

DAILY DYNAMICS OF STRESS IN
CANADIAN PARAMEDICS AND THEIR SPOUSES

by

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ABSTRACT

Due to the unique demands of their job, paramedics have been identified as high risk for post-traumatic stress disorder and trauma-related symptoms (Regehr, Goldberg, & Hughes, 2002). There is additional qualitative evidence that stress experienced by paramedics at work transmits to the home setting and has a negative impact on spouses (Regehr, 2005). Using intensive longitudinal methods, the current line of research examined the daily interplay between home and work environments in a sample of 87 paramedics and their cohabitating spouses. Repeated measures were collected across home and work settings for a period of four consecutive work days. It was generally expected that stress and burnout experienced by paramedics in the work setting would predict subsequent outcomes in the home setting for both paramedics and their spouses. Hypotheses were tested using hierarchical linear modeling (HLM; Bryk & Raudenbush, 1992), with daily measures nested within couples over time. Study 1 first identifies paramedics as experiencing high levels of post-traumatic stress and depressive symptoms. Daily stress transmission to the home setting was also supported, whereby work stress, negative affect, and burnout predicted subsequent outcomes at home for both partners. Study 2 examined the additional impact on dyadic functioning (as moderated by neuroticism), demonstrating significant predictive value of paramedics' burnout in subsequent marital tension. Lastly, Study 3 provides evidence for an impact of work stress and burnout on coping responses in the home setting. Higher levels of extramarital stress predicted increased engagement in rumination and withdrawal, which in turn contributed to greater marital tension. Together, these findings help to explain the intricacies of stress transmission and contagion in couples dealing with high levels of stress. Implications for paramedics specifically and married couples more generally are discussed.

PREFACE

In collaboration with my advisor, Dr. Anita DeLongis, I was responsible for the identification and design of this Ph.D. research program. Over a period of three years, I served as the study coordinator for the project titled, *An Investigation of Stress and Coping across Occupational and Personal Environments (SCOPE) in Canadian Paramedics and their Spouses*. During that time, I was responsible for data collection, data management, and participant troubleshooting (with support from Dr. DeLongis and the assistance of undergraduate students). All analyses reported herein were performed by me, with guidance from Dr. DeLongis.

I am the primary contributor and author of the work presented in this dissertation. The results reported in Chapter 2 have been submitted for publication: King, D. B., & DeLongis, A. (under review). *How was your day? The daily transmission of work stress in paramedics and their spouses*. The results reported in Chapter 3 have been submitted for publication: King, D. B., & DeLongis, A. (under review). *From the frying pan to the fire: Neuroticism and the impact of occupational burnout on day-to-day marital tension*. Results from Chapter 4 have been submitted for publication: King, D. B., & DeLongis, A. (under review). *When couples disconnect: Rumination and withdrawal as maladaptive responses to everyday stress*. All results were derived from the same aforementioned research project, for which I was responsible for data collection, data management, and data analysis. I also spearheaded manuscript writing and correspondence with respective journals for all manuscripts submitted. My co-author, Dr. DeLongis, assisted with study design, data analysis and interpretation, and manuscript revisions. All research contained herein was approved by the

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To my mom.
(for pretty much everything)

CHAPTER 1: General Introduction

Due to the unique conditions and high demands of their job, paramedics regularly experience stress not common to the general population, such as death of a patient under their care, risk of infectious disease, violence, assault, and more generally, exposure to human suffering and tragedy (Regehr, Goldberg, & Hughes, 2002). Their daily responsibilities vary widely and may involve (among many others) basic life support, treatment of life-threatening injuries, medication administration, intravenous therapy, cardiac rhythm interpretation, extrication of persons from trapped vehicles, and attendance of crime scenes involving injury or death, including murders and suicides. These stressors are in addition to the occupational stressors typically experienced by paramedics, such as increased call volume, shift work, changing schedules, lack of dedicated breaks, and scrutiny of job performance for purposes of quality assurance (Regehr, 2005).

As a result, paramedics are at increased risk for burnout, post-traumatic stress disorder (PTSD), and trauma-related symptoms such as depression, anxiety, detachment, sleep disturbance, and emotional numbness (Regehr, Goldberg, & Hughes, 2002; Regehr, 2005). Between one fourth and one third of paramedics show traumatic stress symptoms in the high to severe range at any given time (Alexander & Klein, 2001; Regehr, Goldberg, & Hughes, 2002), levels that are consistent with a clinical diagnosis of PTSD (Regehr & Millar, 2007). Resulting health problems, such as pain, are also more numerous and frequent compared to those reported by the general public (Beaton, Murphy, & Pike, 1996). Goldstein, Jamner, and Shapiro (1992) observed heightened systolic blood pressure in a California sample of paramedics while driving an ambulance and attending a scene, underscoring the heightened physiological stress intrinsic to the job. Given these findings, it can be concluded

that paramedics constitute an ideal subsample of the Canadian population in which to study stress and coping processes.

At the time of the 2006 Canadian Census, there were over 21,000 paramedics working in Canada (referred to as *emergency medical technicians* [EMTs] in some regions). To facilitate a perspective on this number, the same national census reported 18,000 psychologists, 56,000 university professors, and 27,000 firefighters (Statistics Canada, 2006). As the demand for ambulance service grows, the number of paramedics working in Canada continues to increase sharply, with many regions experiencing a shortage (Service Canada, 2011). Paramedics play a critical role in pre-hospital care, and recent improvements in training and education have cemented this role as a key component of primary health services in Canada (Martin-Misener, Downe-Wamboldt, Cain, & Girouard, 2009). Despite their necessity, turn-over rates due to burnout are high (Patterson, Probst, Leith, Corwin, & Powell, 2005), indicating a need to better understand the stress and coping processes unique to this population. A recent national survey of 933 American paramedics and emergency medical technicians (EMTs) revealed that intent to leave the job was related to a number of job satisfaction variables, including responsibility, recognition, and pay and benefits (Chapman, Blau, Pred, & Lopez, 2009). Unknown, however, are the short-term and long-term ramifications of the more traumatic stressors intrinsic to the job, for job satisfaction or otherwise. An extensive literature review revealed that although many of the aforementioned stressors have been identified, paramedics generally remain understudied in this regard. Very little insight has been offered as to the complex unfolding of these stressors over time, how they might be mitigated, and their impact on intra- and interpersonal processes.

Within the past two decades, only two fairly extensive programs of psychosocial research on paramedics have emerged in North America – one in the United States and one in Canada. Unfortunately, both appear to have been discontinued. The former was led by Randal Beaton, a researcher from the University of Washington, whose team produced a series of studies on the stress experienced by Washington firefighters and paramedics. Their initial research indicated that, in comparison to a convenience sample of community-residing men, 15-20% of paramedics and firefighters were at risk for developing somatic, emotional, and behavioural stress outcomes (Beaton, Murphy, Pike, & Jarrett, 1995). A subsequent analysis suggested that job-related stressors were associated with heightened pain complaints, as mediated by negative affect (Beaton et al., 1996). This added to the authors' previous suggestion that a number of intra- and interpersonal factors mediate the relationship between stress and stress outcomes in this population (Beaton & Murphy, 1991). Beaton and his team later identified a number of factors related to the incidence of post-traumatic stress in firefighters and EMTs, including injury to self or co-worker, gruesome victim incidents, provision of aid to the seriously injured, and exposure to death and dying (Beaton, Murphy, Johnson, Pike, & Corneil, 1998). Despite their confirmation of individual variability in the appraisal of such critical incidents, appraisal of incident stressfulness remained constant regardless of previous experience with the stressor. Social support and conflict on the job were also observed to play a role in job satisfaction and stress appraisal (Beaton, Murphy, Pike, & Corneil, 1997). While these studies offer some insight into the stress experienced by paramedics, their generalization to a Canadian population is limited. Within Canada, the differences in education, training, and responsibilities between firefighters and paramedics

are vast. While this body of research may reflect similar experiences of job-related trauma, it should be interpreted with caution in a Canadian context.

The latter body of research was led by Cheryl Regehr of the University of Toronto. Her research, which employed both qualitative and quantitative methods, has indicated that over 80% of Canadian paramedics have experienced emotional distress resulting from a critical incident at work (such as the death of a child, a multiple casualty incident, or violence; Regehr, Goldberg, & Hughes, 2002). Paramedics reporting PTSD symptoms in the high to severe range were more likely to take a mental health leave from work (Regehr, Goldberg, Glancy, & Knott, 2002), indicating a viable threat to employee retention in Canada. In an attempt to better understand contextual factors related to paramedics' occupational stress, interviews conducted by Regehr, Goldberg, and Hughes (2002) and Regehr (2005) identified spouses of paramedics as important sources of support following traumatic work experiences. This reflects previous research by Stone (1999), who found that social support explained over half of the variance in PTSD symptoms in a sample of Detroit paramedics. Despite Regehr and Millar's (2007) finding that the large majority of paramedics in their sample reported having spouses who were very supportive, no additional information is available as to the potential mitigating role of spousal support. As Regehr and Millar (2007) noted, however, an emotional disengagement by paramedics often occurs at home following a stressful day at work. Although paramedics may cope with work stress by distancing themselves emotionally (Regehr, Goldberg, & Hughes, 2002), support for more active, collaborative forms of coping (Berg et al., 2008) suggests that this response may be unsuccessful and/or have negative implications for personal relationships.

