FIREFIGHTERS: HOSTILITY AND SATISFACTION WITH LIFE, JOB, AND MARITAL RELATIONSHIP

by

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Abstract

Hostility is associated with negative health outcomes. Empirical research has indicated that high levels of hostility, in association with personal characteristics, may result in either aggressive actions and re-actions, or isolation and disengagement. The purpose of this study was to investigate hostility and its influence on mental health, overall satisfaction with life, job, and marital relationship, and cardiovascular health of professional firefighters. The study was analyzed in the context of Social Ecology Theory exploring how personality, spousal relationship, and social factors influenced the relationship between work and health. Firefighters were invited to engage their romantic partners in the study assessing how work stress impacted intimate relationships. Data analyses involved structural equation modeling, as well as repeated measures multivariate analysis of variance and multilinear regressions. The results indicated that work stress and exposure to toxic environment and hazardous conditions have a negative impact on the mental health and overall satisfaction of firefighters, but not on hostility. When controlling for personality, openness to experience revealed a significant relationship between work and hostility. No significant relationships were observed either between hostility and domestic conflict or between hostility and cardiovascular health.

Keywords: firefighters, mental health, occupational exposure, life satisfaction, marital satisfaction, job satisfaction, work-related stress, non-work related stress, personality traits, and hostility.

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Dedication

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Chapter One: Firefighters, Hostility and Overall Satisfaction with Life, Job, and Marital Relationship: a Review of the Empirical Literature

The existing literature analyzing occupational stress illustrates the fact that work conditions and job demands can create high levels of stress (Grebner, Semmer, & Elfering, 2005; Kelloway & Day, 2005; Loretto et al., 2005) and discusses the effects of work-related stress on individual health and general well-being (Dollard & Winefield, 1998; Ettner & Grzywacz, 2001; Judge, Ilies, & Scott, 2006). There has been an abundance of research in the area of work-related stress analyzing a variety of professional occupations, work environments, and workplace characteristics; however, the literature remains limited in regards to addressing the potential link between personal characteristics of the individual, such as personality, attitudes towards work, coping skills, or ability to establish good social support, and the work performed, as well as the influence on health, well-being, and overall satisfaction with life, work, and family with respect to professional firefighters (Murphy et al., 1999; Wagner et al., 2010). This lack of empirical work on this specific occupational group is rather surprising when considering the prevalent opinion that firefighting is seen as a very demanding, unsafe, and stressful occupation that can negatively impact individual health and perceived overall satisfaction with job, life, and marital satisfaction (Smith et al., 2011). The particularities and requirements of the work, the complexity and unknown characteristics of the work environment, as well as the paramilitary hierarchical structure and bureaucratic rules and regulations applied within the workplace, make firefighting one of the most difficult and challenging occupations.

Firefighters, along with police officers, emergency medical technicians and other first

responders, are individuals trained to respond to crises and other emergency situations. Although various professions within the emergency services field appear to share commonalities among their distinct fields of activity, the details of day-to-day routines and duties, as well as responsibilities in the workplace, and the skill sets required to perform the job differ according to each occupational group. Firefighters have a specific mandate to protect safety at the population and community level. Through performance of occupational duties, firefighters are often challenged to face and respond to crisis situations, shocking and traumatic realities, and life-threatening events. Their work requires contact and interaction with people in crisis and disturbing situations, with a great likelihood of being challenged by interactions that can be adversarial and unpredictable in nature. As a result, the ever-present threat resulting from the direct interaction with individuals facing emergency situations emphasizes the complexity and difficulty of this type of work (Griffin & Bernard, 2003, Wagner et al., 2010).

Predictors of Occupational Stress for Firefighting Work

The predictors of occupational stress in the case of firefighting are complex and multifaceted; these workplace stressors should be carefully considered collectively rather than being explored in isolation. Parker and DeCotiis (1983) emphasized the fact that organizational determinants of job stress should be viewed as "both multidimensional and variable, with a potential for variation in the level of intensity associated with each dimension" (p.161). As such, a more careful exploration of the predictors of occupational stress in the case of firefighting should aim to combine work and personal characteristics of the individual, family and spousal relationships and life interests, as well as the interactions among these elements in the context of health, wellbeing, and quality of life.

The extant literature analyzed the factors predicting stress and burnout among firefighters or police officers (Beaton, Murphy, Johnson, Pike & Corneil, 1999; Carey, Al-Zaiti, Dean, Sessanna, & Finnell, 2011; Wagner et al., 2010), explored the impact of work-family conflict on the job satisfaction of firefighters (Moreno-Jimenez et al., 2008), discussed personality traits and mental health of firefighters and recruits (Heinrichs et al., 2005; Wagner et al., 2016) or analyzed the response of organizations to the recommendations following a study about stress among firefighters (Murphy et al., 1999). For example, in a dual-site longitudinal prospective study, Murphy et al. (1999) synthesized the main factors leading to stress in the case of firefighting work. Each of the following factors was directly correlated to stress and burnout: the organization of fire departments, exposure to repetitive and frequent trauma, change in firefighter duties, changes in fire service demographics, and, due to the very hierarchical paramilitary structure of the fire departments, lack of control over and decision-making regarding how work is performed. In addition, the fire departments' bureaucratic structure, paramilitary regime, and complicated hierarchical structure may create barriers to effective communication and feedback for the job. However, Beaton et al. (1997) reported that social support at work was inversely correlated with stress symptomatology: the stronger the support and bonding at work, the lower the occupational stress perceived by the firefighters. This is not to say that only work environment and work characteristics have a role in determining the health and wellbeing of individuals working in the firefighting field; work-family conflict is another interface that might contribute to stress. The complex nature of firefighting, with long hours at the fire hall as a result of understaffing and/or lack of flexibility in scheduling work shifts, might negatively interfere with family schedules, thereby adding another layer of stress by creating conflict and distress at the family level.

As such, in agreement with the growing body of literature on occupational stress, the main components of firefighting influencing the way firefighters perceive their work experiences and work environment are considered to be the following: the hiring process, individual characteristics, nature of work, professional prestige and social status, workplace norms, job characteristics, and job satisfaction.

Hiring Process and Individual Characteristics

Indviduals employed in firefighting services have to be physically and psychologically prepared to deal with everyday work related hassles and challenges, exposure to hazards and toxic environments, and crisis situations. The recruitment process is very rigorous, selecting those individuals who have the physical and psychological capabilities to respond to the demands of the job. As such, candidates for firefighting jobs are required to complete medical examinations and intense physical ability tests, as well as assessments of knowledge, abilities, skills, and psychological criteria (i.e., personality characteristics). The hiring protocol indicates that the recruitment process for firefighters is multifaceted providing a complex assessment of the physical abilities and a comprehensive evaluation of the psychological characteristics of the potential candidate for the job.

Previous literature has supported the importance of the roles of individual characteristics and personal resources in mitigating the interaction between work and health (Elovainio, Kivimaki, Steen, & Kalliomaki-Levanto, 2000; Ettner & Grzywacz, 2001; Pines, 2004; Polanyi & Tompa, 2004; Santos et al., 1998; Wang & Patten, 2001; Yost & Lucas, 2002). It has been demonstrated that certain characteristic traits, such as anxiety or hostility, may have a strong influence on how work experience and job satisfaction are perceived (Elovainio et al., 2000). As such, individuals scoring high on trait anxiety would be more

likely to report higher levels of dissatisfaction with their job compared to individuals scoring low on trait anxiety. In addition, individual perspectives on work and health are greatly influenced by personal characteristics and environment (Ettner & Grzywacz, 2001). For example, individuals reporting high levels of extraversion and a great degree of control over their work and work environment are more likely to perceive work as having a positive influence on their health, as opposed to individuals scoring high on neuroticism and working long hours or shift work.

In the same vein, Polanyi and Tompa (2004) discussed the importance of aligning personal characteristics of the individual, values, and interests with work characteristics. Consequently, the quality of work experience may be influenced not only by work environment and job characteristics, but also by the match between workplace and individual expectations and prospects from the workplace. It is important to acknowledge that a poor fit among individual personality, values, attitudes, and work environment can lead to negative work experiences, which have an adverse effect on health; conversely, a fit between the work environment and the skills and abilities required by the job, along with a positive attitude in dealing with the work demands, would more likely lead to high levels of satisfaction with the job and low levels of occupational stress (Elovainio et al., 2000; Kelloway & Day, 2005; Marchand, Demers, & Durand, 2005; Wang & Patten, 2001; Yost & Lucas, 2002).

Lambert, Benight, Harrison, and Cislak (2011) discussed the coping self-efficacy in firefighters as a key factor defining the ability to deal with stressors under various circumstances. In the case of firefighters, coping self-efficacy skills assist with the individual appraisal process and lead to self-belief and confidence in the ability to complete the tasks and work-demands. According to Lambert et al. (2011), high coping self-efficacy traits will

provide the individual the ability to successfully adapt to extreme stress, manage emotional reactivity when facing complex circumstances, and feel self-confident about dealing with the ongoing demands in the workplace and in personal life. Alternately, low coping self-efficacy traits will lead to feelings of insecurity, anxiety about not being able to get the job done, self-doubt, and giving up when confronted with various challenges. Research has demonstrated that not all firefighters develop mental health problems due to exposure to traumatic and stressful events; some individuals are able to cope better than others when faced with the exacerbating effects of intense professional stressors, indicating that personal resources, such as coping self-efficacy traits, combined with personal characteristics and social support, play an important role in mitigating the effect of stress on psychological wellbeing (Sommerfeld, Wagner, Harder & Schmidt, 2017).

Nature of Work

Rotating shift work, overtime, overload, irregular workload, and shift patterns are considered to be major predictors of ill health (Beaton & Murphy, 1993; D'Alonzo & Krachman, 2000; Saijo, Ueno, & Hashimoto, 2008). This irregular work regimen can cause both subjective fatigue, characterized by a sense of exhaustion, reduced alertness, and diminished mental performance (Saijo et al., 2008), and objective fatigue, with a negative impact on physiological functioning of the body (Takeyama et al., 2005). Disruption in the internal circadian rhythm, which regulates internal bodily functions, such as sleep-wake cycles, hormone release, eating habits, digestion, and/or body temperature, and, more importantly, is unable to instantaneously adjust to changes in routine, represents one of the most disturbing stressors for shift workers (Saijo et al., 2008; Takeyama et al., 2005). Some research has indicated that shift workers learn to adjust to the unexpected and irregular

patterns of their jobs by using their individual adaptive mechanisms and coping resources, such as emotional suppression, depersonalization, desensitization, and sometimes humor (Miller, 1995; Swenson et al., 2008). In the case of firefighters, shift work and sleep deprivation can create tension both at work and home by leading to excessive fatigue, irritability, and over-reactivity to conflict. Rotating shifts can disrupt family life due to a reduced ability to attend to social and family interactions, as well as inability to develop and/or sustain personal relationships and social connections. In addition to the emotional and cognitive impairment and the strain of the job, shift work can negatively influence the state of health of the individual, including physical, mental health, and social wellbeing. While it is still not clear what individual resources and coping mechanisms or personal resources can help firefighters be more successful in their effort to reduce the adverse impact of shift work on health and overall satisfaction, existing research proposes some workplace interventions and organizational strategies intended to alleviate the negative effect of work arrangements on overall satisfaction with job, life, and family (Saijo et al., 2008; Swenson et al., 2008; Takeyama et al., 2005).

Professional Prestige and Social Status

Firefighting is considered to be very important for the community. Studies linking professional prestige and social and community integration demonstrate that work quality and social recognition are significant motivators for individuals to become actively involved in community work (Wickrama, Lorenz, Conger, Matthews & Elder, 1997). The firefighting role is, generally, highly regarded by society. Firefighters' service to the community is not only highly valued and appreciated, but also fully visible at the community level and to individual community members; their work is well featured in the media, presented at

charitable campaigns in supporting good causes not related to their line of work, and actively involved in educational and instructional activities advocating for diverse social issues regarding both adults and children (Miller, 1995). This positive image of the social status and professional prestige attached to the firefighting job may be among the main reasons for choosing a career as a firefighter. In addition, this community engagement may play a significant role in promoting wellbeing and overall satisfaction among these individuals (Wickrama et al., 1997).

Workplace Norms and Job Characteristics as Predictors for Job Satisfaction

Workplace Norms

Fire departments are structured on hierarchical paramilitary bureaucracies. They operate on procedures that are designed for efficiency, strong enforcement of rules, regulations, and discipline, with less encouragement for individual creativity and decision latitude (Murphy et al., 1999). These workplaces are characterized by complex and strict norms, which have the role of creating boundaries, defining responsibilities, and providing role clarity. Thus participants in the workplace are expected to behave, interact, and produce outcomes following certain protocols (Hammer, Saksvik, Nytro, Torvatn, & Bayazit , 2004). However, despite the fact that workplace norms have the potential to reduce work related stress and conflict by limiting role ambiguity and promoting role clarity, there are situations when workplace norms and expectations are incompatible with individual personal values or standards. When there is no fit between personal characteristics, values, abilities and interests of the individual, and the demands and expectations of the work environment, the mismatch is assumed to lead to job dissatisfaction, low job performance, health issues, and to create stress and psychological tension for participants in the work process (Caplan, 1975;

Kelloway & Day, 2005).

Research has demonstrated that the stricter the workplace values, expectations, and regulations, the higher the level of stress at the organizational level (Hammer et al., 2004). These findings are supported by Kop, Euwema, and Schaufeli (2010), who demonstrated that organizational stressors, such as poor management, bad mutual relationships, and lack of communication are important factors in defining employee behaviour and wellbeing. In the case of fire departments, where strict protocols are implemented and have to be followed in a diligent, timely, and competent manner, organizational norms (i.e., the rules and expectations placed on the nature of the exchange relationship between co-workers, or firefighters and the public), are considered to be important contributors to overall level of stress and dissatisfaction perceived by firefighters. According to Murphy et al. (1999), most fire departments "have rigid, paramilitary administrative structures with a 'chain of command' that can make some forms of communication difficult. Yet teamwork and communication are essential for the success of emergency services" (p.180).

Job Characteristics

In addition to workplace norms, job characteristics are important factors that can influence the quality of working life, and perceived satisfaction with job and organization. Thus, workload and work pace, role conflict and role ambiguity, work scheduling, workplace support, job demand, and job control, represent significant stressors that need to be taken into consideration when analyzing the effect of work on the health of individuals (Carey et al., 2011; Grebner, Semmer, & Elfering, 2005; Kelloway & Day, 2005). Numerous empirical studies have demonstrated the negative impact of work overload, time pressure, staff shortage, and inadequate personnel resources on health, and identified them as important

predictors of stress and dissatisfaction (Castle & Martin, 2006; Cullen, Lemming, Link, & Wozniak, 1985; Kelloway & Day, 2005; Martinussen, Richardsen & Burke, 2007; Saijo et al., 2008).

Although organizational factors may have a strong impact on individual perception of job stress, personal characteristics of the individual (i.e., personality traits, attitudes towards work, ability to establish good social support, etc.) are also considered important predictors of occupational stress, with high levels of cynicism, anger, isolation from family and social interactions positively associated with high levels of reported job stress (Burke, 1994). Interestingly, the literature discussing firefighting indicates that firefighters' groups are more likely to complain of physical problems, such as hypertension, cardiovascular disease, and/or low cardiorespiratory fitness, as opposed to reporting job related stress as a specific outcome (Donovan et al., 2009; Miller et al., 1996). However, research on the general population has demonstrated a strong link between health conditions, particularly those related to cardiovascular and gastrointestinal issues, and personal attitudes and characteristics, such as cynicism, anger, pessimism, and hostility (Kop et al., 1999; Miller et al., 1996). Hostile individuals, who tend to overreact to stressors and interpersonal challenges in a negative way, experience greater physiological reactivity (e.g., higher level of heart rate and blood pressure) when exposed to continuous stress (Enkelmann et al., 2005). In the case of firefighters, whose security in the workplace depends on individual ability to make sharp decisions and follow protocols in critical situations, role conflict and role ambiguity may be associated with higher levels of frustration, hostility, anger, and aggression.

Job Satisfaction

In addition to job demands and job characteristics, job satisfaction not only is

considered to be a significant predictor of the quality of working experience and work related stress, but also a desirable work outcome. Job satisfaction describes how meaningful, inspirational, and motivational a job is for an individual. Therefore, high levels of satisfaction with job and work environment should result in low occupational stress, low job turnover, and absenteeism rate, as well as a low level of job burnout (Grebner, Semmer, & Elfering, 2005; Kelloway & Day, 2005; Loretto et al., 2005). In an attempt to explain the relationship between job satisfaction and individual and organizational characteristics, Ettner and Grzywacz (2001) presented a social ecological perspective that refers to individual and environmental characteristics that can contribute to and influence personal perception in terms of quality of work experience. Each individual perceives work experiences according to their unique characteristics and attributes, such as gender, age, cultural background, personality, and education level. As such, women perceive as more significant the interrelationship between work and family and the ability to successfully fulfill multiple roles (i.e., firefighter, wife, mother, and caregiver); in contrast, men are seen as primarily concerned about effectively performing their role in the workplace, leaving family roles and responsibilities on a secondary plane (Ettner & Grzywacz, 2001). Although having multiple roles allows for more opportunities for achievement and accomplishment, generating positive feelings of gratification, confidence and self-reliance, conflicting roles can lead to stress accumulation, dissatisfaction with job, life, and family or spousal relationship, and negative emotions. Age and education level can also alter the quality of work experiences according to individual status and perspective on work and life. Older individuals report higher levels of satisfaction with their job and lower level of burnout (Martinussen et al., 2007), yet higher education can be negatively associated with job satisfaction due to underutilization of skills

and lack of opportunities for advancement. However, a recent study conducted on Australian firefighters demonstrated that older age was significantly correlated with higher occupational distress (Chamberlain & Green, 2010).

