9)
Less often	_____	(10)
N/A	_____	(11)

**17d. Dry, itching or irritated skin**

Yes	_____	(1)
No	_____	(2)

If “yes,” was this better during your time away from work?

Yes	_____	(3)
No	_____	(4)
N/A	_____	(5)

How frequent was the symptom?

Every day	_____	(6)
3 – 4 days each week	_____	(7)
1 – 2 days each week	_____	(8)
Every 2 – 3 weeks	_____	(9)
Less often	_____	(10)
N/A	_____	(11)

**18. In the past 12 months, have you had any other symptoms that you think are related to your workplace?**

Yes	_____	(1)
No	_____	(2)

**19. Is there carpet on most or all of the floor space where you work most of the time?**

Yes	_____	(1)
No	_____	(2)

**20. During the past three months, have any of the following changes taken place at your workplace?**

- New carpeting \_\_\_\_\_ (1)
- Walls painted \_\_\_\_\_ (2)
- New furniture \_\_\_\_\_ (3)
- New partitions \_\_\_\_\_ (4)
- New wall covering \_\_\_\_\_ (5)
- Water damage \_\_\_\_\_ (6)

**21. In general, how clean is your workplace?**

- Very Clean \_\_\_\_\_ (1)
- Clean \_\_\_\_\_ (2)
- Neutral \_\_\_\_\_ (3)
- Dirty \_\_\_\_\_ (4)
- Very Dirty \_\_\_\_\_ (5)

**22. How often do you use, or are exposed to, the following while at work?  
(check the appropriate box for each item)**

	Several times a day (1)	About once a day (2)	3 to 4 times a week (3)	Less than 3 times a week (4)	Never (5)
Photocopier (1)					
Laser Printer (2)					
Facsimile (FAX) Machine (3)					
Cleaning Agents, Glue, Correction Fluid or Other Odorous Chemicals (4)					

**If you feel your exposure to any of the above adversely affects your health, please explain.**

**Aesthetic Information**

**23. Which building do you work in most of the time?**

The Main Jail Facility \_\_\_\_\_ (1)  
Work Center \_\_\_\_\_ (2)  
Other \_\_\_\_\_ (3)

**24. How long have you worked in the location you specified above?**

Years \_\_\_\_\_ (1)  
Months \_\_\_\_\_ (2)

**25. On average, how many hours per week do you work in the location you specified above?**

Hours Per Week \_\_\_\_\_ (1)

**26. I have a say in the appearance of my workplace.**

Strongly Agree \_\_\_\_\_ (1)  
Agree \_\_\_\_\_ (2)  
Neutral \_\_\_\_\_ (3)  
Disagree \_\_\_\_\_ (4)  
Strongly Disagree \_\_\_\_\_ (5)

**27. I can adjust, rearrange, reorganize and/or otherwise personalize my workplace.**

Strongly Agree \_\_\_\_\_ (1)  
Agree \_\_\_\_\_ (2)  
Neutral \_\_\_\_\_ (3)  
Disagree \_\_\_\_\_ (4)  
Strongly Disagree \_\_\_\_\_ (5)

**28. I think that the way my workplace looks (building materials used, colors used, layout etc.) increases my stress level.**

Strongly Agree \_\_\_\_\_ (1)  
Agree \_\_\_\_\_ (2)  
Neutral \_\_\_\_\_ (3)  
Disagree \_\_\_\_\_ (4)  
Strongly Disagree \_\_\_\_\_ (5)

**29. I think that the way my workplace looks (building materials used, colors used, layout etc.) is acceptable.**

Strongly Agree \_\_\_\_\_ (1)  
Agree \_\_\_\_\_ (2)  
Neutral \_\_\_\_\_ (3)  
Disagree \_\_\_\_\_ (4)  
Strongly Disagree \_\_\_\_\_ (5)

**30. What changes/improvements to the appearance of your work place would you like to occur?**

**Background Information**

**31. What is your gender?**

Male \_\_\_\_\_ (1)  
Female \_\_\_\_\_ (2)

**32. How old were you on your last birthday?**

20 – 29 \_\_\_\_\_ (1)  
30 – 39 \_\_\_\_\_ (2)  
40 – 49 \_\_\_\_\_ (3)  
50 – 59 \_\_\_\_\_ (4)  
60+ \_\_\_\_\_ (5)