Based on qualitative data obtained from EMT focus groups, Patterson et al. (2005) concluded that working as a paramedic often negatively affects family relationships, suggesting an impact of work stress on the home setting. Qualitative research has further demonstrated that spouses and romantic partners of paramedics deal with stressors resulting from the occupational stress of their significant others (Regehr, 2005). A common coping strategy reported by spouses of paramedics was attempting to understand the job by means of employment in the healthcare field or “ride-alongs” which allowed them to witness their partner’s work stress firsthand. Many spouses also reported avoiding highly emotional interactions at home, often to their own detriment. Despite the potential negative impact on relationships, most spouses were highly supportive of their significant others’ career choice (Regehr, 2005). To date, however, no quantitative research is available on the transmission of paramedics’ work stress to their spouses or families. Limited cross-sectional data on American paramedics indicate that individual differences such as personality may play a role (Beaton et al., 1996).

Available research demonstrates that Canadian paramedics are a highly stressed population (Regehr, Goldberg, Glancy, & Knott, 2002; Regehr, Goldberg, & Hughes, 2002; Regehr et al., 2003; Regehr & Millar, 2007), and that this stress is greater than that experienced by the average individual (Alexander & Klein, 2001; Beaton et al., 1995; Beaton et al., 1996). Despite unique social support systems available both on and off the job (Beaton et al., 1997; Regehr, Goldberg, & Hughes, 2002), there is reasonable evidence that paramedics’ occupational stress transfers across settings (Patterson et al., 2005; Regehr, Goldberg, & Hughes, 2002) and impacts relationships at home (Patterson et al., 2005; Regehr, 2005). The goal of the current body of research is to better understand the dynamic

interactions of these processes as they unfold over time. In order to inform our understanding of these processes, theories and research related to stress transmission, dyadic coping, and dyadic adjustment will be discussed and evaluated for their potential applications in this population.

1.1 Stress and Coping

The transactional-relational model (Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986; Lazarus & Folkman, 1984) remains the leading cognitive theory of stress and coping, and serves as the theoretical basis of this thesis. Its primary tenet is that stress and coping are dynamic processes that arise from the interaction of individual and situational factors, highlighting the subjective experience of stress and offering an explanation for differential responses to similar stressors. Within this model, individual responses depend on (1) the perceived degree of threat (primary appraisal) and (2) one's perceived ability to deal with the stressor, which involves an evaluation of available coping resources (secondary appraisal). Lazarus and Folkman (1984) stressed the reciprocal relationship between person and environment, wherein appraisal occurs continuously throughout the transaction. Coping is defined as "the person's cognitive and behavioural efforts to manage (reduce, minimize, master, or tolerate) the internal and external demands of the person-environment transaction that is appraised as taxing or exceeding the person's resources" (Folkman et al., 1986, p. 572). Given the evidence for individual differences in responses to similar occupational stressors among paramedics (Beaton & Murphy, 1991; Beaton et al., 1996; Beaton et al., 1998; Regehr, Goldberg, Glancy, & Knott, 2002), this model provides an appropriate psychosocial framework for studying stress and coping processes in this population. All

subsequent hypotheses are based on this conception of stress as a dynamic and unfolding process incorporating both individual and contextual factors.

Specific theories of occupational stress have also been proposed. The job strain model (Karasek, & Theorell, 1990), for example, underscores psychological demand as a main factor in work strain. Research has suggested that when demand is high and control is low, individuals report more stress, more absenteeism, and poorer health (Schechter, Green, Olsen, Kruse, & Cargo, 1997). Karasek and Theorell (1990) later added a third dimension to their model, proposing social support as a buffer to work strain. Indeed, research has supported an important role of social resources in the stress experienced by paramedics and other emergency workers (Beaton et al., 1997; Burke, 1993; Buunk & Peeters, 1994; Regehr & Millar, 2007; Weiss, Marmar, Metzler, & Ronfeldt, 1995).

These theories highlight key variables involved in occupational stress, yet they are less encompassing than the broader transactional-relational model of stress and coping. Psychological demand is, after all, one of many cognitive variables implicated in primary appraisal, while control is captured by Lazarus and Folkman's (1984) secondary appraisal. Social support and other dyadic processes have been appropriately construed as resources for coping (O'Brien & DeLongis, 1996) and, more recently, as influencing all stages of the transactional model, from the stressful event itself to one's coping response and the resulting outcome (DeLongis & Holtzman, 2005). Although Regehr and Millar (2007) concluded that the work environment of Canadian paramedics is characterized by high demand, low control, and low support, a more complete account of stress and coping is sought in the current body of research; that is, one that accounts for other psychosocial variables and their role in stress and coping.

Despite their association, occupational stress and burnout have been conceived as distinct constructs, in so much that burnout is generally regarded as an outcome of chronic work stress (Maslach, Jackson, & Leiter, 1997). As a construct, burnout has received substantial attention from both researchers and clinicians for over 40 years (Schaufeli, Leiter, & Maslach, 2009). The leading model of burnout encompasses three main dimensions: depersonalization refers to negative emotions and cynical attitudes about one's clients; reduced personal accomplishment, on the other hand, refers to workers evaluating themselves negatively, particularly regarding their work with clients; and emotional exhaustion has been described as feelings of emotional depletion that can restrict an individual's ability to contribute meaningfully to the workplace. Burnout has been shown to result in reduced job performance, increased physical exhaustion, sleep disturbance, more frequent problem behaviours such as alcohol and drug use, and a greater likelihood for relationship and family problems (Maslach et al., 1997). While it has been stated that paramedics are at an increased risk for burnout (e.g., Patterson et al., 2005), these conclusions are primarily derived from qualitative reports. To date, research has not addressed the issue of burnout in this population by intensive quantitative means. Furthermore, the variability of burnout over time and its impact on alternate settings is not well understood. These shortcomings in the literature exist despite the development and validation of the construct within human service occupations specifically. The current line of research addresses both general perceptions of work stress and burnout specifically.

1.2 Stress Transmission and Contagion

There is ample evidence that stress transfers across settings, contexts, and roles. The most commonly studied, for pragmatic convenience, have been the home and work settings.

Bolger, DeLongis, Kessler, and Schilling (1989), for example, observed significant associations between high demands at work and end-of-day negative affect over a six-week period. These findings were expanded upon by Bolger, DeLongis, Kessler, and Wethington (1989), who revealed that these associations were bidirectional. Time-lag analyses supported both home-to-work and work-to-home spillover of stress among married couples, with some effects varying by gender. For example, home-to-work spillover was significant among men only. This was in contrast to previous qualitative analyses by Crouter (1984), who had observed that mothers with older children were more likely to report home-to-work transmission. Differential findings of this nature may be context-driven, in so much that differences may exist by occupation or particular organizational features. Nevertheless, they speak to the potential for stress in one setting to spill over and impact the alternate setting.

The majority of the research on stress transmission and contagion has focused on interpersonal aspects of stress. The early studies by Bolger and colleagues, for example, found that interpersonal aspects of stress accounted for most of the variance in transmission across settings. On days when men reported a work argument, they were more likely to engage in conflict with a spouse at home (Bolger, DeLongis, Kessler, & Wethington, 1989). Similarly, Repetti (1989) found that work demands among a sample of air traffic controllers negatively impacted marital interactions in the evening. Since these earlier studies, research has continued to support an impact of work stress on the home and family settings. Neff and Karney (2004) observed evidence for a negative impact of external stressors on marital perceptions over a four-year period. Similar observations have been made with long-term marital discord (Karney, Story, & Bradbury, 2005) and spouse reactivity (Neff & Karney, 2009), stressing the importance of factors that are external to the marriage, including those in

the work setting. Story and Repetti (2006) specifically examined the role of occupational stressors in the daily lives of married couples. On days when they reported more negative social interactions at work, both husbands and wives were more likely to express interpersonal anger and withdrawal at home (Story & Repetti, 2006). These findings were replicated by Edge (2008), who found that work stress was associated with more withdrawal and less positive reunions at home in a sample of firefighters and their spouses. A recent cross-sectional study by Carlson, Ferguson, Perrewe, and Whitten (2011) revealed that having an abusive or overly critical boss was associated with greater marital tension at home. Chronic role strain, a form of stress resulting from multiple role occupancy (Wheaton, 1997), appears to be particularly deleterious to relationships at home (Brock & Lawrence, 2008; Karney et al., 2005).