Although the Social Ecological model consideres individual attributes, such as gender, level of education, and age in relationship with perceived job satisfaction, it is also important to consider the impact of personality characteristics on firefighters' perceptions of the work environment and job. As such, hostile and angry individuals, who, under difficult and demanding work circumstances, are considered to fare badly in terms of physiological reactivity (e.g., high blood pressure, elevated levels of nervousness, frequent headaches or stomachaches), are at greater risk of feeling dissatisfied with their job, life, and family (Elovainio et al., 2000; Ettner & Grzywacz, 2001; Judge et al., 2006; Kelloway & Day, 2005). According to the Social Ecological model, it can be argued that personality traits, specifically hostility, may play a significant role in mediating the work-stress process and overall satisfaction. Furthermore, considering the nature of firefighting, which is characterized by routine, frequent interactions with distressing and unpredictable situations, safety concerns, as well as by strict administrative and organizational policies and procedures, firefighters may be at increased risk of poor health and experience high levels of occupational stress.

Environmental factors defined by organizational influences, such as managerial and supervisor support, good co-worker support, and social relations of work, also have positive influences on workers' attitudes and behaviours towards their job. As such, organizational clarity, decision-making opportunities, possibilities for growth, effort-reward balance, as well as support in the workplace are factors that have the power to determine the quality of work

experience and impact the perspective on work for participants in the work process. When applied to firefighters, the model demonstrates that organizational climate exerts a stronger influence on the level of perceived job satisfaction in comparison with personal characteristics and attributes (Beaton et al., 1997; Saijo et al., 2008). Despite the fact that most of the empirical research to date underlines the dominating role played by organizational factors in determining the level of reported job satisfaction, there are studies demonstrating how variability at the individual level significantly influences reporting on job satisfaction (Elovainio et al., 2000).

Work and Home Stress

As work and its characteristics play a vital role in the way people perceive the quality of their lives, it is also important to discuss the interrelationship and overlap between work and non-work domains (Hammer et al., 2004; Judge et al., 2006). The general consensus is that the two domains are closely interconnected, strongly influencing each other. The boundaries between the domains are permeable, allowing stress to spillover from one sphere into another. As such, family conflict can be created by excessive accumulation of stress at work due to the challenging and unrewarding nature of the job, overwork, or lack of support in the workplace. The work-family conflict generates tension and discomfort at home, high levels of dissatisfaction with family, and less time fulfilling family roles. Conversely, satisfaction with job and work environment can create a positive climate at home resulting in quality family time and successfully fulfilling family roles (Kendall & Muenchberger, 2009; Moreno-Jimenez, Mayo, Sanz-Vergel, Rodriguez-Munoz, & Garrosa, 2008).

With more women entering the workforce and increasingly being involved in non-traditional careers, there has been a change in the relationship between work and family. The

changing aspects of family and home have resulted in a reciprocal impact on the work domain. Therefore, in the new context, dual-career families have to juggle and fulfill various work and family roles and are exposed to both work-to-family and also family-to-work conflict. This situation can create a double conflict, having a negative impact on both domains, and can result in over generalized dissatisfaction. It has been argued that women who work outside of home and are married with children are more affected by the work-family conflict than single women or women without children (Karasek & Theorell, 1990; O'Driscoll, Ilgen, & Hildreth, 1992). In a similar vein, in the case of female firefighters, it can be reasoned that this conflict can be a major source of stress due to the nature of the job itself, the expectations placed on these women at work, and the various roles they have to fulfill within the family. It should be mentioned that, despite modern changes in mentality regarding gender-roles, there still exists an expectation that women are to behave in a certain way and tend to their family and home, whereas men are to be the breadwinners and protectors of their families. For female firefighters, the work-family conflict can be exacerbated through the discrepancy of behavior based expectations required in the workplace and at home (e.g., emergency first responder as opposed to mother of young children, or firefighter as opposed to caring wife) and the time constraint to fulfill all the roles at work and within the family. In the case of male firefighters, the work-family conflict would stem primarily from the inability to fulfill family role expectations due to excessive commitment at work, long work hours and overtime due to staff shortages, shift work, and taking on extra responsibilities.

Meltzer (2002) supported the idea that dangerous male-dominated occupations, such as firefighting, have the potential to spill over and influence the level of dissatisfaction and

conflict at the family level. Consequently, according to the situation, the spouses would partake in the distress and dissatisfaction of the firefighters, or, conversely, share the satisfaction of a rewarding job. Partaking in positive or negative work experiences, gives the couple the opportunity to provide beneficial support to each other (Judge et al., 2006; Marchand et al., 2005), thus attenuating the impact of work-related stressors on overall satisfaction with job, life, and family. However, there are situations when it is rather convenient to pass the dissatisfaction and unfulfillment resulting from work issues onto family members and significant others, creating conflict at home and potentially hurtful actions towards an intimate partners or family members (Anderson & Lo, 2011; Burke, 1994; Jackson & Maslach, 1982; Judge et al., 2006); this spillover can create hardship on the couple, debilitating the marital relationship, and increasing adversity and alienation at the couple level.

Hostility and the Work-Family Context

Hostility, as a character trait, has a negative influence on and is linked with low tolerance to stress and coping abilities. Trait hostility is defined as a personality characteristic referring to a set of beliefs associated with angry internal reactions towards various situations, contexts, and also towards other individuals. Despite the fact that research demonstrates a positive relationship among hostility, anger, and aggression, it is necessary to stress that these constructs represent different dimensions of trait hostility. Hostility refers to a cognitive-attitudinal component, represented by the fact that other people are unworthy, and therefore subject to cynicism, mistrust, and resentfulness; but the other two components (anger and aggression) pertain to affective-subjective negative emotion and behaviour (Judge

et al., 2006; Sanz, Garcia-Vera, & Magan, 2010).

According to current empirical research, hostile individuals have the tendency to interpret information in a negative and malicious manner, exhibit physiological and psychological arousal, and negatively react to situational factors (Anderson & Lo, 2011; Hart & Hope, 2004; Judge et al., 2006). As such, hostility should not be viewed as a cognitive attitude only, but also as a negative emotion. In a study analyzing work-family conflict and emotions, Judge et al. (2006) demonstrated that hostile individuals were more likely to overreact to negative events, as well as to report heightened perception of negative emotions and conflict both at work and home. Consequently, negative emotional states associated with conflicting events at work or at home will be more likely to result in attitudinal implications for colleagues in the workplace or for significant others at home. Due to the firefighting culture which endorses "internal solidarity" based on loyalty, privacy, and mutual support, firefighters tend to have stronger affinity and willingness to share their emotions and frustrations with their fellow colleagues than with their significant others (Sommerfeld, Wagner, Harder & Schmidt, 2017). Thus, firefighters may be more inclined to preserve good and constructive relationships at work and particularly rely on the unquestioned support from co-workers and peers. As the firefighting work culture encourages team work, firefighters may be more inclined to share and vent out their emotions and dissatisfactions with their peers at work and more likely to set free their frustrations, hostility, cynicism, and anger on their family members. This is not to say that family support is not important. A good spousal relationship may encourage sharing and debriefing of negative work experiences and frustrations related to employment with their families, friends, and significant others, in the comfort of their home; thus, providing firefighters with reliable support and soothing release

of their negative emotions, anger, and aggressiveness accumulated throughout the daily hassles at work.

Hostility and Cardiovascular Health

Hostility is considered a significant risk factor in the development of cardiovascular disease in the general population (Friedman, 1990). As such, hostility associated with extreme job strain and multiple high-risk exposures characteristic to the firefighting occupation could be linked to increased cardiovascular reactivity. Although the empirical research conducted to date in relationship to cardiovascular disease of firefighters is inconclusive, mainly due to the "healthy worker effect" explained through the rigorous selection during the hiring process, and/or the regular health check-ups during the time of employment, there is significant consensus that firefighters are at increased risk of developing acute coronary disease and high blood pressure due to their complex work environment and occupational exposures (Crawford & Graveling, 2012; Kirkham, Koehoorn, Davies, & Demers, 2011). Carey et al. (2011) indicated that firefighters have a four-fold higher risk of cardiovascular mortality compared to other first responders. On March 10, 2014, the Government of British Columbia proposed an amendment to the Workers Compensation Act to restore heart disease in firefighters as a presumptive disease. Under the proposed amendment, "if a firefighter suffers from heart disease or a heart injury, including heart attack, it will be presumed to be due to their work as a firefighter unless the contrary is proved" (BC Workers Compensation Act, 2018). Recent research conducted on American firefighters who died of cardiovascular issues demonstrated that 73% of these deaths occurred while firefighters were doing intense physical activity (American Academy of Neurology, 2014). These results suggest the premise that, despite their strong physical

condition and apparent state of good health, firefighters' cardiopulmonary fitness might be continuously challenged by a complex of factors, such as the intensity of the work they perform, environmental factors, and/or specific characteristics of their personality (e.g., hostility trait) (Donovan et al., 2009).

Couple conflict may also have a negative influence on cardiovascular health. Although still inconclusive, empirical research has demonstrated that couple dissatisfaction and inability to communicate and resolve marital conflict could lead to high blood pressure, increased heart rate, and blood-glucose levels (Rankin-Esquer, Deeter, & Barr Taylor, 1997). In addition, associating neurotic personality characteristics (e.g., hostility) with domestic conflict would appear to be a significant risk factor in the development of cardiovascular disease, as it is linked with negative emotions, damaging attitudes, and poor health (Janisse, 1988; Sanz et al., 2010). Hostile individuals are more likely to experience high levels of anger and negative moods, and they are also considered more likely to respond poorly to stressors and negatively react to angry feelings. In the case of firefighting which is characterized as a high demand and high-risk occupation, individual reactivity to environmental stressors would be aggravated and would have a negative impact on overall satisfaction with life, marital relationship, and work, and, eventually, would lead to poor health in general, and increased risk of developing cardiovascular disease, in particular (King, 2012; Vahtera, Kivimaki, Uutela, & Pentti, 2000).

Chapter Two: Conceptual Framework

Numerous theories exist explaining the link between work-related stress factors and health. However, Social Ecology Theory, as proposed by Stokols (1992), is one of the frameworks used in occupational stress research. This theory focuses on both the person and the environment, and suggests that individual dispositions, resources, and characteristics shape perceptions of how employment influences health (Ettner & Grzywacz, 2001) by taking into consideration not only the workplace environment but also social, family/marital context, and individual characteristics. It provides the opportunity to analyze mutual associations and interactions between individual or collective behaviour and the surrounding environment thus providing a comprehensive framework for understanding how individual characteristics, dispositions, and resources may influence the way employment is perceived as having a positive or negative impact on personal health, family interaction, and overall wellbeing.

Due to its multidimensional approach, this theoretical framework has recently gained popularity and has been employed in health promotion programs and health related practices used for both large scale preventative strategies of public health, as well as for individual level behavioural strategies. Current research suggests the importance of considering not only multiple dimensions when studying the fit between the individual and their environments, but also considering multiple levels related to individuals, groups, or organizations/communities, and also the characteristics of the situations in which they are involved on a day to day basis (Karasek & Theorell, 1990; Rogers-Warren & Warren, 1977; Stokols, 1992). The model originates its view on three main assumptions.

The first assumption considers the fact that individuals are both influenced by their

environments and have an influence on the way their environments evolve and change around them; there is a mutual influence between person and environment that needs to be taken into consideration when analyzing the relationships that exist among these elements. For instance, individuals who score high on the hostility trait may report poor health, poor family and social relationships, and poor coping skills. This can be a result of personal genetic characteristics but can also be attributed to the influences of the work environment, family relationship, educational, and social contexts. Similarly, stressful and highly demanding work environments can be altered to promote a healthier environment through individual and collective actions of the participants in that environment.

Secondly, a comprehensive analysis of health should include multidimensional and multilevel approaches considering individuals, environments, and the quality of the person-environment fit. In the case of individuals, such approaches should look into personal attributes, resources, skills, and abilities that will assist the individual to cope and adjust to their physical and social environment. For example, empirical evidence suggests that being happily married and being meaningfully employed may translate into better health and engagement in healthy lifestyle (Grzywacz & Fuqua, 2000). Happily married people spend time with their family members, share ideas with their group, help and rely on each other when in need or crisis, and socialize more. This supportive milieu may have a positive influence on lifestyle choices, perception of satisfaction, and overall wellbeing. Similarly, taking into consideration individual traits, personality characteristics may play an important role in how health, satisfaction, and wellbeing are perceived by each individual. Research has demonstrated that extraversion fosters positive emotions and energy that may translate into positive perceptions of health, whereas neuroticism has been linked to negative perceptions

of health (Ettner & Grzywacz, 2001; Galo & Smith, 1997; Hart & Hope, 2004). However, it is expected that other environmental and social layers of interaction, such as a supportive family environment, would positively mitigate any negative effects due to personal characteristics and individual traits. At the organizational and work environment level, a multidimensional, multilevel approach will seek to analyze objective and subjective qualities of physical and social environments (e.g., high vs. low demand and control work environment, high vs. low risk, family-friendly vs. authoritarian work arrangements, organizational clarity and workplace support), their independent attributes (e.g., location, space arrangement, size, and noise), or their scale and proximity to individuals and groups. Nonetheless, organizational theorists argue that support in the workplace and family-friendly work environments are highly regarded and valued by workers and are conducive to a positive perception of health and wellbeing (Stokols, 1992). This is not to say that well-designed ergonomic workplaces promoting health and safety do not provide important characteristics in the work environment; however, these physical attributes may be overlooked and disregarded when the collective and interpersonal work relations are conducive to conflict and disengagement.

Lastly, the state of health itself is a multifaceted concept referring to "a complete state of physical, mental and social wellbeing and not merely to the absence of disease and infirmity" (WHO, 1948). Accordingly, the approach to analyzing health has to be comprehensive, looking at the presence or absence of physiological symptoms, the state of psychological wellbeing, and the degree of social integration.

The social ecological analysis expands beyond the biopsychosocial model by considering the joint influence of multiple life domains and settings. Although the

biopsychosocial framework recognizes the combined influence of genetic and psychosocial environment on wellbeing, the social ecology framework brings into light the importance of adding individual social and physical surroundings when analyzing health (Ettner & Grzywacz, 2001; McLaren & Hawe, 2004; Stokols, 2000).

Chapter Three: Key Gaps in the Literature

Research on the firefighting profession and its influence on individual health and wellbeing remains limited. The literature reviewed supports the idea that firefighters constitute a distinctive group, a group needing careful attention with respect to examining ways in which workplace conditions affect health, as well as the interaction among work, family, and life. This dissertation highlights the fact that, regardless of the evidence demonstrating the stressful and dangerous nature of firefighting, there has been more emphasis on merely studying the impact of work on the health and wellbeing of the individual employed in the emergency response system, as opposed to assessing the potential relationship between high levels of job-related stress (long-term exposure to high risk work environments), hostility (as a result of exposure to occupational stress), and level of satisfaction (e.g. spousal, life, job) in the case of firefighters.

There is no doubt that an impressive body of research has investigated the area of stress and its manifestations (Baba, Jamal, & Tourigny, 1998; Harkness et al., 2005; Kelloway & Day, 2005; Parker & DeCottis, 1983). Nevertheless, researchers are in general agreement that work stress is a serious problem that causes distress not only for the individual, but also for the family unit and the workplace. Surprisingly, studies of firefighters who, due to the nature of their jobs, are at greater risk of developing mental health issues when compared with other professional occupations (e.g., public sector employees, non-emergency workers, etc.) have examined the relationship between occupational stress and its influence on health primarily by looking at work-related stressors from an unidimensional perspective (Heinrichs et al., 2005; Murphy et al., 1999; Saijo et al., 2008; Wagner et al., 2009; Wagner et al., 2010). However, very few studies have taken into account the

multidimensional approach in combination with the joint influence of personal characteristics and the work and non-work related stressors in mediating the interaction between work and wellbeing.

Institutional and organizational factors, such as operational philosophy issues, complexity and ambiguity of job roles, insufficient training, perceived organizational fairness, overtime, shift work, and support in the workplace, each have been considered key factors accountable for the increased work-related stress of firefighters (Burke, 1994; Riolli & Savicki, 2012). Besides the responsibilities related to the organizational rules and procedures of firefighting work, the firefighter's job also requires direct interaction with distressed individuals, colleagues and supervisors, the ability to communicate, understand and interpret verbal and non-verbal signals (i.e., threat, fear, aggression) when around public or peers, and, most importantly, the provision of a role model for the public and other emergency responders. When the interpersonal interactions are associated with negative relationships, the outcome can create stress, emotional tension, and irritability (Swenson et al., 2008). It depends on the personal characteristics of the individual and the personal coping resources of each individual to deal with the situation in a positive manner.