**33. What is your smoking status?**

Never smoked \_\_\_\_\_ (1)  
Former smoker \_\_\_\_\_ (2)  
Current smoker \_\_\_\_\_ (3)

**34. Do you consider yourself especially sensitive to odors, scents, smoke or other airborne substances?**

Yes \_\_\_\_\_ (1)  
No \_\_\_\_\_ (2)



**35. What type of corrective lenses do you usually wear while at your workplace?**

Glasses \_\_\_\_\_ (1)  
Bifocals \_\_\_\_\_ (2)  
Contact Lenses \_\_\_\_\_ (3)  
None \_\_\_\_\_ (4)

**36. Do you have any known hearing loss?**

Yes \_\_\_\_\_ (1)  
No \_\_\_\_\_ (2)

**37. Have you ever been told by a physician that you have or had any of the following?**

Migraine	Yes _____ (1)	No _____ (2)
Asthma	Yes _____ (3)	No _____ (4)
Eczema	Yes _____ (5)	No _____ (6)
Hay Fever	Yes _____ (7)	No _____ (8)
Dust Allergy	Yes _____ (9)	No _____ (10)
Mold Allergy	Yes _____ (11)	No _____ (12)

**38. If “yes” to any of the above, did this occur after you started working in the location you specified?**

Yes \_\_\_\_\_ (1)  
No \_\_\_\_\_ (2)  
N/A \_\_\_\_\_ (3)

**39. Please indicate which occurred after you started working in the location you specified above (check all that apply).**

Migraine \_\_\_\_\_ (1)  
Asthma \_\_\_\_\_ (2)  
Eczema \_\_\_\_\_ (3)  
Hay Fever \_\_\_\_\_ (4)  
Dust Allergy \_\_\_\_\_ (5)  
Mold Allergy \_\_\_\_\_ (6)

**Thank you for your participation. Please place your completed survey in the pre-addressed envelope supplied and return it via US Mail.**

## **Appendix 2: Informed Consent Letter**

### **Study Intentions and Benefits**

Stress is a part of every workplace and each person copes with stress differently. Corrections Deputies in particular work under highly stressful conditions. Stressors can be many different things, including job demands, the level of control someone has over their job, pressure from administrators, and conflicts with coworkers and inmates among others. Workplace environmental conditions, including lighting, temperature, noise, and air quality are often overlooked stressors because their effects are subtle. This study will examine workplace environmental conditions in a correctional setting to determine how they affect workers. The results of this study will provide information which may help improve the correctional workplace. Chief Jones intends to use the environmental data collected to improve the environmental design of the new jail facility.

### **As a voluntary participant in this study, I understand that:**

I must be at least 18 years of age to participate in this study, and by signing this form I am not waiving my legal rights to protection.

This research will involve answering questions about the environmental conditions at the Main Jail facility, The Work Center, or any other workplace I occupy while performing my job as a Corrections Deputy or Corrections Support Staff.

The survey should take approximately 15 – 20 minutes to complete, depending on how much information I wish to provide.

This research will only involve participating in a survey, and will not put me at risk of physical, mental, emotional, or other harm. Additionally, my participation in this study will not provide me with any monetary, promotional or other benefits. I may benefit from this research, however, by understanding more about how environmental conditions may affect my perception of stress, as well as my ability to cope with stress.

I understand that I am not required to answer every question, and I have the right to stop answering the questions at any time if I feel uncomfortable in any way. If I choose to stop answering the survey questions I will not face any penalty or other discredit.

The survey will not ask for any personally identifying information, will not be marked or numbered in any way, and all information that I provide to the researcher will be anonymous. At the end of this study, all survey data will be destroyed.

The only document that will have my name on it is the consent form, which I must sign if I wish to participate in this study. I will receive a copy of the signed consent

form. The copy of the consent form the researcher keeps will be kept in a locked file cabinet in a locked office, separate from all other information and materials used in this study.

If I have any questions about this research, my rights as a research subject, or feel that I have suffered any adverse consequences as a result of my participation in this study, I can contact Dr. Michael Grimes at (360) 650-3614 or Geri Walker, Director, Office of Research and Sponsored Programs, Western Washington University, at (360) 650-3082.

**I understand this form and voluntarily agree to participate in this study.**

---

Participant's Signature

Participant's Printed Name

Date