Stress has also been shown to transfer from one setting to individuals in alternate settings (as reported by those individuals, rather than targets). Given the overwhelming evidence for an impact of occupational stress on marital interaction and satisfaction (e.g., Brock & Lawrence, 2008; Edge, 2008; Karney et al., 2005; Neff & Karney, 2004, 2009; Repetti, 1989; Story & Repetti, 2006), this is of little surprise. Such stress crossover, as it has been called (Bolger, DeLongis, Kessler, & Wethington, 1989), has been primarily investigated from a work-to-home perspective; that is, as stress transfers from the work setting to the home setting and impacts a spouse or family member. Evidence for crossover effects was provided by Bolger, DeLongis, Kessler, and Wethington (1989) in their analyses of married couples. For example, on days when wives reported an argument at work, husbands were more likely to report having a marital dispute in the evening. Wife overload at home was also found to increase on days when husbands reported more overload at work,

suggesting that wives may engage in behaviours that compensate for their husbands' work stress (Bolger, DeLongis, Kessler, & Wethington, 1989). More recently, Neff and Karney (2007) observed crossover effects of spouse stress on the marital satisfaction of both husbands and wives. Brock and Lawrence (2008) also demonstrated that the marital satisfaction of newlywed wives was influenced by the role strain experienced by their husbands over a three-year period.

These findings reflect a broader body of research which strongly supports the transmission of stress and negative affect between members of a family unit (for a review, see Larson & Almeida, 1999). Given the qualitative evidence for the transmission of work stress from paramedics to their spouses (Patterson et al., 2005; Regehr, 2005; Regehr, Goldberg, & Hughes, 2002), it is reasonable to expect that similar patterns of stress spillover and crossover occur in this population. Bodenmann et al. (2007) further propose that chronic, everyday stress, particularly that which originates outside of a marriage or relationship (such as occupational stress), increases the likelihood of dysfunction on both individual and marital levels. This theoretical proposition provides an additional framework for understanding the impact of extramarital stress on the well-being of paramedics and their spouses.

1.3 The Interpersonal Context of Stress and Coping

The evidence for stress contagion speaks to the importance of the interpersonal context of stress and coping. Research has demonstrated that dyadic information accounts for significant variance beyond the individual level (Gruen, Folkman, & Lazarus, 1988). In particular, interpersonal conflict appears to be one of the most salient stressors encountered by individuals in committed relationships, accounting for over 80% of the variance in negative mood among married couples (Bolger, DeLongis, Kessler, & Schilling, 1989). The

impact of relationship functioning extends well beyond mood and into the realm of physical health, directly and indirectly affecting cardiovascular, endocrine, and other physiological systems (for reviews, see Kiecolt-Glaser & Newton, 2001; Robles, Slatcher, Trombello, & McGinn, 2013). Yet the message is not entirely negative. Research has highlighted the importance of both social support and social strain in predicting concurrent and subsequent mood in couples. In fact, DeLongis, Capreol, Holtzman, O'Brien, and Campbell (2004) found that spousal support significantly predicted next-day improvements in mood while spousal strain did not. These findings emphasize the importance of considering the social environment as a context in which all phases of the stress and coping process (i.e., event, stress appraisals, coping responses, and outcome) unfold over time (DeLongis & Holtzman, 2005).

The buffering hypothesis posits that social support mitigates the impact of stress on health and wellbeing (Cohen & Wills, 1985). An early review of this model concluded that there was substantial support for this perspective as well as that which maintains a direct relationship between social support and wellbeing (i.e., a global effect of social support). It was further suggested that in order for a buffering or moderating effect to occur, the type of social support must match the coping needs elicited by a particular stressor (Cohen & Wills, 1985). In support of the buffering hypothesis, DeLongis, Folkman, and Lazarus (1988) demonstrated that the physical and mental health of married couples were more susceptible to the effects of daily stress when social resources were low. Research has continued to offer evidence for both buffering and direct effects of social support (e.g., Chen, Siu, Lu, Cooper, & Phillips, 2009; Gerin, Milner, Chawla, & Pickering, 1995; Vanheule, Declercq, Meganck, & Desmet, 2008), with many highlighting the importance of examining components or types

of social support in order to better approximate a buffering effect (e.g., Peirce, Frone, Russell, & Cooper, 1996; Rosen & Moghadam, 1990; Vanheule et al., 2008).

From a stress and coping perspective, social support might be best viewed as a resource for coping. Since its original conception, the Ways of Coping Scale (Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986), one of the leading psychometric evaluations of coping, has included *seeking social support* as a primary coping strategy, with additional items assessing aspects of confrontation and withdrawal. Recently, models of dyadic coping have evolved to better account for the range of potential interpersonal manifestations of coping. Dyadic coping has been defined as “a process on the dyadic level in which the coping reactions of one partner take into account the stress signals of the other partner” (Bodenmann, Pihet, & Kayser, 2006, p. 486). Coyne and Smith (1991) proposed active engagement and protective buffering as two forms of dyadic coping, the former involving engagement and discussion with one’s partner to aid in problem-solving, and the latter involving attempts to alleviate worry and provide relief, often by hiding concerns and avoiding disagreements. Coyne and Smith (1991) demonstrated that these strategies, particularly protective buffering, may contribute to distress in couples recovering from health-related events. More recently, Bodenmann et al. (2006) found that both positive and negative varieties of dyadic coping (e.g., supportive, delegated, ambivalent, superficial) predicted marital quality over a two-year period.

DeLongis and O’Brien (1990) proposed relationship-focused coping as an extension to traditional problem-focused and emotion-focused functions of coping. Relationship-focused coping efforts involve the regulation and maintenance of social relationships during stressful events, particularly those involving empathic responding, compromise, and support

provision. Alternatively, interpersonal withdrawal, confrontation, and blame have been proposed as negative forms of relationship-focused coping (Lee-Baggley, Preece, & DeLongis, 2005; O'Brien & DeLongis, 1996). Generally, findings indicate that the consideration of relationship-focused coping strategies significantly improves the predictive value of models of coping (O'Brien & DeLongis, 1996). Empathic responding has been shown to minimize marital conflict during laboratory interactions (Gottman, 1998) and predict lower levels of next-day marital tension (O'Brien, DeLongis, Pomaki, Puterman, & Zwicker, 2009), while interpersonal withdrawal appears to be especially harmful to the long-term functioning of relationships (DeLongis & Holtzman, 2005) and are more common among individuals high in neuroticism (Lee-Baggley et al., 2005).

Research has suggested that collaborative forms of coping (defined as couples' efforts to pool resources and solve problems jointly; Berg et al., 2008) are particularly effective strategies for couples, having demonstrated positive associations with dyadic adjustment across studies (Bodenmann et al., 2007; Coyne & Smith, 1994). For example, dyadic forms of coping involving communication, support, and joint problem-solving have been shown to predict marital quality over a two year period (Bodenmann, Pihet, & Kayser, 2006). More active spouse engagement was also related to more positive relationship evaluations in a sample of cancer patients, reflecting previous observations in husbands coping with a myocardial infarction (Coyne & Smith, 1994). Further to this point, Badr and Acitelli (2005) observed a significant association between dyadic adjustment and relationship talk (i.e., talking about the state of the relationship together) in couples dealing with chronic illness. Together, these findings underscore the importance of spouse engagement, collaboration, and taking a "we" approach during times of stress (Acitelli & Badr, 2005).

More generally, the response of one's partner appears to have a meaningful impact on coping, whether through increased support (Holtzman, Newth, & DeLongis, 2004; Manne & Zautra, 1989) or relationship satisfaction (Holtzman et al., 2004; Holtzman & DeLongis, 2007). There is also evidence that positive responses from the spouse to one's own coping behaviours amplify the positive effects of relationship-focused coping (Marin, Holtzman, DeLongis, & Robinson, 2007). Given the broader importance of the spouse's response, other coping strategies not typically designated as relationship-focused or interpersonal have nonetheless been shown to impact the functioning of relationships. For example, rumination has been shown to negatively impact relationship functioning by contributing to interpersonal strain (Lyubomirsky & Nolen-Hoeksema, 1995).

The confluence of findings bodes well for the consideration of the interpersonal context in studies of stress and coping. Among paramedics, there is limited qualitative evidence that social dynamics of both home and work settings impact the experience of occupational stress and the behaviours and cognitions in which paramedics engage to cope with this stress (Beaton et al., 1997; Burke, 1993; Buunk & Peeters, 1994; Regehr, 2005; Regehr & Millar, 2007; Weiss, Marmar, Metzler, & Ronfeldt, 1995). There is further evidence to suggest that traumatic experiences more generally impair and reduce engagement in effective dyadic coping strategies (Kramer, Ceschi, Van der Linden, & Bodenmann, 2005). If we wish to accurately account for the breadth of stress processes both on and off the job, then the broader interpersonal context in which these processes unfold and interact should be examined.