According to Social Ecology Theory, personal characteristics of the individual influence how one perceives stress within the workplace, the manner in which they respond to it, how they disclose it, and how they help manage it for themselves and others (Anderson et al., 1998; Elovaino et al., 2000; Ettner & Grzywacz, 2001; Hart & Hope, 2004; Enkelmann et al., 2005; Martinussen et al., 2007). In this vein, individual attributes are considered to play a significant role in the way work experiences are perceived, assessed, and further reported. By conducting research in the context of Social Ecology Theory, it is expected that an

integrative and comprehensive understanding can be obtained of the ways in which individual traits, psychological, sociocultural, marital, and physical surroundings jointly affect health, overall satisfaction, and wellbeing of firefighters. As such, it is expected that with a social ecological perspective, social environments (e.g., family support and marital relationships, friends and social network, workplaces, etc.) may be considered as important factors in mitigating the positive or negative effect on health rather than individual psychological and/or biological deficits. For instance, due to the firefighting culture characterized by strong bonds, mutual and reliable support at work, and like-mindedness, firefighters may consider their work environment as having a positive influence on their overall satisfaction, which in turn may have potential positive impact on health and wellbeing, although they may also report high levels of neuroticism and hostility. Thus, the workplace may emerge as the pivotal life domain that can promote healthy behaviours and lifestyles conducive to overall satisfaction and wellbeing. In addition, of the limited literature that exists to date analyzing the relationship between hostility, other facets of personality and mental health in firefighters, there is no study to analyze this relationship by employing the Social Ecology framework. Most of the previous studies conducted on firefighters analyzed the influence of personal characteristics of the individual, social and/or marital circumstances in isolation, but failed to consider the combined influence of these factors on health and satisfaction. The one study analyzing hostility in firefighters conducted by Wagner et al. (2016), reporting increased levels of neuroticism and hostility, warrants enough support for further investigation. The present study proposes a joint analysis of individual traits, workplace characteristics, and work-family interaction that can serve as environmental audits of the factors that represent significant stressors for firefighters. This, in turn, will permit the

identification of potential pivotal behaviours and attributes that can be used for workplace health interventions.

Questions for Investigation

Explorations of the relationship between work and health within firefighting need to be linked with the realities of this particular workplace. Given the paucity of research in the area, in particular more recent research, there is a strong need for new approaches to assessing the potential relationship between high levels of job-related stress (long-term exposure to high risk work environments), hostility, and level of satisfaction (e.g. spousal, life, job) in the case of firefighters. The present study used Social Ecology Theory to derive the hypotheses to be tested and, therefore, aimed to further explore if and how personality, spousal relationship, and social factors mediate the relationship between work and health for firefighters. Given previous research completed with paramilitary samples (Wagner et al., 2009; Wagner et al., 2010, Wagner et al., 2016), the general expectation holds that firefighters would score high for hostility and report increased overall dissatisfaction, stress, and health issues. By reporting low levels of overall satisfaction, decreased job satisfaction, marital satisfaction and life satisfaction, one would expect individuals scoring high on hostility to negatively react to work related stressors, experience negative affective emotions, and isolate themselves from co-workers and family. Consequently, many of these individuals would become more anxious, insecure, or more aggressive. This statement is supported by Monier, Cameron, Hobfoll, & Gribble, (2000) who demonstrated that depressive symptoms and high level of aggressiveness were significantly associated with antisocial coping.

The present study asked the following research questions.

a. How do firefighters perceive their health, wellbeing, and overall satisfaction with job, life, and marital relationship in relationship with their work? It was expected that firefighters would report increased overall dissatisfaction, stress, and health issues. High levels of stress at work and exposure to hazards and toxic environments are hypothesized to be associated with high levels of stress and mental health issues, low levels of satisfaction with life, job, and marital relationship and high levels of hostility. The model proposed for investigation suggests that high levels of work stress are associated with high levels of psychological distress and high levels of dissatisfaction with job, life, and marital relationship. All these domains will negatively influence the level of hostility.
b. How do firefighters and their significant others perceive their marital relationship in relationship to work? It was anticipated that properties of the work domain would negatively influence the spousal relationship, with high levels of stress at work resulting in increased conflict at home. Based upon the previously cited research by Judge et al., (2006), it was expected that spouses would report higher levels of dissatisfaction and domestic conflict when compared with their partners. This research question would be investigated as a function of dyad type. Dyads represent groups of two, linked through a socially significant relationship (i.e., spouse/firefighter).
c. How does firefighters' cardiovascular health relate to self-reported hostility in relationship with their work? It was anticipated that firefighter's cardiovascular health (systolic blood pressure, diastolic blood pressure, weight, and body mass index)

would be directly impacted by the levels of reported hostility. Therefore, high hostility would predict high blood pressure, high heart rate, and increased weight.

Chapter Four: Methods

Participants: Sampling and Data Collection

Data for this study was collected from 186 professional firefighters employed in Prince George and Kamloops, both communities located in the province of British Columbia, Canada. The initial sample included 9 new recruits reporting less than one month's work experience; therefore, these responses were excluded from the study. The final sample size for consideration for further analyses was 177 ($N = 177$). All participants were employed full time. The Prince George cohort included 89 respondents ($n = 89$, Male = 88, Female = 1), and the Kamloops cohort included 88 respondents ($n = 88$, Male = 86, Female = 2).

After obtaining permissions from Management and Union Executives at Prince George Fire Rescue (PGFR) and Kamloops Fire Rescue (KFR), data was collected during work hours with the researcher attending each hall, for each shift (in both cities). Data collection process took place over 2 months in the fall of 2016 for Prince George and over 1.5 months in the winter of 2016/2017 for Kamloops.

In Kamloops, data was collected by the principal investigator with help from a research assistant while, in Prince George, data was collected solely by the principal investigator. Following completion of the informed consent process, each participant was asked to independently complete a demographic questionnaire, as well as several psychological, physical, and employment related measures. The completion of the battery of questionnaires lasted one hour and fifteen minutes, on average.

Cardiovascular data was collected from a group of 93 firefighters (n = 35 from Prince George department and n = 58 from Kamloops department) willing to complete the physiological measures. Data regarding physiological responses was completed with the help of two Licensed Practical Nurses, one recruited for Prince George and the other one for Kamloops. The two nurses were in contact with each other and trained on how to follow a similar data collection protocol for both locations. All physiological measurements were collected in a relaxed, seated position after gathering information on activities or tasks performed prior to the data collection (e.g., working out, attending a call, completing small routine duties within the hall, etc.). The participants were instructed to sit quietly with their eyes closed for 10 minutes without falling asleep and keep their movement to a minimum. Immediately thereafter, blood pressure was measured according to standard protocol, using a manual sphygmomanometer. The two health care professionals assisting with the cardiovascular measurements opted for a manual sphygmomanometer to collect information about blood pressure as these are generally used in medical practice and are considered reliable and accurate. Additionally, the two health care professionals measured heart rate using the general routine count: the tips of index and middle fingers placed on the wrist below the base of the thumb with lightly applied pressure until able to feel the pulse, and then counted the beats for 10 seconds and multiplied the number by 6. The height and weight were measured using the same weight scale and measuring tape for all measurements.

In addition to the fire rescue responses, supplementary data was collected from the spouses of the firefighters (N = 39) interested in participating as a couple, (n = 27 from Prince George and n = 12 from Kamloops). During data collection visits, firefighters were invited to engage their romantic partners in the subsequent phase of the research, looking at

how overall satisfaction and work stress might impact intimate relationships. The confidentiality of responses was emphasized. As a result, in addition to the fire rescue responses, supplementary data was collected from the spouses of firefighters ($N = 39$) interested in participating as a couple ($n = 27$ from Prince George and $n = 12$ from Kamloops). There was a total of 58 firefighters that agreed to take the information letter home and to volunteer their spouse's contact information. All 58 spouses were contacted, with only 39 returning the call or showing interest in participating in the project. After obtaining informed consent, the spouses were provided with the survey package and were given the option of completing the surveys at their leisure, anywhere convenient for them. Data collection for this group was limited to the number of participants for which both the firefighter and the partner completed the questionnaires. The information was collected as paired data.

Only those respondents who provided written (signed) consent to participate were included in the research. Overall, the participation rate of the fire rescue personnel was 81.5%.

Measures

Demographics. The demographic questionnaire asked for information regarding the participant's marital status, date of birth, ethnicity, education, employment status, occupation, and length of employment. Both Firefighters and their spouses/partners participating in the project completed this questionnaire.

Measures of Satisfaction. The *Satisfaction with Life Scale* (Diener, Emmons, Larson, & Griffin, 1985) was included as a measure of how satisfied the participants were with their lives, overall. This short five item questionnaire asked the participants to mark, on

a 7-point scale from 1 (“strongly disagree”) to 7 (“strongly agree”), how fully they supported various statements about their life satisfaction (α = 0.80 and test-retest reliability = 0.76 - 0.82; Pavot & Diener, 1993). This questionnaire was completed by both firefighters and their spouses (for those who agreed to participate in the study as a couple).

Measure of Mental Health. The *Symptom Checklist-90-Revised*© (Derogatis, 1996; α = 0.89) was used to evaluate levels of reported symptoms on nine different symptom scales (somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism). This scale is a 90-item scale that can be completed in 15 minutes. This questionnaire was completed by firefighters only.

Measure of Personality. The *Personality Scale NEO-FFI*© (Costa & McCrae, 1992) was a self-administered questionnaire containing 60 items rated on a 5-point scale, with correlations of 0.77 - 0.92 and internal consistency values ranging from 0.68 - 0.86. This questionnaire was completed by firefighters only.

Aggression Questionnaire. The *Aggression Questionnaire* (Buss & Perry, 1992; α = 0.72 - 0.89), a self-administered questionnaire containing five aggression factors: Physical Aggression, Verbal Aggression, Anger, Hostility, and Indirect Aggression. The questionnaire measures not only how aggressive a person is but also how the aggression is manifested. Both firefighters and their spouses/partners completed this questionnaire.

Measure of Relationship Satisfaction. The *ENRICH Marital Scale* (Fournier et al., 1983; Olson et al., 1987; α = 0.86 - 0.90) was used to assess marital adjustment and satisfaction. Both firefighters and their spouses/partners completed this questionnaire.

Measure of Job Satisfaction. The *Job Satisfaction Survey* (Traut, Larsen, & Feimer, 2000; α = 0.69 - 0.88) was a twenty-five-item measure asking respondents to rate on a scale

from 1 (“strongly disagree”) to 4 (“strongly agree”) how much they support statements of satisfaction with various aspects of their employment experience. This questionnaire was completed by firefighters only.

Measure of Work Stress. The *Job Content Questionnaire* © (Karasek, 1985; α = 0.77 - 0.90) evaluated work stress in the following dimensions: workplace decision latitude, psychological demands, social support, physical demands, and job insecurity. The conceptual framework of JCQ permits its use to assess the quality of work by collecting information on work tasks, exposure to risks and hazards in the work environment, as well as the level of satisfaction with skills utilization and control over the worked performed. The completion of this questionnaire requires approximately 15 minutes for the full 49 item version. Respondents are asked to answer on a 5-point scale, with 0 – strongly agree to 4 – strongly disagree. A higher score indicates greater work stress. Reliability is considered good for most scales (Karasek et al, 1998). This questionnaire was completed by firefighters only.

Measure of Work Effort-Reward. The *Effort-Reward Imbalance Questionnaire* © (Siegrist & Peter, 1996; α = 0.80). The ERI model was operationalized as a standardized self-report measure containing 23 Likert-scaled items in its established short version. These items define three unidimensional scales: effort containing six items, reward containing 11 items, and over-commitment containing six items, with each item rated on, respectively, a 5-point (effort, reward) or 4-point (over-commitment) Likert scale. Reliability is considered good for all scales (van Vegchel, de Jonge & Landsbergis, 2005). This questionnaire was completed by firefighters only.

Measure of Job Stress. *Job Stress* was assessed with a 13-item scale developed by Parker and DeCotiis (1983). This is a Likert-type scale with one to five response options

indicating strong agreement to strong disagreement. A high score on this scale indicates a higher degree of occupational stress. This scale is frequently used to tap overall job stress and has good psychometric measures (Baba, Jamal & Tourigny, 1998). This questionnaire was completed by firefighters only.

Measures of Cardiovascular Indicators. Blood pressure, heart rate, weight, and height were collected only from firefighters.

Statistical approach

The statistical approach for this study consisted of various statistical techniques to investigate the hypotheses proposed.

Testing the first hypothesis involved investigating the relationship among work exposure, overall satisfaction with job, life, and marital relationship, and health. It was hypothesized that high levels of stress at work and exposure to hazards and toxic environment would be associated with high levels of stress and mental health issues, low levels of overall satisfaction, and high levels of hostility. This model was analyzed by employing Structural Equation Modeling, a confirmatory technique that uses the structural model function in SPSS AMOS according to the fit indices as indicated by Chi-square, Comparative Fit Index (CFI), and Root Mean Square Error (RMSE) (Tabachnick & Fidell, 2001). A chi-square value close to zero indicates ”lack of fit” with little difference between the expected and observed covariance matrices. The other fit indices, such as CFI, RMSE, and GFI indicate “goodness-of-fit” indices with larger values indicating better fit. The CFI could range from zero to one with a larger value indicating better model fit. An acceptable model fit will be indicated by a CFI value of 0.90 or greater. Root Mean Square Error of Approximation (RMSEA) estimates the lack of fit in a model compared to a full model.

RMSEA values range from zero to one with a smaller RMSEA value indicating better model fit. Values of 0.06 or less indicate a good-fitting model while values larger than 0.10 indicate a poor model fit (Tabachnick & Fidell, 2001).

The first step in the SEM analysis was model specification in which parameters of the model were determined to be fixed or free. Typically, fixed parameters were assigned a value of zero or one and were not estimated from the data; moreover, the paths of fixed parameters were labeled numerically (unless assigned a value of zero, in which case no path is drawn). Free parameters were estimated from the observed data. Determining which parameters were fixed and which were free was at the discretion of the researcher according to preliminary hypotheses about which pathways were considered important in the generation of the structural model.

The next step was model identification by comparing the data points with the number of parameters that were to be estimated. If the number of data points was higher than the number of parameters to be estimated, the model was considered overidentified; equal data points and parameters indicated that the model was just identified, while fewer data points than parameters to be estimated defined an underidentified model. An overidentified model was a necessary condition to continue with the model analysis.

In the case of an acceptable model fit, both the parameter estimates and the statistically significant relationships within the model were examined. As such, the unstandardized coefficients were divided by their respective standard errors to obtain a *z* score for each parameter. Hoyle (1995) suggests that a *z* score is considered significant at the $p < 0.05$ level if its value exceeds 1.96 and at the $p < 0.01$ level it its value exceeds 2.56. Conversely, if an unacceptable model fit was identified, the model was revised when the

modifications were meaningful. Model modification involved adjusting a specified and estimated model by either freeing parameters that were fixed or fixing parameters that were free. The Lagrange Multiplier (LM) test determined whether there was any improvement in the chi-square effects when fixed parameters were freed, similarly to forward stepwise regression. While the LM test identified which parameters should be added to the model, the Wald test employed a backward deletion of parameters in order to obtain information about the change in chi-square that results if free parameters were fixed (Hoyle, 1995).

The proposed measurement model for SEM analyses related to the observed variables including responses from the SCL-90 questionnaire (hostility scale excluded), Satisfaction with Life, Marital Satisfaction, Effort-Reward Imbalance, Job stress, and Job content questionnaires. The model had three construct variables: WorkState, Overall Satisfaction, and Psychological State. Two of these construct variables, WorkState and Overall Satisfaction, were second order constructs. The WorkState construct included observed variables pertaining to work exposure and job stress, whereas Overall Satisfaction construct contained observed variables pertaining to job satisfaction, marital satisfaction, and life satisfaction (see Table 1).

The structural model presented in Figure 1 and represented by the pathways between the constructs was tested following SEM techniques using AMOS 24 software.

Table 1
Observed Variables included in the WorkState and Overall Satisfaction Second Order Constructs

Construct	Observed Variables	Survey Item
WorkState	Job stress	There are lots of times when my job drives me right up the wall
		My job gets to me more than it should
		Working here leaves little time for other activities
		I have felt fidgety or nervous as a result of my job
		Working here makes it hard to spend enough time with my family
		I spend so much time at work, I can't see the forest for the trees
	Exposure	Do you have a problem with dangerous tools, machinery, or equipment?
		Do you have a problem with exposure to dangerous work methods in your job?
		Do you have a problem with exposure to air pollution from dusts, smoke, gas, fumes, fibers, or other things on your job?
		Do you have a problem with exposure to dangerous chemicals on your job?
Overall Satisfaction	Marital Satisfaction	Our relationship is a perfect success.
		My partner and I understand each other perfectly.
		I am very happy with how we handle role responsibilities in our marriage.
		I have some needs that are not being met by our relationship.
		I have never regretted my relationship with my partner, not even for a moment.
		I am very pleased about how we express affection and relate sexually.
	Life Satisfaction	I am satisfied with my life.
		So far I have gotten the important things I want in life.
		The conditions of my life are excellent.
		In most ways my life is close to my ideal.
	Job Satisfaction	On duty time is available for self-improvement.
		My supervisor has earned my respect.
		I feel my job is an important part of the organization.