1.4 The Role of Personality in Stress and Coping

Given the adopted perspective that stress and coping unfold from a dynamic interplay of person and situation (DeLongis & Gruen, 1986; DeLongis & O'Brien, 1990; Folkman et al., 1986), personality represents an additional factor of potential significance to stress and coping processes. As noted by O'Brien and DeLongis (1996), the five-factor model (i.e., the big five personality variables of neuroticism, agreeableness, extraversion, conscientiousness, and openness to experience) may be especially relevant to stress adaptability. In particular, neuroticism has been identified as playing a key role in both stress reactivity and coping effectiveness. Those high in neuroticism are characterized by a tendency to experience greater negative affect, including anxiety, depression, hostility, and self-consciousness (for a review, see McCrae & Costa, 1987). In regards to stress perception and reactivity, individuals higher on neuroticism generally describe stressful events (including stressors of an interpersonal nature, such as conflict) as more severe (Bolger & Zuckerman, 1995; Lee-Baggley, Preece, & DeLongis, 2005). To date, studies of coping have suggested an increased likelihood of neurotics to engage in emotion-focused coping strategies that involve hostility, passivity, and indecisiveness (McCrae & Costa, 1986), such as rumination (Suls & Martin, 2005). In their examination of the role of neuroticism in relationship-focused coping, O'Brien and DeLongis (1996) observed less frequent use of typically adaptive strategies and more frequent engagement in maladaptive strategies.

In marital relationships, those high in neuroticism tend to make more negative attributions, responding less constructively to spousal tension (Karney, Bradbury, Fincham, & Sullivan, 1994) and experiencing more negative social interactions (Davey, Fincham, Beach, & Brody, 2001). This indicates a potential impact of neuroticism on day-to-day

marital functioning. Previous research has further demonstrated increased spillover from one experience or setting to the next among individuals high in neuroticism (Suls & Martin, 2005), implicating it as a potentially important factor in work-to-home stress transmission and contagion.

1.5 Daily Process Methods

It has been argued that in order to accurately assess contextual factors of stress and coping, and therefore investigate coping as a process according to Lazarus and Folkman's (1984) transactional model, coping should be measured as a behavioural response to a specific psychological or environmental stressor (Folkman et al., 1986). This is in contrast to research which accounts for trait-like tendencies to engage in particular coping strategies. Nevertheless, it has been demonstrated that coping responses indeed vary according to contextual influences, including those arising from differences in family and work related stress (Folkman et al., 1986) and aspects of one's social environment (O'Brien & DeLongis, 1996). As analytical strategies have evolved, intensive longitudinal designs employing daily process methods have proven especially useful in capturing stress and coping as a dynamic process unfolding over time and across contexts (Bolger & Laurenceau, 2013; DeLongis & Holtzman, 2005).

Daily process methods are used to measure psychosocial processes as they unfold over a particular course of time, and may be employed once or multiple times daily depending on the goals of the research (Bolger, Davis, & Rafaeli, 2003). Also referred to as daily diary studies, these methods appropriately examine a variety of processes, including intraindividual change, interpersonal differences in change, dyadic interdependence, time-lag effects, aggregated effects, and/or longitudinal projections, among others (Bolger et al.,

2003). They have effectively accounted for significant variation in myriad contextual factors relevant to stress and coping (e.g., Bolger, DeLongis, Kessler, & Schilling, 1989; Newth & DeLongis, 2004), including occupational stress (e.g., Bolger, DeLongis, Kessler, & Wethington, 1989; Repetti, 1989; Story & Repetti, 2006) and interpersonal relationships (e.g., DeLongis et al., 1988; DeLongis et al., 2004; Holtzman & DeLongis, 2007; Lee-Baggley et al., 2005; O'Brien et al., 2009; Puterman, DeLongis, & Pomaki, 2010; Repetti, 1989). They have further facilitated the documentation of stress transmission across settings and between individuals (e.g., Bolger, DeLongis, Kessler, & Wethington, 1989; Story & Repetti, 2006) and have proven useful in the study of marital and family processes (Laurenceau & Bolger, 2005).

As noted by Bolger et al. (2003), the method of data analysis which has emerged as the most appropriate for handling the repeated-measures data obtained in daily process studies is multilevel modeling (also known as hierarchical linear modeling). For a more thorough review of daily process methodology, see Bolger et al. (2003). Given the current interest in contextual and interactional factors of stress and coping in paramedics and their spouses, daily process methods were employed and data were analyzed using multilevel modeling.

1.6 Overview of the Dissertation

The following studies generally address the impact of daily work stress (including work-related negative affect, perceived stress, and burnout) experienced by paramedics on key stress outcomes in the home and family contexts (such as subsequent negative affect and perceived stress, coping and coping effectiveness, and dyadic functioning). In addition to a primary focus on stress transmission, subsequent contagion effects to spouses of paramedics

were also of interest. To this end, reports were collected from both paramedics and their spouses across studies. Other contextual factors, including personality, were also investigated. This body of research stemmed from a larger project titled, *An Investigation of Stress and Coping across Occupational and Personal Environments (SCOPE) in Canadian Paramedics and their Spouses*. All findings are derived from the same sample of paramedics and their spouses.

Study 1 (Chapter 2) examines the transmission of negative affect, stress, and burnout from paramedics' work setting to the home setting and to spouses directly, while also establishing the relative psychological adjustment of the paramedics recruited (via assessments of depressive symptoms, post-traumatic stress, and professional burnout). Study 2 (Chapter 3) addresses the impact of paramedics' burnout on dyadic functioning, as measured by both partners' reports of marital tension. Neuroticism was also examined for its moderating effect on these relationships, in order to investigate the role of person-level factors. Finally, Study 3 (Chapter 4) examines the extramarital (i.e., work-related) antecedents of particularly maladaptive coping responses and their outcomes for dyadic functioning (as also measured by marital tension). Interactions between partners' coping responses (namely, rumination and interpersonal withdrawal) were also investigated in Study 3. The dissertation will conclude by summarizing and integrating these findings, while also considering general limitations of the research, implications of the findings, and recommendations for future research (Chapter 5).

CHAPTER 2: How Was Your Day? The Daily Transmission of Work Stress in Paramedics and their Spouses¹

Paramedics and emergency medical service (EMS) personnel have been identified as populations that experience abnormally high levels of stress (Alexander & Klein, 2001; Beaton, Murphy, & Pike, 1996; Goldstein, Jamner, & Shapiro, 1992; Patterson, Probst, Leith, Corwin, & Powell, 2005; Regehr, 2005; Regehr, Goldberg, & Hughes, 2002; Regehr & Miller, 2007; Saunders, 2004). The source of this stress is primarily occupational, resulting from daily patient care responsibilities and organizational factors such as call volume, shift work, changing schedules, lack of dedicated breaks, and job performance scrutiny for purposes of quality assurance (Regehr, 2005). Daily patient care can vary widely in quantity and quality, requiring both minor protocol (e.g., first aid, intravenous therapy, medication administration, cardiac rhythm interpretation) and major emergency care procedures (e.g., cardiopulmonary resuscitation [CPR], treatment of life-threatening and/or violent injuries, psychiatric management, extrication of patients from trapped vehicles, and attendance of crime scenes, including murders and suicides). Resulting stressors include (but are not limited to) a general exposure to human suffering and tragedy, patient death (including infants and children), and a heightened risk of infectious disease, violence, and assault (Beaton, Murphy, Johnson, Pike, & Corneil, 1998; Regehr, Goldberg, & Hughes, 2002). Qualitative research has suggested that the impact of these traumatic experiences can be immediate, delayed, and/or cumulative in this population (Saunders, 2004), indicating a need to understand how these effects unfold over time.

¹ This chapter has been adapted from King, D. B., & DeLongis, A. (under review). How was your day? The daily transmission of work stress in paramedics and their spouses. It has been modified to fit the format of this thesis.

In comparison to a convenience sample of community-residing men, Beaton, Murphy, Pike, and Jarrett (1995) determined 15-20% of paramedics to be at risk for developing somatic, emotional, and behavioural stress outcomes, including chronic pain. Although the occupational landscape of pre-hospital care is diverse and complex, the aforementioned factors appear to coalesce in a way that places paramedics at an increased risk for burnout, post-traumatic stress, and trauma-related symptoms such as depression, anxiety, detachment, and sleep disturbance (Regehr, 2005; Regehr, Goldberg, & Hughes, 2002). It has been reported that between one fourth and one third of paramedics show traumatic stress symptoms in the high to severe range at any given time (Alexander & Klein, 2001), levels that are consistent with a clinical diagnosis of post-traumatic stress disorder (PTSD; Regehr & Miller, 2007). A range of specific factors have been shown to contribute to this incidence, including injury or threat of injury to self or co-worker, gruesome victim incidents, provision of aid to the seriously injured, and exposure to death and dying (Beaton et al., 1998). More generally, Regehr, Goldberg, and Hughes (2002) found that up to 80% of Canadian paramedics had experienced emotional distress resulting from a critical incident at work. Related health problems, such as pain, high blood pressure, and cardiac conditions are also more numerous and frequent compared to those reported by the general public (Beaton et al., 1995; Beaton et al., 1996). Goldstein et al. (1992) observed heightened systolic blood pressure in a California sample of paramedics while driving an ambulance and attending a scene, underscoring the heightened physiological stress intrinsic to the job.