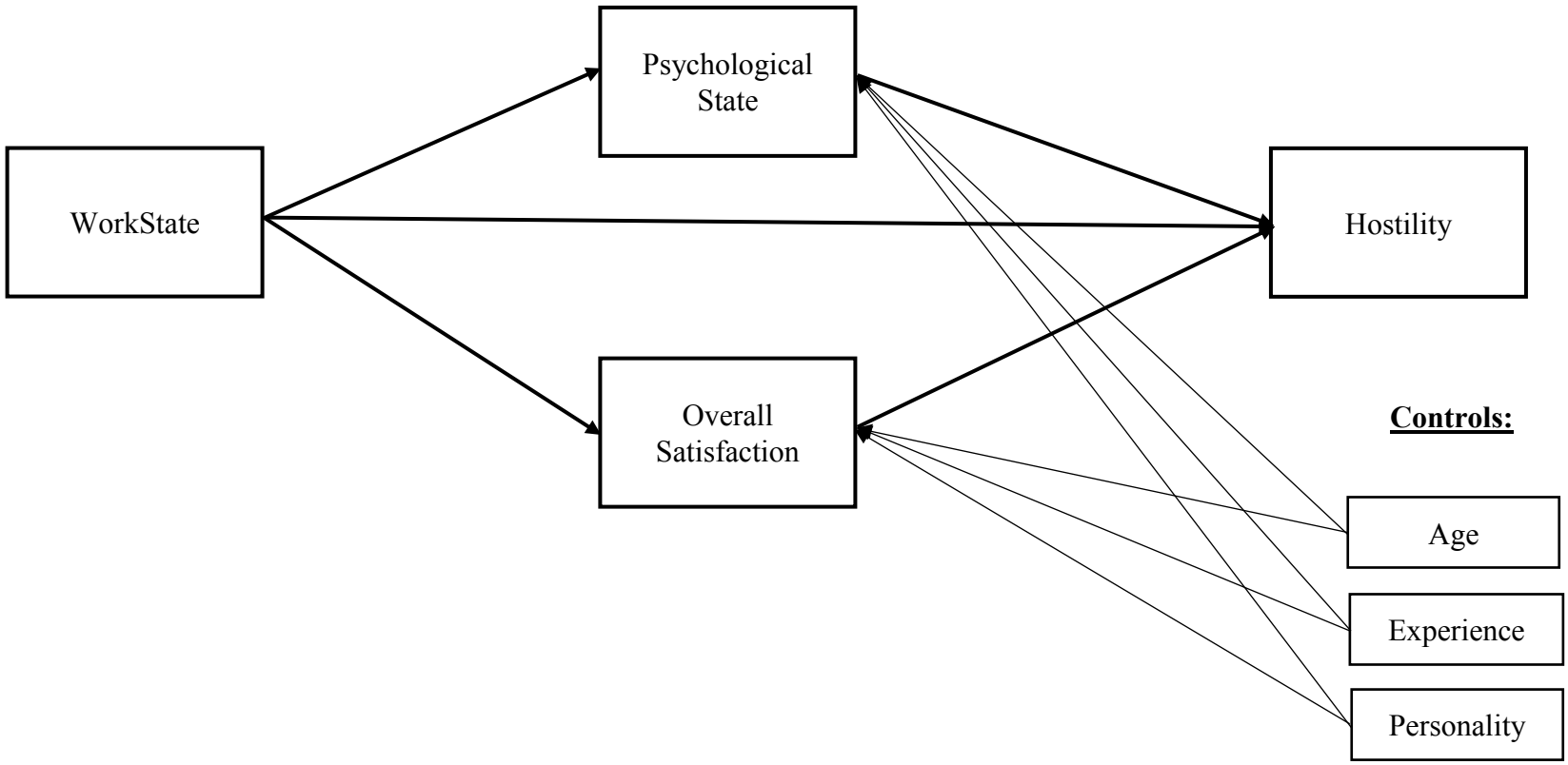

Figure 1: Overall model of the interaction between work, overall satisfaction, mental health, and hostility

Testing the second hypothesis involved investigating the relationship between work and family. It was hypothesized that properties of the work domain would negatively influence the spousal relationship, with high levels of stress at work resulting in increased conflict at home. In order to explore interpersonal processes and differences or similarities between the groups as a function of dyad type (spouse/firefighter), Repeated Measures MANOVA statistical techniques were employed. A characteristic of dyad-type statistical analyses is that the data collected from both partners had interpersonal links originating from the same members of a social unit. The total sample size employed in the analyses for the present study was N = 34 paired-cases, with the dyad members being distinguishable (spouses and firefighters). It should be noted that the data for the relationship satisfaction/marital discord variable was limited to participants living in a marital-like relationships at the time of data collection and willing to participate in the project as a couple. As such, data collection for the present study was limited to the number of participants for which the couple, firefighter and partner, was able to complete the questionnaires.

Testing the third hypothesis involved investigating the relationship between cardiovascular health and hostility in the case of firefighters, with high hostility predicting high blood pressure, heart rate, and weight. For this hypothesis, hierarchical multiple regressions were employed. The predictor variables were entered in the equation in a particular sequence in order to assess what they added to the equation above and beyond the other independent variables. The analysis was performed using SPSS Regression and SPSS frequencies for evaluation of assumptions. The sample size for this analysis was assessed according to Tabachnick and Fidell (2001) recommendation and the predictor variables

included in the analysis. Tabachnick and Fidell (2001) state $N \geq 50+8m$ (where m is the number of IVs) as the rule of thumb for an adequate sample size, $\alpha = 0.05$ and $\beta = 0.20$.

Chapter Five: Results and Discussion

Results

Participant Demographics

The firefighters' ages ranged from 26 to 60 years ($M = 41.22$, $SD = 8.3$). Comparisons of the mean ages for the fire rescue respondents in the two groups revealed a significant difference between the ages of firefighters in Prince George and the ages of firefighters in Kamloops ($F[1, 176] = 11.77$, $p = 0.001$) with the Prince George cohort ($M = 43.38$, $SD = 8.3$) being older than the Kamloops cohort ($M = 39.23$, $SD = 7.8$).

Participants' responses to a demographic questionnaire indicated that the majority of fire rescue personnel were married or in a relationship (88.1%), with 6.8% reporting being separated/divorced and 4.5% single/never married. Most firefighters were born in Canada (98.9%), with only 2.3% declaring their ethnic background as "other" as compared to Caucasian. Responses showing the highest level of education achieved indicated that most of the fire rescue personnel had completed trades/technical education (24.3%), some university training (22%), college diploma (18%) or university degree (18.6%). The firefighters' length of employment ranged from 1 to 36 years ($M = 13.56$, $SD = 8.3$) with an average of $M = 44.23$ hours worked per week. Comparisons of the means for work experience for the fire rescue respondents in the two groups revealed a significant difference between the work experience reported by the firefighters in Prince George and the work experience reported by the firefighters in Kamloops ($F [1, 176] = 3.93$, $p = 0.049$) with the Prince George cohort ($M = 12.33$, $SD = 6.8$) reporting a slightly shorter work experience than the Kamloops cohort ($M = 14.77$, $SD = 9.4$).

The NEO-FFI personality test was administered to all fire rescue respondents. For

each subscale of the NEO-FFI, scores above the 50th percentile were considered as indicators for the presence of the trait (Costa & McCrae, 1992); therefore, the 50th percentile was chosen as the cut-off representing greater than the average presence of the trait for the five different traits assessed. Overall, the mean scores for the cohort indicated that most of the respondents scored high on the extraversion personality trait ($M = 55.33$, $SD = 8.9$), followed by conscientiousness trait ($M = 54.59$, $SD = 8.9$), agreeableness ($M = 50.08$, $SD = 9.2$), openness ($M = 49.51$, $SD = 9.1$), and neuroticism ($M = 45.85$, $SD = 10.6$). Comparisons of the means for personality traits exhibited by the fire rescue respondents in the two groups revealed no statistically significant differences for any of the five traits: extraversion ($F(1, 176) = 1.19$, $p = 0.28$), conscientiousness ($F(1, 176) = 0.07$, $p = 0.80$), agreeableness ($F(1, 176) = 0.58$, $p = 0.45$), openness ($F(1, 176) = 0.26$, $p = 0.61$), and neuroticism ($F(1, 176) = 0.97$, $p = 0.33$). Out of the total of 177 respondents, the results indicated that 58 individuals (32.77%) scored high on neuroticism as a personality trait, with almost half of these respondents (43.1%) scoring high and very high on neuroticism.

Hostility was measured with SCL-90 among the other 8 scales measured with this instrument. For each subscale, raw scores were converted to t-scores. The SCL-90 R test is a clinical assessment of nine symptoms of psychopathology requiring a more conservative cutoff. For this study, a t-score of 63 representing the 90th percentile was considered the cutoff, indicating the presence of the psychopathological condition (Derogatis, 1994). Out of the total sample of 177 respondents of the overall cohort, 45 individuals (25.42%) were placed within and above the 90th percentile cutoff for hostility, with over two-thirds of the 25.42% scoring high and very high on hostility.

Cardiovascular data was collected from a group of 93 firefighters (N = 35 from PGFR and N = 58 from KFR). The firefighters' ages ranged from 27 to 58 years old. Most of them were middle aged (M = 42.2, SD = 8.5) and, on average, they had served as firefighters for 13.8 years (M = 13.8, SD = 7.96). Their height ranged from 160 cm to 198 cm (M = 180.54, SD = 7.3) and weight from 62 kg to 141 kg (M = 95.03, SD = 13.9). The measurements of blood pressure and heart rates were in the normal range (blood pressure (mmHg) at M = 120.83/73.69, SD = 12.9/10.4 and heart rates (bpm) M = 66.27, SD = 10.3), but Body Mass Index (BMI) was in the overweight range (M = 29.11, SD = 3.5). Most of the participants in the cardiovascular data collection reported that they consumed two/three cups of coffee during shift work and exercised regularly. Data was collected while on-duty. Out of the total of 93 respondents participating in the cardiovascular data collection, five firefighters (5.4%) reported smoking fewer than 10 cigarettes per day, while 27 firefighters (29.2%) reported chest pain and 25 firefighters (26.8%) reported breathing problems.

Spouses' responses to a demographic questionnaire indicated that the majority of significant others were born in Canada (99%), with only 1% declaring their ethnic background as "other" in comparison to Caucasian. Responses showing the higher level of education achieved indicated that 27.5% of the spouses completed university, 22.5% graduated with a college diploma, with the rest completing trades/technical, high school or other training. The median number of children per couple was 2.02 with 50% of the couples reporting two children and 22.5% reporting three children per family. Spouses' length of employment ranged from 1 to 34 years (M = 11.67, SD = 8.4) with an average of M = 34.62 hours worked per week. The age of spouses ranged from 29 to 58, with a mean of M = 41.38. The responses indicated all spouses were in their first marital relationship.

Statistical Analyses

Overall, it was hypothesized that firefighters scoring high on hostility would report high levels of overall dissatisfaction. The proposed model suggested that a high level of stress at work and exposure to hazards and toxic environments would be associated with high levels of stress and mental health issues, high levels of domestic conflict, and high levels of hostility. The work state domain would negatively influence the level of satisfaction with life, spousal relationship, and job. The reporting of lower level of overall satisfaction results from the perception that certain individual traits, such as hostility, both played a negative role in the interaction between work and family and vice-versa, and also undermined wellbeing.
H1: Work exposure will impact overall satisfaction and psychological state, which in turn will impact hostility.

Direct hypothesized effects for H1:

H1a: Work exposure has a direct effect on overall satisfaction: the higher the levels of job stress, exposure to hazards and toxic environment, the lower the levels of satisfaction with life, marital relationship, and job.

H1b: Work exposure has a direct relationship on psychological state: high job stress and exposure to difficult work conditions will lead to a negative impact on psychological health, with high levels of reported somatization, interpersonal sensitivity, obsessive-compulsive, anxiety, depression, phobic anxiety, paranoid ideation, and psychoticism.

H1c: Work exposure has a direct effect on the levels of hostility perceived: the higher the levels of job stress and exposure to hazards and toxic environment, the higher the levels of hostility reported.

The a-priori sample size calculation**,** for an anticipated effect size between 0.3 and 0.5 with a statistical power level of 0.8, indicated the need for a sample size between 145 and 170 (the model contains six latent variables and 49 observed variables). A sample size of 163 for a probability level of 0.05 will be used. The total sample size for these analyses was 163 cases. Out of the total of 177 respondents, the 14 respondents with "not married/in a relationship" status were excluded. There were four respondents with one missing variable in rows and the missing data were replaced with the median values calculated using SPSS.

Two surveys in the Satisfaction with Life scale presented erroneous data due to misinterpretation of the Likert scale (1- very unsatisfied instead of 7- very satisfied). In addition, the Satisfaction with Life survey did not present much variation in responses, it is a short survey with five items which does not provide much room for variation; however, it was decided to keep the responses in the analysis. As the respondents needed a minimum of one hour to complete all questionnaires, it can be inferred that most of the respondents were engaged in responding to the questions as none of the respondents completed the questionnaires in less than the time suggested.

There were no missing data in columns. Normal distributions for the indicators of latent factor in terms of skewness and kurtosis were observed. All values were between the acceptable parameters (skewness: between -3 and +3; kurtosis between -5 and +5). As such, in accordance with Tabachnick and Fidell (2001), who recommend 10, respective 3.3 as the upper threshold for normality, the assumption of normality was not violated.

Preliminary analyses for structural equation modeling

Exploratory Factor Analysis was conducted to determine the primary factors that were evident in the data to be used in later model fitting procedures. The data to be factor analyzed included the SCL-90 questionnaire (hostility scale excluded), Satisfaction with Life, Marital Satisfaction, Effort-Reward Imbalance, Job stress, and Job content. The extraction method used was Maximum Likelihood with Promax as the rotation method. After a few iterations, the expected factor loading was obtained with a clean pattern matrix. That is, using a criterion of a minimum loading of 0.5 (Tabachnick & Fidell, 2001), six primary factors were identified (see Table 2). The KMO factor was 0.864 with a significant Bartlett's Test of Sphericity and with six factors with the Eigenvalue above one explaining 64.2% of the total variance. As evidence of conversion validity, no factor loaded under 0.5, with all factors loading above 0.6. The six factors were labeled as follows: Psychological State (PsychState), Marital Satisfaction (MSat), Life Satisfaction (LSat), Job Satisfaction (JSat), Job Stress (JS), and Exposure (Exposure).

Table 2
Primary Factors and their Loadings in the Pattern Matrix

PsychState	MSat	JStress	LSat	Exposure	JSat
.874	.847	.905	.927	.867	.957
.864	.799	.799	.874	.806	.800
.851	.796	.760	.857	.771	.696
.847	.701	.755	.830	.619	
.753	.674	.728			
.723	.664	.688			
.687	.621				
.683					

Note: All factors load above 0.6

All factors in the pattern matrix loaded cleanly with no cross-loading. Moreover, in the factor correlation matrix, all factors loaded fairly well, with no factor above 0.7, thus demonstrating discriminant validity (see Table 3).

Table 3
Factor Correlation Matrix

Factor	PsychState	MSat	JStress	LSat	Exposure	JSat
PsychState	1.000	-.353	.351	-.293	.107	-.340
MSat	-.353	1.000	-.159	.375	.076	.224
JStress	.351	-.159	1.000	-.204	.084	-.388
LSat	-.293	.375	-.204	1.000	-.030	.203
Exposure	.107	.076	.084	-.030	1.000	-.161
JSat	-.340	.224	-.388	.203	-.161	1.000

The scales represented by the six factors demonstrated good reliability, with all but one scale having Cronbach's alpha factors above 0.7 (see Table 4). The literature provide support for the Cronbach's Alpha of 0.6 for factors with less items (2 or 3) (Moss, Prosser, & Costello, 1998). The Job Satisfaction factor contains three items; therefore, a Cronbach's alpha of 0.627 will be considered acceptable.

Table 4
Factor Scales Reliability

	PsychState	MSat	JStress	LSat	Exposure	JSat
Cronbach's Alpha	.929	.882	.903	.925	.846	.627

The next step was to conduct a confirmatory factor analysis (CFA) on the six factors extracted. The initial CFA obtained was good, with good convergent validity (all items loading above 0.6) and good discriminant validity (all correlations less than 0.8) (see Figure 2). The validity and reliability were checked, and showed that there was convergent validity as evidenced by the AVE with all above 0.5, reliability as evidenced by CR with all above 0.7, discriminant validity based on the square root of the AVE being greater than any of the interfactor correlation (see Table 5).

Table 5
Convergent Validity, Reliability, and Discriminant Validity

Factor	CR	AVE	MSV	MaxR(H)	Exposure (1)	PsycState (2)	MSat (3)	JStress (4)	LSat (5)	JSat (6)
(1)	.854	.598	.031	.873	**.773**					
(2)	.930	.627	.160	.959	.086	**.792**				
(3)	.887	.532	.152	.970	.068	-.390	**.729**			
(4)	.904	.613	.179	.977	.106	.400	-.174	**.783**		
(5)	.926	.757	.146	.983	-.049	-.338	.382	.201	**.870**	
(6)	.864	.683	.179	.985	-.177	-.314	.206	.423	.185	**.826**

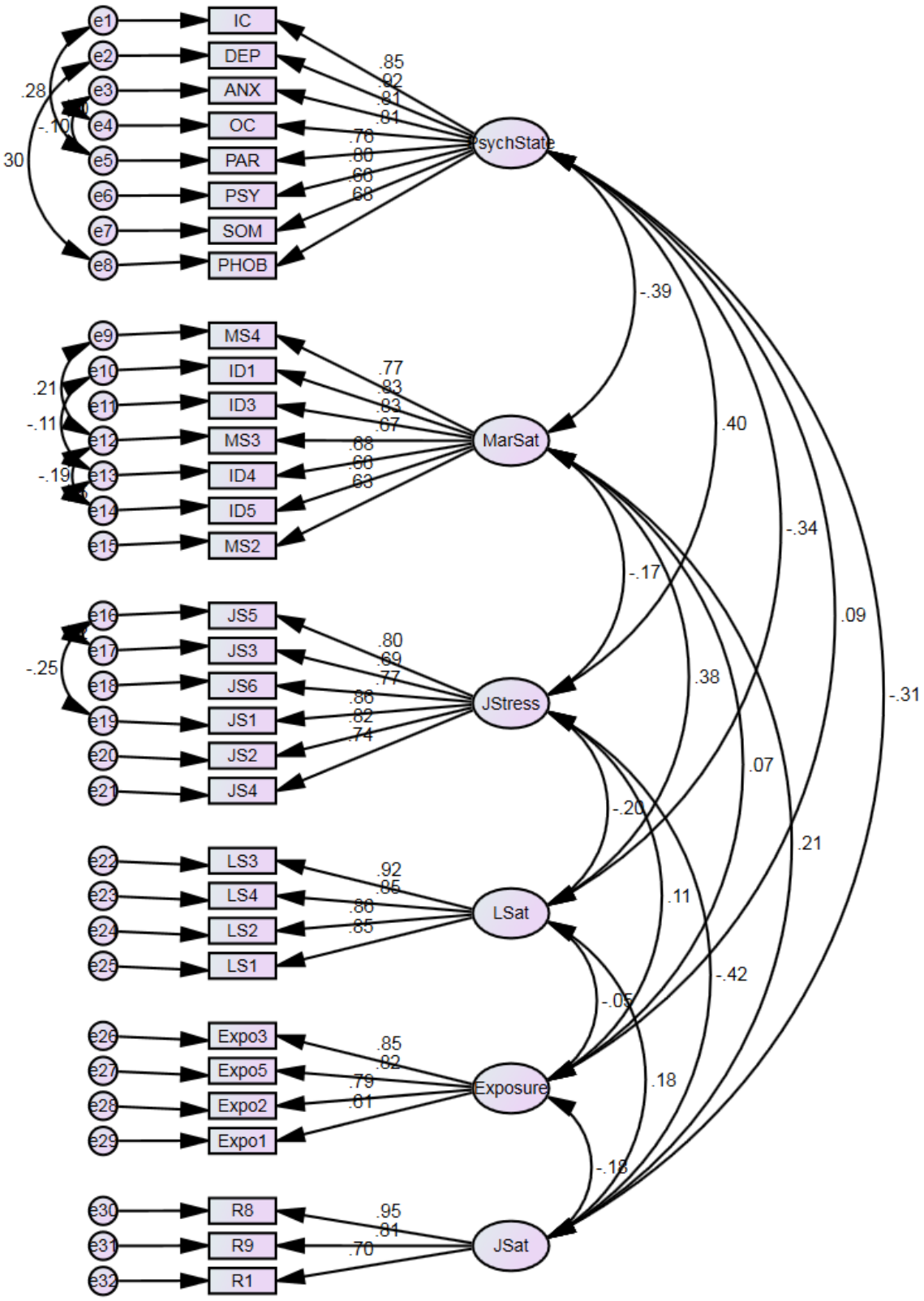

Figure 2: Initial CFA model.

The next step in the analysis was to verify for common method bias. As such, shared variance across all items was tested to determine whether it was significantly different from zero. Two models, unconstrained and fully constrained (0 constrained), were tested, and it was determined that the models were significantly different from zero, meaning that there was shared variance and the common latent factor would have to be retained in the further analyses (see Figure 3).

Testing the hypothesized model

Structural Equation Modeling, in SPSS AMOS, was employed to examine the model proposed to investigate the set of relationships among work status, psychological state, overall satisfaction, and hostility levels in firefighters. In the displayed model (Figure 4), the values provided on the pathways indicate the standardized regression weights for the individual pathways, whereas the values provided in the corners of the observed variables indicated the squared multiple correlations for the individual variables.

Due to the fact that measures of marital satisfaction, life satisfaction, and job satisfaction could be accounted for by a common higher order general factor (Overall Satisfaction - OverallSat) and measures of job stress, and exposure to hazards and toxic environment within the job could be accounted for by a common higher order factor (WorkState), it was decided to use a second-order factor model with Overall Satisfaction and WorkState being the second-order factors. The proposed model was tested using maximum likelihood estimation and was found to be a good fit [χ^2 (23) = 1.52, p = 0.052, *GFI = 0*.959, *NFI = 0*.927, *CFI = 0*.972, *RMSEA = 0.057*, *PCCLOSE = 0.353*].

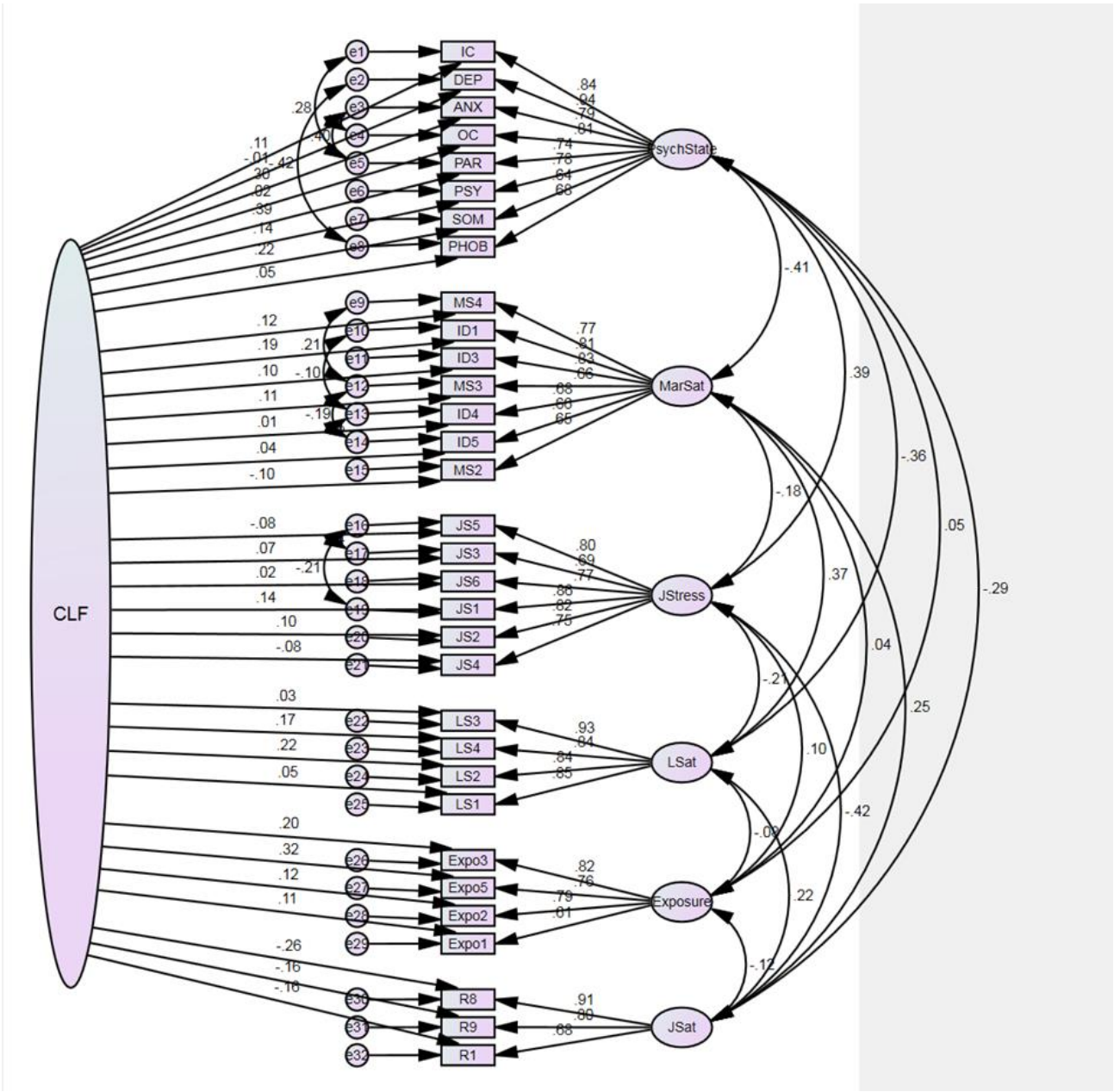

Figure 3: CFA model with common latent factor (CLF) included.

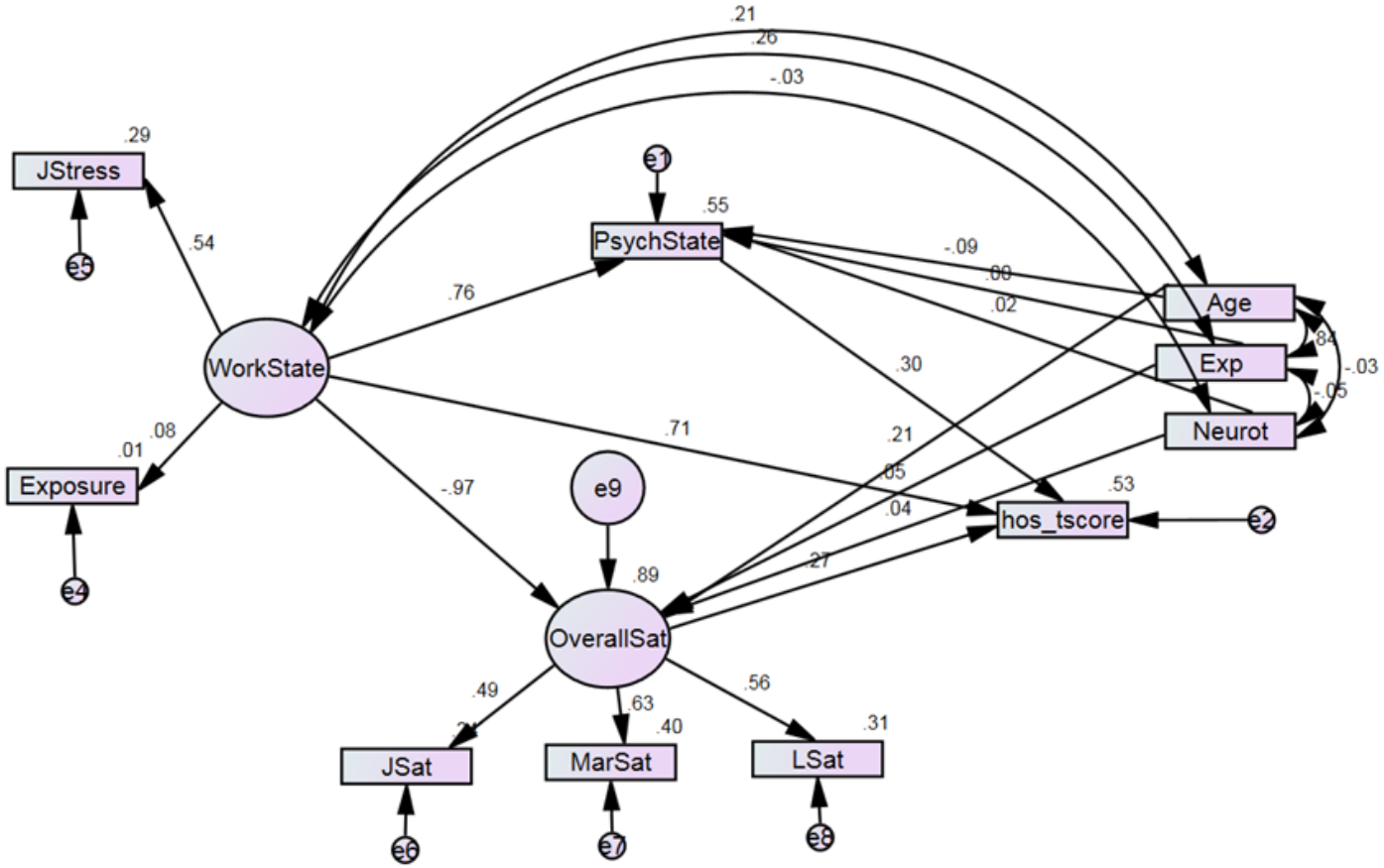

Figure 4. The Path model for the interaction among WorkState, Overall Satisfaction, PsychState, and Hostility.

The model demonstrated that the pathway from the second order factor WorkState to PsychState was significant, as was the pathway from WorkState to OverallSat. These results support the hypotheses H1a and H1b. Thus, work exposure had a direct negative relationship on overall satisfaction: higher levels of job stress, exposure to hazards and toxic environments were associated with lower levels of satisfaction with life, marital relationship, and job. Similarly, work exposure had a direct positive effect on psychological state: high job stress and exposure to difficult work conditions lead to a negative impact on psychological health, with high levels of reported somatization, interpersonal sensitivity, obsessive-compulsive, anxiety, depression, phobic anxiety, paranoid ideation, and psychoticism. The pathway from WorkState to Hostility was not significant, thus the H1c hypothesis was not supported. As displayed in Figure 4, the pathways from PsychState to Hostility and OverallSat to Hostility were also not significant. None of the controls used in the model (age, work experience, and personality with neuroticism as the personality trait) had a significant influence on the dependent variables, PsychState and Overall Satisfaction.

Testing alternate models. As indicated, though the NEO_FFI personality test was administered to all fire rescue respondents, the mean scores for the cohort indicated that firefighters scored high on extraversion, followed by conscientiousness, agreeableness, openness, and, lastly, neuroticism. In consideration of these results, the model was tested by including extraversion, openness, agreeableness, and consciousness as controls for personality trait in place of neuroticism. The proposed models including extraversion and openness were found to be of a good fit: extraversion [χ^2 (23) = 34.61, p = 0.057, *GFI = 0.*958, *NFI = 0.*928, *CFI = 0.*973, *RMSEA = 0.056*, *PCCLOSE = 0.369*], and openness [χ^2 (23) = 34.92, p = 0.064, *GFI = 0.960*, *NFI = 0.930*, *CFI = 0.975*, *RMSEA = 0.055*, *PCCLOSE*

= *0.390*]. In these models, the pathway from the second order factor WorkState to PsychState, as well as the pathway from WorkState to OverallSat, remained significant, following a similar pattern to the original model. Thus, work exposure continued to have a direct negative relationship on overall satisfaction, whereas work exposure continued to have a direct negative effect on psychological state. However, opposing the results from the original model, in the case of openness, the pathway from WorkState to Hostility was significant, thus the H1c hypothesis was supported when openness was used as a control in the model.

H2: Analyses of couple satisfaction and domestic conflict

Hypotheses about differences or similarities in perceiving marital satisfaction and/or domestic conflict as a function of dyad type (wife/husband, conjugal relationship) were addressed by statistically comparing group differences. Prior to conducting the analyses, assumption testing was conducted. The assumption of sufficient sample size was tested following Tabachnick and Fidel (2000) recommendation; as such, in order to meet the assumption of sufficient sample size, a minimum of 20 sets of scores was required for each level of the independent variable (e.g., gender with two levels female and male with 34 cases for each group). There were no outliers identified in the data set; the Mahalanobis distance had a value of 13.31 that was lower than the maximum of 16.27. The assumption of multivariate normality was tested using the Shapiro Wilks test and indicated that, for the Couple Satisfaction and Life Satisfaction, there was a non-normal distribution. As such, data was transformed using a $\log_{10}$ function. After transformation, a normal distribution was observed for all dependent variables in terms of skewness and kurtosis. All values were between the acceptable parameters (skewness: between -3 and +3; kurtosis between -5 and

+5). This does not violate the rules of normality as stated by Tabachnick and Fidel (2000). Finally, the assumption of absence of multicolinearity and singularity was not violated.

Repeated Measures MANOVA analyses were conducted to test the effect of hostility on firefighter-spouse marital satisfaction as a function of dyad type. These analyses examined the associations between couple satisfaction and hostility as within-subjects variables. Before proceeding with further analyses, correlations were computed in order to determine whether conflict (physical, verbal, anger, hostility, and indirect aggression) and couple satisfaction were inter-correlated. The results indicated that the variables were significantly inter-correlated (see Table 6).

Table 6
Inter-correlations between conflict and couple satisfaction

Variable	1	2	3	4	5	6
Physical	-	.387**	.546**	.212**	.324**	.001
Verbal		-	.536**	.411**	.411**	-.162
Anger			-	.393**	.355**	.311
Hostility				-	.340**	-.202
Indirect					1	-.205
Couplesat						-

**$p < .05$

The association between hostility and couple satisfaction was analyzed using repeated measures MANOVA. An alpha level of 0.05 was applied for all statistical tests. The means and standard deviations for the conflict for firefighters and spouses are presented in Table 7.

Table 7
Means and Standard Deviations for conflict (hostility vs. couple satisfaction) for firefighters and spouses

Variable		M	SD	n
Hostility	Firefighters	47.65	8.6	34
	Spouse	46.88	7.5	34
Couple Satisfaction	Firefighters	67.18	9.8	34
	Spouse	65.59	13.4	34

The results indicated a significant effect for hostility (F [1, 33] = 82.02, $p < .05$, eta-squared = .713), no significant effect for couple satisfaction (F [1, 33] = .828, $p = .37$), and no interaction between hostility and couple satisfaction (F [1, 33] = .064, $p = .80$).

Further, a similar analysis was run to explore the association between hostility and life satisfaction.

Table 8
Means and Standard Deviations for conflict (hostility vs. life satisfaction) for firefighters and spouses

Variable		M	SD	n
Hostility	Firefighters	47.65	8.6	34
	Spouse	46.88	7.5	34
Life Satisfaction	Firefighters	28.68	3.8	34
	Spouse	28.15	4.4	34

The results indicated a significant effect for hostility (F [1, 33] = 217.77, $p < .05$), no significant effect for couple satisfaction (F [1, 33] = .471, $p = .49$), and no interaction between hostility and couple satisfaction (F [1, 33] = .009, $p = .92$).

Alternately, the association between groups (firefighters and spouses) and domestic

conflict and their interaction was analyzed by repeated measures MANOVA. An alpha level of 0.05 was applied for all statistical tests. The means and standard deviations for the conflict for firefighters and spouses are presented in Table 9. The results indicated a marginal effect for group (F [1, 33] = 3.258, p = .08, eta-squared = .09), no significant effect for conflict (F [4, 30] = .940, p = .454), and a significant interaction between group and conflict (F [4, 30] = 5.227, $p < .05$, eta-squared = .411). These results indicate that the two groups will express their dissatisfaction with couple disagreements differently. Firefighters tend to resort to either physical aggression or indirect aggression in order to deal with couple conflict, whereas spouses will use anger as a way to express dissatisfaction.