A more recent study by Regehr and Millar (2007) indicated that the work environment of North American paramedics is characterized by high demand, low control, and low support, a combination of factors shown to exacerbate occupational stress (Karasek

& Theorell, 1990). Although improvements in training and education have cemented the role of paramedics in pre-hospital care (Martin-Misener, Downe-Wamboldt, Cain, & Girouard, 2009), it has been suggested that turn-over rates due to burnout are high (Patterson et al., 2005). A recent national survey of 933 American paramedics and emergency medical technicians (EMTs) revealed that intent to leave the job was related to a number of job satisfaction variables, including responsibility, recognition, and pay and benefits (Chapman, Blau, Pred, & Lopez, 2009). Paramedics reporting PTSD symptoms in the high to severe range were also more likely to take a mental health leave from work (Regehr, Goldberg, Glancy, & Knott, 2002), indicating a probable threat to both mental health and employee retention. Unknown, however, are the short-term and long-term ramifications of the day-to-day stressors intrinsic to the job, particularly in regard to their potential transmission to alternate contexts, roles, and individuals. Very little insight has been offered as to the complex unfolding of these unique stressors over time and their impact on factors external to the workplace. A review of the literature revealed that paramedics remain a largely understudied population.

While it has been stated that paramedics are at an increased risk for burnout (e.g., Patterson et al., 2005), these conclusions are primarily derived from qualitative reports. To date, research has not addressed the issue of burnout in this population by quantitative means. Furthermore, the variability of burnout over time and its impact on alternate settings is not well understood. These shortcomings in the literature exist despite the development and validation of the construct within human service occupations specifically.

As a construct, burnout has received substantial attention from both researchers and clinicians for over 40 years (Schaufeli, Leiter, & Maslach, 2009). The leading model of

burnout encompasses three main dimensions (Maslach, Jackson, & Leiter, 1997).

Depersonalization refers to negative emotions and cynical attitudes about one's clients, which can lead workers to view their clients as deserving of their issues and problems.

Reduced personal accomplishment, on the other hand, refers to workers evaluating themselves negatively, particularly regarding their work with clients. The third dimension, emotional exhaustion, is described as feelings of emotional depletion and exhaustion that can restrict an individual's ability to contribute meaningfully to the workplace. Although a debate surrounds the factor structure of its most widely endorsed measure, the Maslach Burnout Inventory (MBI; Maslach, Jackson, & Leiter, 1996), it is generally accepted that emotional exhaustion is the defining characteristic of this syndrome (Maslach et al., 1997). Detrimental outcomes identified in the literature extend beyond the individual to impact both care recipients and coworkers, resulting in reduced quality of care, job turnover, absenteeism, and low morale. Yet the impact is felt most heavily by the individual, who is likely to report increased physical exhaustion, sleep disturbance, more frequent problem behaviours such as alcohol and drug use, and a greater likelihood for relationship and family problems (Maslach et al., 1997).

Since its conception, burnout has been studied in a number of occupations and professions, including but not limited to those of the human service variety. Police officers, teachers, nurses, and other hospital staff are among those frequently identified as reporting high levels of burnout (for a review, see Maslach et al., 1997). While it may seem reasonable to compare paramedics to police officers and nurses, significant differences in both responsibilities and stressors remain, begging for a quantitative survey of burnout specific to this population. Previous research assessing burnout in other populations has primarily used

cross-sectional methods, in which the MBI or a similar measure is administered at a single point in time. Recently, however, diary studies of burnout in non-emergency occupations have emerged, supporting the predictive value of daily reports of burnout (e.g., Haar, Roche, & Ten Brummelhuis, 2011). The variable and unpredictable nature of the occupational stress experienced by paramedics (Beaton et al., 1995; Regehr, 2005; Regehr, Goldberg, & Hughes, 2002) underscores the importance of investigating fluctuations in burnout over time (and indeed, from one day to the next) in this population.

It should be noted that although related, occupational stress and burnout have been conceived as distinct constructs. Maslach et al. (1997) note that the emotional exhaustion component of burnout is the most similar to stress, but that focusing solely on this factor is to ignore the interpersonal characteristics of burnout. The authors suggest that it is more accurate to regard burnout as a potential result or outcome of chronic stress at work (Maslach et al., 1997).

There is ample evidence that stress transfers across settings, contexts, and roles. The most commonly studied, for pragmatic convenience, have been the home and work settings. Bolger, DeLongis, Kessler, and Schilling (1989), for example, observed significant associations between high demands at work and end-of-day negative affect over a six-week period (dubbed stress *spillover*). These findings were expanded upon by Bolger, DeLongis, Kessler, and Wethington (1989), who revealed that these associations were bidirectional. Time-lag analyses supported both home-to-work and work-to-home spillover of stress among married couples, with some effects varying by gender. For example, home-to-work spillover was significant among men only. This was in contrast to previous qualitative analyses by Crouter (1984), who had observed that mothers with older children were more likely to

report home-to-work transmission. Differential findings of this nature may be context-driven, in so much that differences may exist by occupation or particular organizational features. Nevertheless, they speak to the potential for stress in one setting to carry over and impact another setting. Although burnout has not been widely studied in this regard, Haar et al. (2011) reported a reduction in work-family balance as a result of increased daily burnout, suggesting that burnout may also *spill over* into the home.

Additionally, stress has been shown to transfer to individuals in other settings. Given the overwhelming evidence for an impact of occupational stress on marital interaction and satisfaction (e.g., Brock & Lawrence, 2008; Edge, 2008; Karney Story, & Bradbury, 2005; Neff & Karney, 2004, 2007, 2009; Repetti, 1989; Story & Repetti, 2006), this is of little surprise. Such stress *crossover*, as it is technically referred (Bolger, DeLongis, Kessler, & Wethington, 1989), has been primarily investigated from a work-to-home perspective; that is, as stress transfers from the work setting to the home setting and impacts a spouse or family member. More recently, Neff and Karney (2007) observed crossover effects of spouse stress on the marital satisfaction of both husbands and wives. Brock and Lawrence (2008) also demonstrated that the marital satisfaction of newlywed wives was influenced by the role strain experienced by their husbands over a three-year period. These findings reflect a broader body of research which strongly supports the transmission of stress and negative affect between members of a family unit (for a review, see Larson & Almeida, 1999).

There is limited evidence (primarily qualitative) that occupational stress and burnout experienced by paramedics are brought into the home environment, impacting both intra- and inter-personal variables (Patterson et al., 2005; Regehr, 2005; Regehr, Goldberg, & Hughes, 2002). While paramedics often cope by distancing themselves emotionally (Regehr,

Goldberg, & Hughes, 2002), qualitative research has also documented increased problem behaviours after work, such as drinking alcohol (Regehr, Goldberg, & Hughes, 2002). These findings generally reflect observations of coping strategies employed by other emergency service workers, including police officers (e.g., Clohessy & Ehlers, 1999; Regehr, LeBlanc, Jelley, & Barath, 2008; Tully, 2004). At a more fundamental level, they suggest that a paramedic's occupational stress is not confined to the work setting, but rather continues beyond the end of one's shift and must be subsequently managed in alternate settings, potentially impacting other individuals directly and/or the functioning of relationships more generally. Regehr (2005) examined qualitative reports from 14 spouses of paramedics. Among the issues identified as contributing to spousal stress were the paramedic's emotional reactivity and withdrawal at home following traumatic or highly stressful experiences at work. Beyond these findings, however, information is lacking as to the nature of the transmission of stress between paramedics and their spouses. The additional transmission of paramedic burnout to spouses has not been examined, despite the interpersonal nature of the construct and evidence for increased relationship and family problems by individuals who are burned out at work (Maslach et al., 1997).

The current study. The current study sought to investigate the impact of daily occupational stress and burnout experienced by paramedics on key stress outcomes in the home setting (specifically, negative affect and subsequent perceived stress) for both paramedics and their spouses. Intraindividual relationships between work and home (i.e., the transmission of stress across settings and within paramedics) were examined in order to investigate basic spillover effects, while dyadic relationships involving spouses were examined in order to investigate stress crossover. Questions were addressed using an

intensive longitudinal design (Bolger & Laurenceau, 2013) comprising daily process methods, which are useful in capturing stress as a dynamic process that unfolds over time and across different settings (DeLongis & Holtzman, 2005). These methods were employed multiple times daily in the current study so as to acquire data from both work and home environments and therefore better approximate the transmission of stress (Bolger, Davis, & Rafaeli, 2003; DeLongis, Hemphill, & Lehman, 1992).

Hypotheses. In light of the broader lack of quantitative research on this population, as well as previous suggestions that paramedics report higher-than-average levels of PTSD and burnout (e.g., Alexander & Klein, 2001; Patterson et al., 2005; Regehr & Miller, 2007), baseline levels of post-traumatic stress, depressive symptoms, and burnout are first presented for a sample of full-time paramedics. Means were compared to cut-off values for clinical significance and/or normative data (where available) in an effort to better characterize participants' psychological adjustment to such unique forms of occupational stress. Given the exploratory nature of these latter analyses, no specific hypotheses were proposed.

Regarding daily processes, it was expected that stress transmission and contagion effects would be observed from work to home settings in paramedics and their cohabitating spouses. Specifically, multilevel analyses were expected to reveal significant associations between reports of negative affect at work and paramedics' later reports of perceived stress and negative affect in the home setting over a period of 4 consecutive work shifts. As noted by Bolger et al. (2003), the method of data analysis which has emerged as the most appropriate for handling the repeated-measures data obtained in daily diary studies is multilevel modeling (i.e., hierarchical linear modeling). Similar relationships were expected between earlier reports of both perceived stress and burnout at work and subsequent reports

of perceived stress and negative affect at home for paramedics. These hypotheses were based on the larger body of evidence for stress transmission between work and home settings (e.g., Bolger, DeLongis, Kessler, & Schilling, 1989; Story & Repetti, 2006), as well as qualitative reports of said transmission in paramedics (e.g., Patterson et al., 2005; Regehr, 2005; Regehr, Goldberg, & Hughes, 2002). Given the limited evidence for stress crossover in this population (e.g., Regehr, 2005), paramedics' earlier reports of negative affect, perceived stress, and occupational burnout were also expected to predict increased stress and negative affect for spouses across paramedics' work days. All hypotheses were tested using hierarchical linear modeling (HLM; Bryk & Raudenbush, 1992), with daily measures nested within couples over time. This strategy offers a number of benefits for the current data set, including handling missing data and accounting for the natural dependence that occurs across repeated measures and between two members of a dyad (Kenny & Cook, 1999).

2.1. Methods

Participants. Target participants included 87 paramedics and their cohabitating spouses. Paramedics were licensed by the Canadian Medical Association and were employed in major urban centers throughout Canada with an average of 15.2 years on the job ($SD = 7.7$). Of the total sample, 82 paramedics self-identified as Caucasian, 4 as Asian, and 1 as Hispanic. The mean age of paramedics was 42.1 years ($SD = 8.3$; range = 27 – 62 years) at the time of participation, with the majority of paramedics identifying as male (71). In order to establish some degree of similarity in home environments across paramedics, and also to test hypotheses regarding potential crossover effects of stress, eligibility was contingent upon the participation of a cohabitating romantic partner or spouse during the duration of the study. Sixty-six participating couples were married, with 55 couples having at least one child living

with them. Average length of relationship was 13.1 years ($SD = 8.7$), while average length of cohabitation was 11.6 years ($SD = 8.6$). Of the participating spouses, 79 self-identified as Caucasian, 5 as Asian, 2 as First Nations, and 1 as Latin American. The mean age of spouses was 41.3 years ($SD = 9.2$, range = 24 – 74 years), with the majority being female (75). In total, 72 spouses reported being employed at the time of participation (56 full-time). In an effort to maintain homogeneity, only paramedics working full-time or full-time equivalent hours (minimum 4 shifts per week) were eligible to participate. In order to also maintain similar daily diary schedules, all participating paramedics were required to work similar shift patterns at the time of participation (specifically, four consecutive shifts). Participating paramedics were recruited via brochures and print advertisements at EMS stations (with the cooperation of local services) and via online media (e.g., Facebook). If interested, paramedics were directed to the project website (www.medicscope.com) where they were able to complete an eligibility questionnaire. This application asked basic questions about employment status, schedule information, and relationship status.

Cohabiting spouses and romantic partners of paramedics were invited to participate by their significant others (i.e., paramedics), and therefore received no direct advertisement. Spouse eligibility was determined according to the relevant paramedic's eligibility; thus, collective eligibility of the couple was determined prior to confirmation and subsequent direction. If deemed eligible, paramedics and spouses received e-mail instructions regarding subsequent online phases of participation. Participants' e-mail addresses served as usernames throughout the study, in order to match responses over time. Participating paramedics and their spouses each received a \$40 gift card to a local retail establishment (e.g., Starbucks). Of the 558 initial questionnaires completed by interested paramedics, only 87 met eligibility

criteria. The primary reasons for study exclusion were lack of interest from spouses of interested paramedics (49%), not working four consecutive shifts during the course of the study (46%), and not being in a committed relationship and/or not having a cohabitating spouse (41%). With respect to available information on applicants who did not meet eligibility criteria, the current sample differed significantly in employment status, with only 53% of total applicants being full-time compared to 94% of the current sample ($\chi^2 = 29.4$, $p < .001$), reflecting inclusion criteria. No significant differences in certification level were observed between the current sample and those who were excluded.

Procedures and measures. All phases of participation were completed online using a secure server at the University of British Columbia. Questions were made available in online format in order to improve ease, confidentiality, and privacy of responding. Identifying information was collected only for the purposes of mailing honorariums and was not matched to participant responses.

Phase 1. The first phase of participation lasted approximately 20 minutes. Consent was first obtained for all phases of participation in the study. Following the provision of consent, participants completed a short series of online questions about basic demographic information (including age, gender, and ethnicity), length of relationship and length of cohabitation with spouse, and education, training, and experience as a paramedic (paramedics only). Information was also gathered as to when participants would like to be called for Phase 2 scheduling.

Following completion of Phase 1, participants were contacted by phone in order to schedule the second phase of the study. This also provided participants the opportunity to ask questions about the study and develop rapport with the research team. Once scheduled and

coordinated with both parties, a confirmation e-mail was sent to each participant including a link to the online daily diary questions (Phase 2) and detailed instructions regarding their completion. All research assistants conducting phone interviews were trained using the University of Michigan Survey Research Center's protocol for interviewer training.

Phase 2. The second phase of the study followed paramedics and their spouses across a one-week period that encompassed four consecutive work shifts for the paramedic, with at least one day off work both preceding and following the work period. Paramedics answered questions three times daily: (T1) within 1 to 2 hours of waking (in reference to “the day so far”); (T2) immediately after work (in reference to their time spent at work); and (T3) before bed (in reference to the period of time “since last entry”). Paramedics were not asked to answer any questions during working hours, in order to avoid interfering with the often sensitive nature of the job. Participants were able to opt for daily reminders via e-mail or text message. Across the four work days, 82% of paramedics completed at least nine of the twelve Phase 2 time points, with 89% completing eight of the twelve time points. Spouses completed only two diaries daily at T1 and T3, for a total of eight time points across the paramedics' four work days. Of the participating spouses, 90% completed at least 6 time points, with 94% completing 5 of the 8 time points. Couples with paramedics having more than six missing time points, or with spouses having more than four missing time points were excluded from analyses, maintaining only couples that adhered to a 50% response rate at minimum. Diary data analyzed here are from the four-consecutive days on which paramedics were working. Diary questionnaires were brief (requiring approximately 3 to 5 minutes per time point). Measures included in the diary are described below.

Negative affect. Paramedic and spouse negative affect was assessed using items from the 15-item version of the Profile of Mood States (POMS-15), designed specifically for use in daily diary research (Cranford, Shrout, Iida, Rafaeli, Yip, & Bolger, 2006). The anxious mood, depressed mood, and anger subscales (measured by three items each) were administered in the current study. Participants are asked to rate affective adjectives on a scale of 1 ('not at all') to 5 ('extremely') depending on their degree of experience with each at T1, T2, and T3. Cranford et al. (2006) have demonstrated the scale to be a reliable measure of within-person change over time.

Perceived stress. Stress appraisal (i.e., perceived stress) was measured using the 4-item abbreviated version of the Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983) at T1, T2, and T3. Although the original version of the PSS assesses the stressfulness of events within the past month, item wording was adjusted to address perceived stress occurring since waking or since previous response point. Items (e.g., "How much have you felt that you were unable to control important things in your life?") were rated on a scale of 0 ('never') to 4 ('a lot'). Reliability and validity of the PSS have been supported in a number of studies (Cohen, Tyrrell, & Smith, 1993). Previously, the scale has been related to outcome measures of physical health and mood (Cohen et al., 1983), suggesting it is an appropriate tool for addressing the current study's questions of interest.

Occupational burnout. In order to capture fluctuations in paramedics' burnout over time, a daily measure of burnout was derived from the Maslach Burnout Inventory – Human Services Survey (MBI-HSS; Maslach et al., 1996) and included at T2. Based on the magnitude of their factor loadings in previous studies (Gil-Monte, 2005; Worley, Vassar, Wheeler, & Barnes, 2008), three items were identified as being reliable indicators of burnout,

including two items measuring emotional exhaustion (“I feel burned out from my work” and “I feel like I’m at the end of my rope”) and one item measuring depersonalization (“I’ve become more callous towards people”). This further reflects a general trend in the literature to place primacy on these two aspects of burnout (Worley et al., 2008). Items were reworded for their use in a daily diary format. The original rating scale of 0 (‘not at all’) to 6 (‘all of the time’) was maintained as an indicator of the frequency of feelings of burnout during the referenced period of time.

Phase 3. The final phase of participation involved the online assessment of key individual difference variables for paramedics, including depressive symptoms (CES-Depression Scale 10-Item Version; Radloff, 1977), post-traumatic stress (Posttraumatic Diagnostic Scale; Weathers, Litz, Huska, & Keane, 1994), and professional burnout (Maslach Burnout Inventory; Maslach et al., 1996). These final questionnaires were available online at the participants’ convenience and required a time commitment of approximately 30 minutes.