Table 9
Means and Standard Deviations for conflict for firefighters and spouses

Variable		M	SD	n
Firefighters	Physical	50.32	8.527	34
	Verbal	49.18	8.861	34
	Anger	47.91	7.481	34
	Hostility	47.05	8.623	34
	Indirect	49.91	5.895	34
Spouse	Physical	46.09	6.925	34
	Verbal	47.06	8.499	34
	Anger	49.62	6.462	34
	Hostility	46.88	7.535	34
	Indirect	44.74	8.393	34

Further, a SPSS MANOVA was used to conduct the two-way between-subjects multivariate analysis of variance to compare the two groups with respect to their levels of perceived satisfaction with life and couple relationship. The independent variable for the analyses was Groups: firefighters and spouses. The first MANOVA was conducted on two dependent variables, life satisfaction and couple satisfaction, to identify significant

differences between the two groups (firefighters vs. spouses) with regard to life satisfaction and couple satisfaction. With the use of the more conservative Pillai's Trace criterion, due to the non-normal distribution detected for both dependent variables, the combined dependent variables were not significantly affected by the Groups, (F [2, 65] = .182, p = .834). The results reflected no association between Groups scores (firefighters vs. spouses) and the combined dependent variables. Therefore, the two groups did not differ in the way they perceive their satisfaction with life and their partner and marital relationship.

The second MANOVA was conducted on five dependent variables: physical aggression, verbal aggression, anger, hostility, and indirect aggression. There were no outliers in the data set. The assumption of multivariate normality was tested using Shapiro Wilks test and indicated that for the Physical, Verbal, Hostility and Indirect Aggression the assumption of normality was not violated, although for Anger, the test indicated a non-normal distribution. A normal distribution was observed for all dependent variables in terms of skewness and kurtosis. Finally, the assumption of absence of multicolinearity and singularity was not violated. With the use of the more conservative Pillai's Trace criterion due to the non-normal distribution detected for Anger, the combined DVs were significantly affected by the Groups, (F [5, 62] = 5.393, p < .001). Firefighters had significantly higher scores on Physical Aggression, Verbal Aggression, Indirect Aggression, and Hostility, but not on Anger. The responses collected from spouses indicated significantly higher scores on Anger. Overall, the group differences were significantly higher on Indirect Aggression and Physical Aggression, followed by Anger. The results reflected a modest difference between Group scores (firefighters vs. spouses) and Physical Aggression, (F [1, 66] = 5.054, p < .005, partial η^2 = .071), as well as between Group scores (firefighters vs. spouses) and Indirect

Aggression, (F [1, 66] = 8.661, $p < .005$, partial $\eta^2 = .116$).

To further investigate the impact of each main effect on the individual dependent variables, a Roy-Bargmann stepdown analysis was performed on the prioritized dependent variables. As the dependent variables were correlated, they were considered reliable to warrant stepdown analysis. As such, the highest priority dependent variable (indirect aggression) was tested in univariate ANOVA, with appropriate adjustment of alpha. The rest of the dependent variables were tested using a series of ANCOVAs in the following order: anger, physical aggression, hostility, and verbal aggression. Each successive dependent variable was tested with higher priority dependent variables as covariates to see what, if anything, it added to the combination of dependent variables already tested. Homogeneity of regression was achieved for all components of the stepdown analysis – Box's Test of equality of covariance matrices was not significant. Results of this analysis are summarized in the Table 10.

Table 10
Roy-Bargman Stepdown F – tests

Variable	Hypoth. MS	Error MS	StepDown F	Hypoth. DF	Error DF	Sig. of F
Indirect	455.52941	52.59626	8.66087	1	66	.004
Anger	220.24719	40.6338	5.42029	1	65	.023
Physical	401.87659	39.44497	10.18828	1	64	.002
Hostility	2.84948	54.89600	.05191	1	63	.821
Verbal	29.48200	51.56980	.57169	1	62	.452

**$p < .05$

A unique contribution to predicting differences between firefighters and spouses was made by indirect aggression, stepdown (F [1, 66] = 8.6608, $p < .01$, $\eta^2 = .116$). For the indirect aggression, firefighters showed a higher tendency to express anger in actions that avoided direct confrontation ($M = 49.91$, $SD = 5.9$) than their spouses ($M = 44.73$, $SD = 8.5$). A significant difference was also found when the next DV (anger) was entered in the stepdown analysis, stepdown (F [1, 65] = 5.42, $p < .01$, $\eta^2 = .015$). Spouses scored higher on irritability, frustration, emotional lability, and temperamental gesturing ($M = 49.61$, $SD = 6.5$) when compared with firefighters ($M = 47.91$, $SD = 7.5$). The third DV entered in the stepdown analysis that displayed differences in the independent variable Groups was physical aggression, stepdown (F [1, 64] = 10.18, $p< .01$, $\eta^2 = .071$). Firefighters reported a higher tendency to use physical force when expressing anger and aggression ($M = 50.324$, $SD = 8.5$) than their spouses ($M = 46.088$, $SD = 6.9$). Although hostility and verbal aggression were also introduced into the stepdown analyses, these variables did not reveal significant differences.

H3: Analyses of firefighter hostility and cardiovascular health

Hypotheses about cardiovascular health in relationship to hostility were addressed by performing hierarchical multiple regressions between systolic blood pressure (Systolic_BP) as the dependent criterion and body mass index (BMI), heart rate (HeartRate), and diastolic blood pressure (Diastolic_BP), and hostility as predictor variables. No cases had missing data. Upon identifying the outliers, the sample size for this analysis was $N = 88$, and it was deemed adequate given the three predictor variables to be included in the analysis. The assumption of normality of the dependent variable was met with a non-significant Shapiro-Wilks coefficient. Residuals and scatter plots indicated that the assumption of linearity,

normality, independence of residuals, homoscedasticity of residuals, and multicolinearity were met.

To examine the unique contribution of hostility in the explanation of systolic blood pressure, a hierarchical multiple regression analysis was performed. Since systolic blood pressure and diastolic blood pressure are partial functions of heart rate, these variables were entered in the analysis separately as dependent variables; body mass index and hostility were entered in two steps, to find out if hostility could predict systolic blood pressure, diastolic blood pressure, or heart rate above and beyond body mass index. As such, three separate multiple regression analyses were performed, with body mass index introduced in step one, and hostility entered in the next step. Intercorrelations between the multiple regression variables indicated that the variables in the analysis were not correlated.

After conducting the hierarchical multiple regressions, the results indicated the following:

(a) Systolic blood pressure as dependent variable: at step one, body mass index had a non-significant contribution to the regression model, ($R = 0.170$, $F\,[1, 87] = 2.578$, $p = 0.112$) and accounted for 18% of the variation in systolic blood pressure. At step two, after introducing hostility, with body mass index already in the equation, an additional 9% of variation in systolic blood pressure was introduced, indicating a non-significant change with ($R^2 = 0.03$, $F\,[1, 86] = 0.278$, $p = 0.599$).

(b) Diastolic blood pressure as dependent variable: at step one, body mass index had a non-significant contribution to the regression model, ($R = 0.167$, $F\,[1, 87] = 2.494$, $p = 0.118$) and accounted for 17% of the variation in systolic blood pressure. At step two, after introducing hostility, with body mass index already in the equation, an

additional 27% of variation in systolic blood pressure was introduced, indicating a non-significant change with ($R^2 = 0.049$, F [1, 86] = 0.1886, $p = 0.173$).

(c) Heart Rate as a dependent variable: at step one, body mass index, had a non-significant contribution to the regression model, ($R = 0.175$, F [1, 87] = 2.762, $p = 0.100$) and accounted for 20% of the variation in systolic blood pressure. At step two, after introducing hostility, with body mass index already in the equation, an additional 9% of variation in systolic blood pressure was introduced, indicating a non-significant change with ($R^2 = 0.031$, F [1, 86] = 0.036, $p = 0.850$).

Interestingly, when body mass index was replaced with data on weight, the results followed the same pattern for heart rate, having a non-significant contribution to the regression model. However, for systolic blood pressure and diastolic blood pressure, weight made a significant contribution to the regression model. As such, weight contributed to the regression model with ($R = 0.322$, F [1, 87] = 10.088, $p < 0.05$) and accounted for 9.4% of the variation in systolic blood pressure; similarly, weight contributed to the regression model with ($R = 0.213$, F [1, 87] = 4.149, $p < 0.05$) and accounted for 3.5% of the variation in diastolic blood pressure. No significant contribution was made by introducing hostility in the equation. However, weight was a significant predictor of systolic blood pressure and diastolic blood pressure, with none of the other independent variables, body mass index and hostility, being significant predictors.

Chapter Six: Discussion

Overview

The present study examined the relationship between work and health within the firefighting profession. More specifically, this research assessed the relationship between high levels of job-related stress (long-term exposure to high risk work environments), hostility, and level of satisfaction (e.g. spousal, life, and job) in the case of firefighters. The study was analyzed in the context of Social Ecology Theory and aimed to explore how personality, spousal relationship, and social factors influenced the relationship between work and health for firefighters.

The first hypothesis investigated the influence of work exposure on the health and wellbeing of firefighters. Thus, it was hypothesized that work exposure will have a negative impact on the psychological health of firefighters, their overall satisfaction (e.g. spousal, life, and job), and on the levels of self-reported hostility. As such, three direct effects were examined:

a. Work exposure will have a direct negative relationship on overall satisfaction: the higher the levels of job stress, exposure to hazards and toxic environment, the lower the levels of satisfaction with life, marital relationship, and job.
b. Work exposure will have a direct positive effect on psychological state: high job stress and exposure to difficult work conditions will lead to negative impact on psychological health, with high levels of reported somatization, interpersonal sensitivity, obsessive-compulsive, anxiety, depression, phobic anxiety, paranoid ideation, and psychoticism.

c. Work exposure will have a direct effect on the levels of hostility perceived: the higher the level of job stress and exposure to hazards and toxic environment, the higher the levels of reported hostility.

Testing the second hypothesis involved investigating differences or similarities in perceiving marital satisfaction and/or domestic conflict as a function of dyad type (wife/husband, conjugal relationship). Furthermore, it was expected that spouses would report higher levels of marital dissatisfaction and domestic conflict when compared to their significant others.

Finally, testing the last hypothesis entailed analyzing firefighters' cardiovascular health in relationship to hostility. It was expected that hostility, diastolic blood pressure, heart rate and body mass index, as indicators for cardiovascular disease, would predict systolic blood pressure on firefighters. Thus high levels of hostility, diastolic blood pressure, and increased heart rates and body mass index would predict high systolic blood pressure, and therefore also increased predisposition for cardiovascular reactivity and cardiovascular disease.

Support for Hypotheses about Relationship among Job-Related Stress, Hostility, and Overall Satisfaction

The hypotheses regarding the relationship among high levels of job-related stress (long-term exposure to high risk work environments), hostility, and level of satisfaction (i.e., spousal, life, and job) in the case of firefighters were partially supported. In general, the findings support previous literature on firefighting emphasizing the concept that bad work has a negative impact on both psychological state and overall satisfaction (Karasek & Theorell, 1990; Kendall & Muenchberger, 2009; Ettner & Grzywacz, 2001). Therefore,

firefighting exposure and work conditions have a significant direct negative impact on the psychological state of firefighters with higher levels of work stress and exposure to toxic environment and hazardous conditions leading to negative impact on mental health symptomatology. These findings add to the vast body of research regarding the general population and to the literature on firefighting in particular, demonstrating the negative impact of work stress on mental health (Chamberlin & Green, 2010; Heinrichs et al., 2005; Kop et al., 2010; Saijo et al., 2008; Wagner et al., 2009; 2010; 2016). The model of the present study confirmed that, in the case of firefighters, job stress had a significant impact on the way work was perceived, and it was directly correlated with psychological distress. The work state, defined as including job stress and exposure to toxic and hazardous conditions, was positively associated to high levels of stress symptomatology; firefighters' responses indicated elevated levels of depression, interpersonal sensitivity, and somatization ranging from lack of motivation and loss of vital energy, to complaints of pain and discomfort associated with bodily dysfunction. In addition, no significant impact on the work stress and psychological state was evident when controlling for age and the level of experience measured in years of service. These results are consistent with previous research conducted by Wagner et al. (2010) indicating no evident relationship between mental health and years of service. However, in our model, age was highly correlated with the years of service supporting the natural interrelationship between these two predictors.

Furthermore, work conditions and exposure to hazards and toxic environments had a significant direct negative relationship on overall satisfaction of firefighters, with higher levels of work stress and exposure to toxic environment and hazardous conditions leading to lower levels of satisfaction with job, life, and spousal relationship. This confirmed previous

findings on the meaningfulness, inspirational, and motivational role of job satisfaction at the individual level and its interconnectedness with personal satisfaction with life and the spillover effect into marital satisfaction (Elovainio et al., 2000; Ettner & Grzywacz, 2001; Judge et al., 2006; Kelloway & Day, 2005). Thus, increased work stress could impact the work-family balance and will negatively impact satisfaction with family, marital relationship, and life that could be translated into feelings of self-reproach and potential hostility either at work or at home (Judge et al., 2006). In the present model, the three components of satisfaction contributed significantly to the overall satisfaction factor, with marital satisfaction loading the highest, life satisfaction loading second, and job satisfaction last. This indicates that the relationship with families and significant others, as well as the satisfaction with personal life, play a significant role on firefighters' overall satisfaction and wellbeing; however, the requirements of the job and work commitments might play an important role in modifying these interactions. The complex nature of firefighting, with shift work impacting numerous aspects of family and personal life, has been captured in previous research emphasizing the importance of home support and department "brotherhood" in mitigating work stress (Kendall & Muenchberger, 2009; Meltzer, 2002; Moreno-Jimenez et al., 2008; Sommerfeld et al., 2017). A qualitative study conducted on firefighters and their spouses indicated that spousal satisfaction and spousal support were paramount for firefighters, while camaraderie and positive work environment were mentioned subsequently in alleviating the negative effect of work stress on overall satisfaction (Sommerfeld et al., 2017).

However, when controlling for neuroticism as personality trait, the model of the present study supported neither the hypothesis that work state has a direct significant effect on the levels of hostility for firefighters, nor the assumed indirect effects of work state

through psychological state or overall satisfaction on hostility. One explanation for these results might exist in the fact that, overall, firefighters scored lowest in neuroticism as a personality trait when compared to their scores on extraversion, conscientiousness, agreeableness, and openness. Not surprisingly, the two groups of firefighters, Prince George Fire Rescue and Kamloops Fire Rescue, were not significantly different in their reporting on personality traits, with extraversion scores being the highest in both groups. These results are consistent with findings in other studies on professional firefighters and new recruits, indicating that high levels of extraversion, as a personality trait, are present in individuals employed in fire services, regardless of the years of service (Wagner et al., 2009).

When testing the model using the other four personality traits as controls in the analyses, extraversion and openness led to models that complemented the hypotheses considered in the original model, with the addition that, in case of openness as the control for personality trait, a significant direct relationship between work state and hostility was observed. In other words, when controlling for openness to experience, thus holding constant the willingness to engage in learning to adapt to changing work contexts, job stress and work conditions indicated a direct positive correlation with the levels of hostility perceived by firefighters. As hostility refers to a cognitive-attitudinal component linked with low tolerance to stress and coping abilities, one explanation for the above finding might rest in the fact that openness to experience would act as an "influencer" between job stress and hostility seen as negative emotionally charged aggressive attitudes towards work situations. This assumption is supported by extant literature demonstrating direct and indirect relationships between personality traits and aggressive behaviours (Barlett & Anderson, 2012). Interestingly enough, although openness was considered to be unrelated to aggressive behaviours, the

study conducted by Bartlett and Anderson (2012) indicated that openness to experience was directly related to physical aggression and indirectly related, through aggressive attitudes, to violent behavior. Although our results are consistent with the literature examining personality and aggressive behavior, our results should be interpreted with caution in the case of firefighters and would require more attention in future studies.

Further, contrary to our findings, most of the extant literature focused more on the fact that openness to experience was associated with attenuation of the negative impact of stressors and less reactive responses to stressors (Oswald et al., 2006; Williams et al., 2009), also linking openness with the ability to reassess the severity of the stressors and use emotion-focused coping strategies (Leger, Charles, Turiano & Almeida, 2016). These studies indicated that individuals exhibiting openness to experience as a personality trait are capable of evaluating and controlling stressors, thus experiencing less stressor-related negative affect. In addition, in a study analyzing personality and job stress, it was demonstrated that openness was associated not only with lower perceived job stress, but also with higher job control and job demands (Tornroos et al., 2013).

The present results suggest that personality traits should be considered of the utmost importance when analyzing perceived mental health in firefighters, as it has been demonstrated that personality plays a very important role in the way each individual perceives their environment and their ability to successfully manage the challenges of the job and everyday life. However, it is important to note that the concept of personality represents a combination of all personality traits and their interactions, as opposed to considering individual traits only; analyzing only individual traits with respect to how work environment affects mental health or overall satisfaction may not depict the full picture. This is not to say

that examining individual personality traits (such as moods and energy levels as reflected through extraversion and neuroticism, organization and self-management as reflected through conscientiousness, interpersonal skills through agreeableness, or the ability to adjust to new and changing work environment as reflected through openness) will not provide valuable information in relationship to perceived health and work stress.