Depressive symptoms. Depressive symptomology was measured using the 10-item Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977), a well validated and widely used measure of depressive symptoms in community residing adults. The CES-D asks participants to rate a number of behaviours and emotions for their frequency within the past week according to a 4-point Likert scale ranging from 0 (“rarely or none of the time”) to 3 (“all of the time”), with a possible total range of 0 – 30. The CES-D has been shown to be a reliable and valid measure of depressive symptoms in a variety of populations, including both patient and non-patient groups (Knight, Williams, McGee & Olaman, 1997; Naughton & Wiklund, 1993; Radloff, 1977). The abbreviated 10-item version of the CES-D has been

similarly validated (e.g., Miller, Anton, & Townson, 2008). Cut-off values of 10 (Andresen, Malmgren, Carter, & Patrick, 1994) and 11 (Miller et al., 2008) have been recommended in the literature as indicating the presence of significant depressive symptoms. Unfortunately, normative data using the 10-item version of the CES-D are not available for comparison.

Post-traumatic stress. The PTSD Checklist Civilian Version (PCL-C; Weathers et al., 1994) was administered to measure symptoms of post-traumatic stress, including intrusive thoughts, avoidance, numbing, and hyperarousal. The PCL-C is a 17-item self-report measure designed to assess PTSD symptoms in the last 30 days. Items are rated on a 5-point Likert scale, 1 being “not at all” and 5 being “extremely,” with a possible total range of 17 – 85. The scale has been previously validated in diverse populations (e.g., Andrykowski, Cordova, Studts, & Miller, 1998; Smith, Redd, DuHamel, Vickberg, & Ricketts, 1999) and internal consistency, test-retest reliability, convergent validity, and discriminant validity have been well supported (Ruggiero, Del Ben, Scotti, & Rabalais, 2003). The PCL-C was developed based on DSM-IV criteria for PTSD and is flexible in its application as both a diagnostic tool and a measure of PTSD severity. A cut-off score of 44 on the PCL-C has been proposed for non-military samples to indicate a likely diagnosis of PTSD (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996). Although normative data for the PCL-C have not been well established, data from a large sample ($N = 1739$) of Navy personnel returning from operational deployment in the Middle East will be used for comparison in the current study (Rayner, 2005) in order to offer some perspective. This sample of 1459 men and 280 women reported a mean PCL-C score of 23.4 (7.4).

Burnout. Professional burnout was assessed using the 22-item Maslach Burnout Inventory – Human Services Survey (MBI-HSS; Maslach et al., 1996). The MBI was

designed specifically for health care workers and has been widely demonstrated as a valid and reliable measure of three dimensions of burnout: emotional exhaustion (EE), depersonalization (DP), and personal accomplishment (PA; Maslach et al., 1996). The EE subscale consists of nine items assessing feelings of being overextended and emotionally exhausted by one's work. The DP subscale consists of five items assessing an impersonal response and lack of feelings towards care recipients. The remaining PA subscale assesses feelings of achievement and competence in one's work. Items are rated on a 7-point Likert scale, from 0 ("never") to 6 ("every day"). A high level of burnout reflects high scores on EE and DP and a low score on PA. It has been reported that 90% of all studies assessing professional burnout have utilized the MBI (Worley et al., 2008). Cut-off values for high (clinically significant) levels of burnout are 27 or greater for EE (with a possible range of 0 – 54), 10 or greater for DP (with a possible range of 0 – 30), and 33 or less for PA (with a possible range of 0 – 48), with lower levels of PA indicating reduced personal accomplishment (Maslach et al., 1996). For purposes of comparison, norms published for nurses and physicians ($N = 1104$) are 22.19 (9.53), 7.12 (5.22), and 36.53 (7.34) for EE, DP, and PA, respectively (Maslach et al., 1996). To date, normative data specific to paramedics and/or EMTs are not available.

2.2 Analyses and Results

Cross-sectional analyses of paramedics. Means, standard deviations, 95% confidence intervals, and internal consistency estimates (alphas) are first displayed for all individual difference measures administered to participating paramedics (see Table 2.1). Internal consistency was moderate to high for all measures, coming close to or exceeding the recommended value of .80 for excellent internal reliability (Clark & Watson, 1995). The only

exception was the PA subscale of the MBI ($\alpha = .66$), although previous studies have suggested that this factor is the least reliable compared to the other two MBI subscales (Worley et al., 2008).

Depressive symptoms. The mean score on the CES-D 10-item version exceeded the highest recommended cut-off value of 11 (Miller et al., 2008) for significant depressive symptoms. On an individual basis, 44% of paramedics met this more conservative cut-off value for clinically significant symptoms, with 49% meeting the less conservative cut-off of 10 (Andresen et al., 1994), suggesting that approximately half of participants were likely experiencing clinical symptoms of depression at the time of Phase 3.

Post-traumatic stress. The mean score on the PCL-C approached but did not meet the recommended cut-off for PTSD symptomology (Blanchard et al., 1996). On a case-by-case basis, however, 29% of participants exceeded this cut-off value, suggesting that approximately one third of paramedics may have met the diagnostic criteria for PTSD. Unpaired *t*-tests revealed that the mean PCL-C score for the current sample of paramedics was significantly higher than that of a large sample of Navy personnel returning from deployment in Iraq ($t = 15.30$, $df = 1824$, $p < .001$).

Burnout. Although the mean score on the EE subscale of the MBI fell just below the recommended cut-off value of 27 for high burnout, the mean for DP met its cut-off value of 10 or greater. The mean score for PA did not fall in the required range of 0 to 33 for high burnout. On an individual basis, 49%, 67%, and 21% of paramedics reported high levels of burnout on the EE, DP, and PA subscales, respectively. Of the 64 respondents who reported high burnout on one or more factors, 23 reported high burnout on only one of the factors, 27 reported high burnout on two of the factors, and 14 reported high burnout on all three

components. In sum, 74% of all paramedics in the current sample reported one or more symptoms of high burnout. Unpaired *t*-tests were used to compare burnout in the current sample of paramedics to normative data from a sample of 1104 nurses and physicians. The current sample scored significantly higher on EE ($t = 3.84$, $df = 1189$, $p < .001$) and DP ($t = 9.68$, $df = 1189$, $p < .001$). Paramedics did not differ significantly from the comparison group on the PA subscale.

Significant bivariate correlations were observed among the cross-sectional measures. The PCL-C and CES-D displayed a correlation of $r = .744$ ($p < .01$). The EE and DP subscales of the MBI also displayed significant correlations with the PCL-C, $r = .33$ ($p < .01$) and $r = .24$ ($p < .05$), respectively. The CES-D correlated significantly with the EE subscale of the MBI only, $r = .35$ ($p < .01$). No significant correlations were observed between the PA subscale of the MBI and either the CES-D or the PCL-C.

Daily diary analyses of paramedics and spouses. Descriptive statistics are presented for all daily variables of interest in Table 2.2. Alphas indicated good internal reliability for all daily diary measures. Paired *t*-tests indicated that compared to spouses, paramedics reported significantly higher levels of both T1 and T3 negative affect. Similar findings were not observed with perceived stress, which resulted in no significant difference between paramedics and spouses at either time point. Bivariate correlations among all daily variables are displayed in Table 2.3. Both T1 negative affect and T1 perceived stress were significantly related to nearly all outcome variables of interest for both paramedics and spouses, supporting their inclusion as control variables in the following multilevel models. Specifically, correlations in the moderate to high range (above .55) were observed between

T1 negative affect and T3 negative affect and, similarly, between T1 perceived stress and T3 perceived stress.

Hypotheses regarding the transmission of stress from work to home and from paramedic to spouse were tested using hierarchical linear modeling (HLM) software (v6.0; Raudenbush, Bryk, Cheong, & Congdon, 2004), with daily measures nested within couples over time. Using HLM, within-couple variation is modeled at Level 1 and between-couple variation is modeled at Level 2, allowing for simultaneous examination of both sources of variance. A two-intercept approach incorporating actor and partner effects was utilized (with random intercepts and slopes), in order to better control for the natural non-independence of the data (Cook & Kenny, 2005). All Level 1 predictor variables were grand-mean centered in order to preserve the variance due to the dyad. Centering improves the interpretability of the intercepts in order to reflect the average response of each couple. These decisions were made according to recommendations by Kenny, Kashy, and Cook (2006) for modeling dyadic data involving couples.

Regarding power, Kenny et al. (2006) note that of the studies examining both members of dyads (to date), the median number of dyads is 101, with as few as 25 in some studies. In order to have sufficient power to accurately approximate consequential non-independence of dyadic data, they recommend having a minimum of 44 dyads when running two-tailed tests of between-dyad effects of independent variables (at an alpha of .05). Nevertheless, it has been suggested that even when non-independence cannot be detected (by means of correlations among dyad members' responses), the safest course of action is to assume non-independence in dyadic research. Kenny et al. (2006) add that increasing the number of repeated measures in a study of dyads further improves power and significantly

reduces the likelihood of committing Type II error. Kenny and Cook (1999) previously noted that power is better preserved when both members of a couple are examined together in the same analyses. This has been accomplished in the current analyses by incorporating both actor and partner effects.