If we were to look at the entire cluster of personality traits contributing to the overall personality style of the firefighter cohort analyzed in this study, we could characterize them as upbeat optimists unconcerned in the face of stress, easy going individuals with a clear sense of direction, who enjoy meeting other people and participating in community projects, go-getters, well organized, rule followers, and altruistic (Costa & McRae, 1992). This description of the group's characteristics and style is consistent with conclusions drawn from a qualitative research conducted by Sommerfeld et al. (2017), presenting firefighters as optimists, appreciating positive interactions at work, contributing to community and being proud of their profession and professional image in the community. Firefighters are known for their team attitude, fostering close relationships with one another, appreciating good colleague interactions, and mimicking their comrades' attitudes and behaviour to best fit within the group; thus group style, its characteristics, and dynamics in regards to firefighting work could be an important topic of research to help clarify the picture further.

Support for Hypotheses about Similarities and Differences on Couple Satisfaction and Domestic Conflict

The hypotheses about couple satisfaction and domestic conflict as a function of dyad type were partially supported. For the first hypothesis, looking at the differences in levels of satisfaction with life and marital relationship, it was expected that spouses would report

lower satisfaction levels when compared to their significant others. In contrast to our hypotheses, the results indicated that both groups reported high levels of satisfaction with life and marital relationships, with no significant differences in the levels of satisfaction with life and couple relationship between groups. These results confirm previous research on firefighters that indicated that spouses would work together as partners to balance the family responsibilities with the challenges of the firefighting shift schedule (Sommerfeld et al., 2017). Although some aspects of firefighting work may be challenging for the couple, such as adjusting roles and responsibilities around shift work, parenting, spending family time together, health and safety while on the job, or spillover effect from work to home, other aspects turn out to be very beneficial. For example, job and financial stability, strong professional status and recognition within the community, flexibility with child care arrangements, strong support network from the organization and other families of firefighters, are just a few of the benefits (Sommerfeld et al., 2017). In addition, in an attempt to reason the results of our model, recent research has demonstrated that sharing positive events with others induces a state of happiness for those who share, as opposed to those who prefer to keep these events for themselves (Judge et al., 2006). When we translate this to the tight-knit firefighter group, sharing positive family stories with coworkers or positive work stories with family members will lead to positive spillover from family to work or work to family, which, in turn, will lead to increased satisfaction with work and family, thus confirming our results. However, due to the fact that spouses participating in our study were the ones invited by the firefighters, we might assume that only individuals confident with the status of their conjugal relationship might have volunteered their spouse for the study. Therefore, our results should be interpreted with caution due to potential selection bias.

The second hypothesis analyzed the group differences in perceiving aggression and domestic conflict. The results indicated significant differences between the two groups - firefighters and their spouses - when all five variables (physical aggression, verbal aggression, anger, hostility, and indirect aggression) were entered into the equation at once. Not surprisingly, firefighters scored higher on indirect aggression, physical aggression, verbal aggression, and hostility; whereas, their partners scored higher on anger. These results are strongly supported by the literature with men scoring high on physical, verbal, and indirect aggression, but not on anger (Buss & Perry, 1992). One explanation for this may consist in the fact that anger is more directly related to charging emotionally in preparation for aggression, more specific to women than men, rather than adopting an aggressive attitudinal behavior towards a situation, more specific to men than to women (Buss & Perry, 1992; Salari & Baldwin, 2002).

Further analyses indicated that firefighters and their spouses are more likely to use different ways to express aggression and, therefore, domestic conflict. As such, according to our results, indirect and physical aggression were the two facets of aggression that firefighters would be most likely to employ in interpersonal transactions and, particularly, within intimate relationships. Indirect aggression refers to the tendency to express frustration and irritation in actions that avoid direct confrontation, whereas physical aggression focuses on the use of physical force to release anger and frustration (Buss & Warren, 2008). Research supports the hypothesis that men are in general more aggressive than women, with biology, gender roles, and cultural and societal influences contributing to these differences (Bettencourt & Miller, 1996; Buss & Perry, 1992). In addition, it has been demonstrated that men tend to use physical aggression as opposed to women, who tend to inhibit aggression

and use anger instead. However, previous research has also demonstrated that, under provocation in intimate relationships, men and women behave equally in terms of aggressive behaviour (Bettencourt & Miller, 1996).

The results of the present study indicated that the gender difference was significantly larger for indirect aggression as opposed to physical aggression or verbal aggression as demonstrated by the empirical literature. In the case of the model presented in this study, it appears that firefighters would be more likely to use indirect aggression in order to react to frustrations and irritability. As indicated by previous research, some of the indirect aggression actions expressing avoidance of conflict could be ignoring one's partner, withholding affection, or intentionally embarrassing the partner in front of others (Buss & Perry, 1992). Due to the fact that this approach does not always resolve the conflict, individuals using this type of approach to express their negative emotions are more likely to suffer chronic frustration; hence, this might explain the elevated level of perceived hostility in firefighters. In order to build an argument for this, one might look into the relationship that exists between firefighters and their support network. Although support originates from different sources, it seems that support from family and significant others is particularly valued by firefighters, with support from co-workers and organization coming on second (Sommerfeld et al., 2017). As such, in cases of domestic disagreement, due to the fact that firefighters greatly value their support network, they would be more likely to limit their frustration to indirect aggression, thus avoiding direct conflict with their spouses, rather than imposing their opinion through physical or verbal aggression. This approach to conflictual situations prevents escalation and relationship deterioration, as well maintains the support network around the firefighter. By the same token, firefighters would be more likely to

employ indirect aggression at work as well, thus maintaining good relationships within the brotherhood, not altering the social support offered by their co-workers, in addition to following the workplace norms, and respecting the hierarchy. It has been argued that persons bound by strict societal norms may inhibit and/or regulate their aggression (Bettencourt & Miller, 1996; Hammer et al., 2004). The firefighting profession comes with strict norms, professional prestige, and a highly regarded social status. Thus, indirect aggression might seem the covert way to express aggression and deal with angry feelings while maintaining the good image at work and in the community.

On the other hand, the results of the present study indicated that spouses would express their frustration through anger, translated by negative emotions, irritability, and emotional lability. Although research suggests that this way of expressing aggression may be explained through biology, social role models, and cultural and social influences (Bettencourt & Miller, 1996), the complex nature of firefighters' family relationships and dynamics may also have a significant influence on the way spouses express their anger. For example, at the level of the family unit, firefighters' spouses are the ones who make sacrifices in adjusting their professional career, their work schedule, and their personal hobbies and interests in order to accommodate the needs and work arrangements of their partners and families. In addition to the worries and fears for the partner's health and safety while on the job, the impact of shift work on spouses and on household dynamics would likely represent significant factors adding to the daily stress and frustration of spouses. Not being able to attend family events together as a couple due to work schedule or work commitments, or not having their partner share family responsibilities or spend less time fulfilling parenting roles, would be expected to trigger frustration and irritability that would be more likely to be vented

through anger. However, the support from the organization and family or friends was mentioned in research as an alleviating factor for stress at the family level and contributed to spouse and family satisfaction (Sommerfeld et al., 2017).

Support for Hypotheses Linking Hostility to Cardiovascular Health

The analyses of cardiovascular health in relationship to hostility were performed using hierarchical multiple regression between systolic blood pressure (Systolic_BP) as the criterion variable and body mass index (BMI), heart rate (HeartRate), diastolic blood pressure (Diastolic_BP), and hostility as predictor variables. The hypothesis that hostility would predict blood pressure was not supported. Good predictors for systolic blood pressure were diastolic blood pressure and weight; whereas, heart rate and body mass index did not have any significant contribution. One explanation for these results may lie in the fact that, overall, the firefighters' sample analyzed exhibited good general health. The cardiovascular measurements for the group were all in the normal range, with only the body mass index above the normal. In addition, it is possible that the firefighters who volunteered for the cardiovascular data collection might have been the ones confident with their level of health, fitness, and wellbeing. Importantly, however, PGFR has implemented a wellness program which includes regular health and mental health checkups, as well as incentives for adopting healthy behaviors: regular physical exercise, eating well, taking care of overall health and mental health. In their study, Sommerfeld et al. (2017) emphasized the fact that firefighters were not only aware of the importance of maintaining their physical fitness and good health, but also acted on this knowledge. In the same vein, our results were consistent with Donovan et al. (2009) findings in American firefighters indicating that the prevalence of metabolic

syndrome, a cluster of conditions that increase the risk of cardiovascular disease, was lower when compared with the prevalence rate observed in the males in the general population. In addition, this study stated that the level of cardiorespiratory fitness was higher than expected for a similar age and sex-matched general population, while the self-reporting smoking rate was low (Donovan et al., 2009).

Several factors could explain these results. The "healthy worker" syndrome might be one of these factors; firefighters undergo a very stringent hiring process, where physical fitness and overall health plays an important role in a successful selection. However, the demanding nature of their work, the exposure to hazardous and toxic environments, and the exposure to traumatic events mean that follow up regular screening would be imperative. Thus, those individuals who might be at high risk of cardiovascular reactivity would benefit from these regular screenings before too many cardiovascular risk conditions accumulate to threaten the health and wellbeing of the individual.

The results of this present study indicate that firefighters have good health, or at least they self-report good health, however, more research is needed to further look into factors that trigger "hidden" cardiovascular disease. Studies investigating sudden deaths of firefighters emphasize the fact that, in most of the cases, the death occurred due to undetected or unrecognized cardiac disease (Donovan et al., 2009; Liao, Al-Zaiti, & Carey, 2014). As such, the need to continue to explore mechanisms that link mental and physical health to the development of cardiovascular issues in firefighters is critical. Interestingly, happiness and satisfaction were found to be negatively correlated to development of cardiac disease, particularly with systolic blood pressure, such that blood pressure was lower when participants were happy and generally satisfied (Brondolo, Alexander, Bobrow, & Schwartz,

1999). The present results align with this assumption, with our firefighter cohort reporting high levels of overall satisfaction with life, marital relationship, and job, and reporting good levels of physical health, along with normal ranges for blood pressure, heart rate, and body mass index.

Chapter Seven: Limitations, Conclusions, and Recommendations

Limitations

The present study has several limitations. These limitations should not be viewed as minimizing the results of our study, but as important aspects to be mentioned and addressed in future research. First, the study was cross-sectional in its design, measuring information at only one point in time. Although this seemed an efficient and a convenient way to collect data (considering the work load at fire halls and already busy life of firefighters), it does entail the possibility of recall and/or respondent bias. Consequently, our study was limited in its ability to pinpoint the causal relationship between work stress, mental health, overall satisfaction, and hostility in firefighters. Although the present research assessed a model that reflected the impact of work on mental health and satisfaction, it remains unclear whether high hostility negatively impacts mental health, overall satisfaction, and work stress, or whether work conditions negatively impact mental health, hostility, and overall satisfaction. In order to mitigate these limitations and to ensure the quality of the data, recommendations for future research include completion of longitudinal or mixed-methods (i.e., quantitative and qualitative) studies to supplement the cross-sectional data reported here.

Second, the current study utilized self-report data, thus bringing response bias into consideration. Data collection was completed while firefighters where on-duty at their workplace. Therefore, the pressure of completing the questionnaires in between responding to emergency calls or fulfilling administrative work might have influenced or rushed the responses provided by the firefighters. There was also the potential influence of peer pressure to agree to respond to the questionnaires as the groups are very tight and refusal to participate in the data collection might be perceived as a separation from the group.

Third, the participants in the study were primarily male, with only two female participants at both locations, and the respondents in our study were mainly Caucasian with only a few respondents declaring their cultural background as “other”. Consequently, for fire departments with a relatively homogenous (male, caucasian) workforce, the results could be considered sound; however, the results should be interpreted with caution, as they cannot be generalized in case of larger, more diverse fire departments that have a larger female representation amongst the members, or a more diverse ethnic representation.

Fourth, our samples representing spouses and firefighters participating in the cardiovascular data collection were obtained by volunteering, thus raising concerns of selection bias. In other words, those who agreed to participate in data collection were more likely to be happy and satisfied with their relationship or with their health and cardiovascular fitness status. Although altogether, all these biases might have influenced the results, it is argued that the relative intensity of the relationships in the model presented will still hold.

Recommendations

Based on the findings of the current study, more research is needed to investigate the causal relationship between work, mental health, and hostility in firefighters. These studies should be longitudinal in order to capture the changes at both the group and individual levels and could also be conducted employing the social ecology model. Providing a longitudinal holistic approach will enable future research to capture all facets of the interaction between work, and health and wellbeing in the case of firefighters. However, not all firefighters develop mental health issues related to exposure to workplace environment and trauma. There is a plethora of factors that can mediate these effects, personality characteristics being one of them. In this present study, firefighters scored high on extraversion and openness to

experience, and low in neuroticism. Based on this, the present study could be expanded to further investigate the coping self-efficacy skills in order to identify key coping mechanisms employed by firefighters in mediating the impact of stress and trauma on mental health and wellbeing. In addition, research on training and intervention approaches on how to enhance resilience in firefighters may be beneficial.

Another recommendation based on the findings of this current study refers to expanding research on the uniqueness and significance of the social support of firefighters. Spousal support and the brotherhood are presumed to play a very important role in mitigating the effects of the stressful work environment of firefighting. Future studies following a longitudinal design would be beneficial to investigate the importance of family and social support for firefighters. However, one of the limitations of conducting this type of research is the risk of sampling bias due to the fact that couples confident with the status of their conjugal relationship may be much more likely to agree to participate in the study.

Conclusions

Overall, the results of our study contribute to the growing empirical evidence that explains the relationship among work stress, mental health, overall satisfaction with life, job, and marital satisfaction, and hostility in firefighters. The present research replicated previous findings in regards to negative influence of work stress on mental health and overall satisfaction. Generally, increased stress and exposure to hazards and toxic environment were associated with poor mental health and low satisfaction with life, job, and marital satisfaction. Surprisingly, in the model proposed for this research, the work exposure to toxic and hazardous environment did not have a significant influence on hostility when controlling for different types of personality traits. The relationship between work exposure and hostility

remained non-significant for extraversion, neuroticism, conscientiousness, and aggreableness. Interestingly, openness to experience was the only personality trait to link work conditions to hostility. This finding suggests that firefighters possess the willingness to experience change and the capacity to deal with change in a positive manner, which indicates great coping self-efficacy skills. This statement is supported by research conducted on firefighters' coping skills that emphasized the importance of self-efficacy skills and appraisal processes in the succesful adjustment to a complex work environment or following stressful experiences (Lambert et al., 2011).

Although some of the health risk factors could not be modified (e.g., age, genetics, biology, gender, personality, etc.), there are some that could be altered, such as occuptional stress, work conditions, and work reward. Although our study adds to the understanding of the impact of work stress on mental health and overall satisfaction in firefighters, the intercorrelation between these components needs to be explored in further research. Mental health may be negatively impacted by the unpredictability of the work, emergency calls, and exposure to hazards and toxic environments, and by the personal characteristics of the individual and the availability and quality of social support. Overall satisfaction with life, job, and marital satisfaction may be influenced by work and by the social support both at home and at work. Little has been studied regarding the significance of the exclusive social support of firefighters, the belongingness, and the feeling of connection to a select and highly regarded professional group, and how these aspects impact their mental health and overall satisfaction.

The cardiovascular health of firefighters in relationship to hostility is another topic of concern for firefighters. Although the results of our study indicated that firefighters reported

good health, with systolic and diastolic blood pressure, heart rate, and weight within the normal range, more research is needed to investigate what type of wellness programs are meaningful and motivational for firefighters in order to be successfully implemented within the fire department.

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Appendixes

Appendix A.

Information Letter and Consent Form - Firefighters
Date: August/September/October 2016
Researcher: Romana Pasca, PhD Candidate, Health Sciences, UNBC
Researcher Supervisor: Dr. Shannon Wagner, Professor, School of Health Sciences, UNBC

Dear Sir or Madam:

This letter is to inform you about a research project entitled "Firefighters, Hostility, and Satisfaction" that you may be interested in and to ask if you would consider participating. I am a PhD student in the School of Health Sciences at University of northern British Columbia conducting research under the supervision of Dr. Shannon Wagner. This research project is a fundamental component of my PhD dissertation. The intent of this project is to attempt to determine how occupational stress is perceived by the different groups of employees in the context of the Canadian firefighting work.

Your participation in this phase of this project will involve one 45 to 60 minute time period during which you will be asked to complete several surveys that ask questions about yourself, your occupation, and its influence on health and wellbeing. I am interested only in overall perceptions or views. In addition, you will be tested on several cardiovascular functioning indicators, such as heart rate, body mass index, and blood pressure measurements. All information that you provide will be collected and held in strict confidence, unless disclosure is required by law. Only the researchers who are involved in this project will ever have access to your completed surveys, which will be kept in a locked and secure place at the University of Northern British Columbia for an unlimited period of time until no longer needed for research after which they will be shredded. Your names will be removed from all questionnaires and replaced with code numbers. Please note, if information is disclosed regarding child abuse or serious and imminent threat of harm to yourself or others, the law requires that we report this information to appropriate authorities. Please be assured that once you have decided to participate as a volunteer in the project, you can still withdraw from the study at any time with no consequence, and any information collected from you will be withdrawn and shredded.

We want you to be aware of the possible risks/side effects associated with participation in this study. For example, there is a possibility of minor physical risks/side effects associated with the collection of cardiovascular health indicators or the fact that the survey questionnaires may contain questions of extremely sensitive nature and may bring about potentially traumatizing issues that may cause you emotional or psychological discomfort. In the event that you develop any negative reactions, or are concerned that you may, please contact the researcher Romana Pasca at pascar@unbc.ca. You may also contact my supervisor Dr. Shannon Wagner at wagners@unbc.ca. Other counseling services are listed in Appendix C.

You will not benefit directly from participating in this project; however, the potential benefits include the opportunity to help provide more information about occupational influence on health and wellbeing of firefighters employed in the Canadian work environment. In addition, in order to have a more comprehensive understanding of the impact of long-term occupational exposure on health, we would like to inform you that another purpose of this project is to link data collected during this project with data collected in 2004 from the paid professional firefighters and recruits employed by the PG Fire Department.

If you would like to participate in this project, please complete and return the attached informed consent sheet and feel free to keep this information letter for further reference. Also, I must inform you that you must receive a copy of your signed consent form. If interested, a copy of the final results can be attained, upon completion of the project, by contacting me directly. This research study is a fundamental component of my PhD dissertation and I intend to publish excerpts/reports of the study. However, your name will not appear or be disclosed in the dissertation or any publications/reports resulting from this study.

Thank you very much for your time and consideration. I look forward to hearing from you. If you have any questions, please contact me at pascar@unbc.ca or my supervisor Dr. Shannon Wagner (250 960-6320; wagners@unbc.ca). Also, if at any time, you have concerns about the research project, you may contact the UNBC Office of Research (250 960-6735; e-mail: reb@unbc.ca).

Sincerely,

Romana Pasca
PhD Candidate, Health Sciences Program

University of Northern British Columbia

Information Letter and Consent Form - Spouse
Date:
Researcher: Romana Pasca, PhD Student, Health Sciences, UNBC
Researcher Supervisor: Dr. Shannon Wagner, Associate Professor, School of Health Sciences, UNBC

Dear Sir or Madam:

This letter is to inform you about a research project entitled "Firefighters, Hostility, and Satisfaction" that you may be interested in and to ask if you would consider participating. I am a PhD student in the School of Health Sciences at University of Northern British Columbia conducting research under the supervision of Dr. Shannon Wagner. This research project is a fundamental component of my PhD dissertation. The intent of this project is to attempt to determine how occupational stress may influence the level of satisfaction with life, marriage, and job perceived by firefighters in the context of the Canadian workplace. You will not benefit directly from participating in this project; however, the potential benefits include the opportunity to help provide more information about occupational influence on health and wellbeing of firefighters employed in the Canadian work environment.

Occupational stress perceived by your spouse may also have an influence on the family and your overall perception of life. I invite you to provide your input and perspective on this matter. I am interested only in overall perceptions or views. Your participation in the project will involve one 30 minute time period during which you will be asked to complete several questionnaires that ask questions about yourself, your health and wellbeing, and your overall perception of satisfaction with life, family, and marital relationship. All information that you provide will be collected and held in strict confidence, unless disclosure is required by law. Only the researchers who are involved in this project will ever have access to your completed surveys, which will be kept in a locked and secure place at the University of Northern British Columbia for an unlimited period of time until no longer needed for research after which they will be shredded. You are participating in this study confidentially. I will not use your name or any information that would allow you to be identified. Please be assured that once you have decided to participate as a volunteer in the project, you can still withdraw from the study at any time with no consequence, and any information collected from you will be withdrawn and shredded.

Please be aware that your responses are confidential. However, there may exist a minimal risk that, while completing the survey, your spouse or other family members can gain access to the responses you will provide for this research. In order to protect the confidentiality of your responses, we suggest to complete the questionnaires in the presence of the researcher or you exercise caution by sealing very well all completed questionnaires and store them in secure locations. Additionally, I want you to be aware that the survey questionnaires may contain questions of extremely sensitive nature and may bring about potentially traumatizing issues that may cause you emotional or psychological discomfort. In the event that you develop any negative reactions, or are concerned that you may, please contact the researcher Romana Pasca at pascar@unbc.ca.You may also contact my supervisor

Dr. Shannon Wagner at wagners@unbc.ca. Other counseling services are provided with the questionnaires package.

If interested, a copy of the final results can be attained, upon completion of the project, by contacting me directly. As I already mentioned, this research study is a fundamental component of my PhD dissertation and I intend to publish excerpts/reports of the study. However, your name will not appear or be disclosed in the dissertation or any publications/reports resulting from this study.

Thank you very much for your time and consideration. I look forward to hearing from you. If you have any questions, please contact me at pascar@unbc.ca or my supervisor Dr. Shannon Wagner (250 960 6320; wagners@unbc.ca). Also, if at any time, you have concerns about the research project, you may contact the UNBC Office of Research (250 960-6735; e-mail: reb@unbc.ca).

Sincerely,

Romana Pasca
PhD Student, Health Sciences Program
University of Northern British Columbia

Firefighters, Hostility, and Satisfaction
Researcher: Romana Pasca
Research Participant Consent Form

Do you understand that you have been asked to participate in a research study?	Yes	No
Has the attached information sheet been explained to you? *A copy must be given to you for you to keep.*	Yes	No
Do you understand the benefits and the risks involved in participating in this research study?	Yes	No
Do you understand that you are free to refuse to participate or to withdraw from the study at any time? *You do not have to give a reason for your choice to withdraw.*	Yes	No
Have you been able to ask questions and to discuss this research study?	Yes	No
Do you understand who will have access to the information you provide?	Yes	No
Have the issues of anonymity and confidentiality been explained to you?	Yes	No
Do you understand that there are limits on this confidentiality if you disclose child abuse in any form?	Yes	No
Do you understand that there are limits on this confidentiality if you disclose serious and/or immediate threat to either yourself or someone else?	Yes	No
Do you understand that the information collected during the assessment must be released if subpoenaed by a court of law?	Yes	No
Do you understand that the information collected during the assessment must be released if requested by the College of Psychologists of BC?	Yes	No
Do you understand that the results of the present research will be compiled in a form of a report and potentially released to your employer?	Yes	No
Do you understand that you may be contacted in the future to request participation in future related studies?	Yes	No
Have you been informed that the data collected through this project will be linked to data collected from the department in 2004?	Yes	No
Do you agree to have the information collected during this project linked with the information collected in 2004?	Yes	No
Do you understand that the collected data may be analyzed in a variety of way and published in academic journals of other sources?	Yes	No

This research was explained to me by: _____
Print name

I agree to participate in this study:

_____
Signature of Research Participant

_____
Printed Name of Research Participant

_____
Date of Participant's Signature

_____
Signature of Witness

_____
Date of Witness's Signature

I believe that the person signing this form understands what is involved in the research study and voluntarily agrees to participate.

_____
Signature of Researcher

_____
Date of Researcher's Signature

Appendix B. Demographic Survey
Please answer the following questions.

What is your gender? _____Male
_____Female

What is your marital status? _____Single
_____Never married
_____Married/Common Law/In a relationship
_____Separated
_____Divorced
_____Widowed

How many years have you been in the current relationship? _____

How many children do you have? _____

What is your date of birth? _____ _____ _____
Day Month Year

What is your place of birth? _____ _____ _____
Country Province City/Town

What are your ethnicity/cultural backgrounds? _____
(Please specify)

What is your highest educational level completed?

_____ High school

_____ Trade/Technical School (please specify): _____

_____ College Diploma (please specify): _____

_____ Some University

_____ University Degree (please specify): _____

_____ Other (please specify): _____

How many hours per week do you work at your job? _____

What is the length of your employment in this field?_____

Appendix C. Prince George/ Kamloops Wellness Resources Sheet

Public Counselling Resources

Resources	**Phone Number**	**Web Page**
Anxiety Disorders Group	250 561-8033 250 319 7667	www.bcss.org
Canadian Mental Health Association	250 564-8644 250 374 0440	www.cmhapg.ca
Depression Support Group	250 564-8644	www.cmha.bc.ca
Mental Health Information Line	1-800-661-2121	www.cmha-bc.org
Psychological Association Referral Service	1-800-730-0522	www.psychologists.bc.ca
Mental Health and Addiction Services	250 545-7417 250 377 6500	www.northernhealth.ca www.interiorhealth

Private Counseling Resources Prince George

Resources	**Phone Number**	**Web Page**
Brazzoni & Associates	250 614-2261	www.brazzoni.com
Worth Counselling and Assessment	250 563-7331	
Walmsley & Associates Professional Counselling/Couple Marital Counsel	250 564-1000	www.walmsley.ca
Theravive – Family Counseling	250 588 4534	www.theravive.com
Wellspring Counseling Services	250 561 0410	www.wellspringcounsel.ca

Private Counseling Resources Kamloops

Resources	**Phone Number**	**Web Page**
Riverbend Counselling and Wellness	250 334 4801	www.riverbendcounselling.ca
Synergy Counselling Family Therapy	250 314 0298	www.synergycounselling.ca
Counselling Kamloops	250 372 7299	www.counsellingkamloops.ca
Kamloops Centre for Therapy/Couple Counselling	250 852 7862	www.kamloopscentrefortherapy.com

Appendix D. Satisfaction with Life Scale

Directions: Below are five statements with which you may agree or disagree. Using the 1-7 point scale, indicate your agreement or disagreement with each item by selecting the appropriate number.

Strongly Disagree	Disagree	Slightly disagree	Neither agree or Disagree	Slightly agree	Agree	Strongly agree
1	2	3	4	5	6	7

1. In most ways my life is close to my ideal.	1	2	3	4	5	6	7
2. The conditions of my life are excellent.	1	2	3	4	5	6	7
3. I am satisfied with my life.	1	2	3	4	5	6	7
4. So far I have gotten the important things I want in life.	1	2	3	4	5	6	7
5. If I could live my life over, I would change almost nothing	1	2	3	4	5	6	7

Appendix E. Symptom Checklist – 90 – Revised ©

Appendix F. Personality Scale NEO-FFI©

Appendix G. Aggression Questionnaire©

1	2	3	4	5
Not all Like me	A little Like me	Somewhat Like me	Very much Like me	Completely Like me

1. My friends say that I argue a lot.
2. Other people always seem to get the breaks.
3. I flare up quickly, but get over it quickly.
4. I often find myself disagreeing with people.
5. At times I feel I have gotten a raw deal out of life.
6. I can't help getting into arguments when people disagree with me.
7. At times I get very angry for no good reason.
8. I may hit someone if he or she provokes me.
9. I wonder why sometimes I feel so bitter about things.
10. I have threatened people I know.
11. Someone has pushed me so far that I hit him or her.
12. I have trouble controlling my temper.
13. If I am angry enough, I may mess up someone's work.
14. I have been mad enough to slam a door when leaving someone behind in the room.
15. When people are bossy, I take my time doing what they want, just to show them.
16. I wonder what people want when they are nice to me.
17. I have become so mad that I have broken things.
18. I sometimes spread gossip about people I don't like.
19. I am a calm person.
20. When people annoy me, I may tell them what I think of them.
21. I sometimes feel that people are laughing at me behind my back.
22. I let my anger show when I do not get what I want.
23. At times I can't control the urge to hit someone.
24. I get into fights more than most people.
25. If somebody hits me, I hit back.
26. I tell my friends openly when I disagree with them.
27. If I have to resort to violence to protect my rights, I will.
28. I do not trust strangers who are too friendly.
29. At times I feel like a bomb ready to explode.
30. When someone really irritates me, I might give him or her the silent treatment.
31. I know that "friends" talk about me behind my back.
32. Some of my friends think I am a hothead.
33. At times I am so jealous I can't think of anything else.
34. I like to play practical jokes.

Appendix H: PREPARE/ENRICH Marital Scale

PREPARE/ENRICH Marital Satisfaction Scale Items

1	2	3	4	5
Strongly Disagree	Moderately Disagree	Neither Agree nor Disagree	Moderately Agree	Strongly Agree

1	2	3	4	5	(+)1. My partner and I understand each other perfectly.
1	2	3	4	5	(-) 2. I am not pleased with the personality characteristics and personal habits of my partner.
1	2	3	4	5	(+) 3. I am very happy with how we handle role responsibilities in our marriage.
1	2	3	4	5	(+) 4. My partner completely understands and sympathizes with my every mood.
1	2	3	4	5	(-) 5. I am not happy about our communication and feel my partner does not understand me.
1	2	3	4	5	(+) 6. Our relationship is a perfect success.
1	2	3	4	5	(+) 7. I am very happy about how we make decisions and resolve conflicts.
1	2	3	4	5	(-) 8. I am unhappy about our financial position and the way we make financial decisions.
1	2	3	4	5	(-) 9. I have some needs that are not being met by our relationship.
1	2	3	4	5	(+)10. I am very happy with how we manage our leisure activities and the time we spend together.
1	2	3	4	5	(+)11. I am very pleased about how we express affection and relate sexually.
1	2	3	4	5	(-) 12. I am not satisfied with the way we each handle our responsibilities as parents.
1	2	3	4	5	(+)13. I have never regretted my relationship with my partner, not even for a moment.
1	2	3	4	5	(-) 14. I am dissatisfied about our relationship with my parents, in-laws, and/or friends.
1	2	3	4	5	(+)15. I feel very good about how we each practice our religious beliefs and values.

Appendix I: Couples Satisfaction Index (CSI -16)

Couples Satisfaction Index (CSI-16)

1. Please indicate the degree of happiness, all things considered, of your relationship.

Extremely Unhappy	Fairly Unhappy	A Little Unhappy	Happy	Very Happy	Extremely Happy	Perfect
0	1	2	3	4	5	6

	All the time	Most of the time	More often than not	Occa-sionally	Rarely	Never
2. In general, how often do you think that things between you and your partner are going well?	5	4	3	2	1	0

	Not at all TRUE	A little TRUE	Some-what TRUE	Mostly TRUE	Almost Completely TRUE	Completely TRUE
3. Our relationship is strong	0	1	2	3	4	5
4.My relationship with my partner makes me happy	0	1	2	3	4	5
5.I have a warm and comfortable relationship with my partner	0	1	2	3	4	5
6. I really feel like <u>part of a team</u> with my partner	0	1	2	3	4	5

	Not at all	A little	Some-what	Mostly	Almost Completely	Completely
7. How rewarding is your relationship with your partner?	0	1	2	3	4	5
8. How well does your partner meet your needs?	0	1	2	3	4	5
9. To what extent has your relationship met your original expectations?	0	1	2	3	4	5
10. In general, how satisfied are you with your relationship?	0	1	2	3	4	5

For each of the following items, select the answer that best describes *<u>how you feel about your relationship</u>*. Base your responses on your first impressions and immediate feelings about the item.

11.	**INTERESTING**	5	4	3	2	1	0	**BORING**
12.	**BAD**	0	1	2	3	4	5	**GOOD**
13.	**FULL**	5	4	3	2	1	0	**EMPTY**
14.	**STURDY**	5	4	3	2	1	0	**FRAGILE**
15.	**DISCOURAGING**	0	1	2	3	4	5	**HOPEFUL**
16.	**ENJOYABLE**	5	4	3	2	1	0	**MISERABLE**

Appendix J: Job Satisfaction Survey

Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4

Directions: Each of the following items asks you about how you feel about several aspects of your job. Please use the above scale to give the response that best describes you.

1	2	3	4	I feel my job is an important part of the organization.
1	2	3	4	I feel confident that my supervisor will do his/her best to get me an answer if he/she doesn't know.
1	2	3	4	I believe that my workload is just about right.
1	2	3	4	I receive adequate support from other divisions.
1	2	3	4	The training that I receive is adequate for me to perform my job.
1	2	3	4	I feel that training requirements are reasonable.
1	2	3	4	Operations, training, prevention, and headquarters personnel feel like they work as one organization.
1	2	3	4	On duty time is available for self-improvement.
1	2	3	4	My supervisor has earned my respect.
1	2	3	4	I am not bored while on duty.
1	2	3	4	I believe that I can make a difference.
1	2	3	4	I am allowed to make the decisions needed to do my job.
1	2	3	4	I feel that the recruit training program is adequate to produce quality workers.
1	2	3	4	I feel that my supervisor is interested in my suggestions.
1	2	3	4	Communications flow up and down the chain of command.
1	2	3	4	I feel that members from other divisions do all they can to help me do my job.
1	2	3	4	Time on-site (in-station) is effectively planned and constructive.
1	2	3	4	I receive good training for my position.
1	2	3	4	My job performance does make a difference in the community.
1	2	3	4	I feel that my work is productive and not busy work.
1	2	3	4	I receive adequate support from the Chief Officers.
1	2	3	4	Leaving town for up to two weeks for outside training is not a waste of my time.
1	2	3	4	I feel that my supervisor adequately explains what is expected of me.
1	2	3	4	I receive the support I need from my supervisor.
1	2	3	4	I look forward to coming to work.

Appendix K: The Job Content Questionnaire©

Appendix L: The Effort Reward Imbalance Questionnaire©

Appendix M: Job Stress Questionnaire

Strongly Disagree	Disagree	Neither disagree nor agree	Agree	Strongly Agree
1	2	3	4	5

I have felt fidgety or nervous as a result of my job	1	2	3	4	5
Working here makes it hard to spend enough time with my family	1	2	3	4	5
My job gets to me more than it should	1	2	3	4	5
I spend so much time at work, I can't see the forest for the trees	1	2	3	4	5
There are lots of times when my job drives me right up the wall	1	2	3	4	5
Working here leaves little time for other activities	1	2	3	4	5
Sometimes when I think about my job I get a tight feeling in my chest	1	2	3	4	5
I frequently get the feeling I am married to the company	1	2	3	4	5
I have too much work and too little time to do it in	1	2	3	4	5
I feel guilty when I take time off from job	1	2	3	4	5
I sometimes dread the telephone ringing at home because the call might be job-related	1	2	3	4	5
I feel like I never have a day off	1	2	3	4	5
Too many people at my level in the company get burned out by job demands	1	2	3	4	5

Appendix O: Measures of Cardiovascular Indicators (blood pressure, heart rate, body mass index, and hip to waist ratio indicators).