Where the outcome variable of interest was T3 negative affect, daily T1 reports of negative affect were included as controls. Similarly, T1 reports of perceived stress were included as controls in models predicting T3 perceived stress in the home setting. Partner effects were included only for predictor variables expected to cross over from paramedics and impact spouses (i.e., variables were created in which paramedics' T2 negative affect, T2 burnout, and T2 perceived stress at work were entered for their respective spouses). Given the disproportionate number of paramedics who were female, paramedic gender and spouse gender were also entered at Level 2 as controls. All models were also run controlling for shift work (coded 1 for day shift and 2 for night shift) at Level 1 and both length of relationship and length of cohabitation at Level 2. These latter variables were dropped from analyses due to lack of significant effects. In order to test the hypothesis that paramedics' T2 negative affect would predict T3 negative affect in the home setting for paramedics and spouses, a general model of work-to-home transmission was tested:

$$\begin{aligned} \text{T3 negative affect}_{ti} = & \text{medic} [\beta_{1ip}] + \text{spouse} [\beta_{2is}] + \beta_{3ip} (\text{paramedic's T1 negative} \\ & \text{affect})_{ti} + \beta_{4is} (\text{spouse's T1 negative affect})_{ti} + \beta_{5ip} (\text{paramedic's T2 negative affect})_{ti} \\ & + \beta_{6is} (\text{partner effect of paramedic's T2 negative affect})_{ti} + r_{ti} \end{aligned}$$

where T3 negative affect_{ti} is end-of-day negative affect at time point t for couple i; (medic) is a dummy indicator which is 1 for all paramedics and 0 for all spouses; (spouse) is a dummy indicator which is 1 for all spouses and 0 for all paramedics; β_{1ip} is the intercept for

paramedics and β_{2is} is the intercept for spouses; $(\text{paramedic's T1 negative affect})_{ti}$ is the paramedic's T1 negative affect at time point t for couple i; β_{3ip} is the relationship between paramedic's T1 negative affect and paramedic's T3 negative affect; $(\text{spouse's T1 negative affect})_{ti}$ is the spouse's T1 negative affect at time point t for couple i; β_{4is} is the relationship between spouse's T1 negative affect and spouse's T3 negative affect; $(\text{paramedic's T2 negative affect})_{ti}$ is the paramedic's T2 negative affect at time point t for couple i; β_{5ip} is the relationship between paramedic's T2 negative affect paramedic's T3 negative affect; $(\text{partner effect of paramedic's T2 burnout})_{ti}$ is the partner effect of paramedic's T2 negative affect at time point t for couple i, where paramedic's T2 negative affect scores are entered for the spouse; β_{6is} is the relationship between paramedic's T2 negative affect and spouse's T3 negative affect; and r_{ti} is the within-couple error. This model was repeated with T3 perceived stress as the outcome variable. In this alternate model, T1 negative affect was substituted with T1 perceived stress. Results from these multilevel models are presented in Table 2.4.

According to multilevel analyses, paramedics' T2 negative affect emerged as a significant predictor of T3 negative affect for paramedics only, controlling for T1 negative affect. In particular, higher levels of work-related negative affect predicted increased T3 negative affect for paramedics over time. Paramedics' T2 negative affect also significantly predicted subsequent increases in T3 perceived stress for both paramedics and spouses, while T2 perceived stress predicted increased T3 negative affect for paramedics. Similar models were run including paramedics' work stress and paramedics' burnout at work as the main predictor variables of interest. In these latter models, partner effects of paramedics' T2 perceived stress and T2 burnout were similarly entered for spouses. Results from these models are presented in Tables 2.5 and 2.6, respectively.

Paramedics' T2 perceived stress displayed a significant association with T3 perceived stress for paramedics only, controlling for T1 perceived stress. In particular, higher levels of work stress predicted increased T3 perceived stress for paramedics over time. Paramedics' T2 perceived stress did not significantly predict subsequent levels of T3 negative affect for paramedics, nor did it predict either T3 negative affect or T3 perceived stress for spouses.

In analyses of daily occupational burnout, higher levels of T2 burnout at work as reported by paramedics predicted increases in both T3 negative affect and T3 perceived stress for paramedics, controlling for T1 negative affect and T1 perceived stress, respectively. The same reports of T2 occupational burnout, however, did not predict changes in T3 negative affect or T3 perceived stress for spouses.

2.3 Discussion

Previous research has suggested that paramedics and EMTs working in the United States and Canada experience abnormally high levels of stress (Patterson et al., 2005; Regehr, 2005; Regehr, Goldberg, & Hughes, 2002; Regehr & Miller, 2007; Saunders, 2004). Although the amount of data available on this population remains limited, a handful of studies have identified paramedics as particularly prone to PTSD and related symptoms (Alexander & Klein, 2001; Regehr, Goldberg, & Hughes, 2002). Despite a lack of quantifiable data, the suggestion has also been made that paramedics experience high levels of burnout resulting from unique job-related stressors (e.g., Patterson et al., 2005). From a purely descriptive perspective, the current sample of 87 Canadian paramedics reported what might be best described as clinically significant symptoms of chronic work stress. Specifically, approximately half (44% – 49%, depending on criteria) of the current sample reported clinically significant levels of depressive symptomology. Although the CES-D is not

a diagnostic tool, it might be helpful to consider that lifetime prevalence estimates for major depressive disorder range from 8.3% in Canada to 16.9% in the United States (Kessler & Bromet, 2013). Nearly one third were also likely to meet the diagnostic criteria for PTSD at the time of study involvement, reflecting previous reports that between one fourth and one third of paramedics report trauma symptoms in the high to severe range (Alexander & Klein, 2001; Regehr, 2005). Further to this point, paramedics rated significantly higher on PTSD overall when compared to a sample of Navy personnel returning from deployment in Iraq (Rayner, 2005). While these comparisons are limited due to differences in sample size, they nonetheless speak to the potential scope of these clinical features. Indeed, they should raise considerable alarm regarding the long-term impact of an occupation that is indispensable to pre-hospital care and emergency services more broadly.

Of additional concern is the level of burnout reported by the current sample. According to cut-off points established by Maslach et al. (1996), an alarming 74% of the current paramedics reported one or more symptoms of burnout in the high range, with 47% reporting high burnout on at least two subscales of the MBI. Depersonalization emerged as the most highly rated component of burnout (67%), indicating that the majority of these full-time or full-time equivalent paramedics are struggling to engage personally and emotionally with their patients. Not only does this suggest impaired empathic responding, but it also raises concerns over the ability of these paramedics to engage in effective patient care. According to Hojat (2007), empathy is an essential aspect of patient care and has a number of implications for meaningful health outcomes. Half of paramedics also reported high levels of emotional exhaustion on the MBI, underscoring the potential emotional impact of occupational stress. When compared to normative data from a group of nurses and

physicians, the current sample scored significantly higher on both emotional exhaustion and depersonalization, suggesting that the job of a paramedic is especially prone to feelings of burnout. Previous research has defined the work setting of paramedics as characteristically low in both control and support (Regehr & Millar, 2007). Indeed, compared to nurses and physicians who work in more controlled settings (i.e., hospitals) with multiple support staff, the lack of tangible support and control experienced by paramedics is great. These factors have likely contributed to the observed normative differences, highlighting the need for normative burnout data specific to paramedics and EMTs.

Together, these data support previous claims that paramedics experience levels of stress uncharacteristic of other professions. Although the current study did not examine causal antecedents of cross-sectional stress-related outcomes, it is reasonable to suspect that features and responsibilities unique to the job are implicated to some degree. This is particularly true for burnout, which has been conceptualized and validated as a professional and occupation-specific construct (Maslach et al., 1997). Findings from the daily diary component of this research support this proposition, as earlier reports of burnout and perceived stress predicted significant increases in subsequent reports of perceived stress and negative affect for paramedics. Nevertheless, longitudinal studies should examine relationships among these factors, as well as other indicators of psychological adjustment, in order to flesh out the potential causal role of occupational stress in the incidence of depression and post-traumatic stress in paramedics. While the current sample size was restricted by the criteria of a participating spouse and a common work schedule, larger cross-sectional studies should be employed in order to generalize these findings and develop

normative data for a population whose stress appears quite pronounced. The potential impact on health and wellbeing (both short-term and long-term) should also be examined.

On a daily basis, it is clear that paramedics are bringing work-related negative affect, work stress, and burnout into the home environment. Multilevel analyses of daily diary data revealed that higher perceived stress at work predicted increases in perceived stress at home over the course of one block of consecutive shifts. Negative affect at home also appeared to be exacerbated by higher levels of work-related negative affect and higher burnout at work. Similarly, higher burnout predicted increases in subsequent stress at home over the same work period. These findings support work-to-home spillover of all three markers of occupational stress, including negative affect, perceived work stress, and burnout within this sample of paramedics, reflecting earlier qualitative reports (Patterson et al., 2005; Regehr, 2005; Regehr, Goldberg, & Hughes, 2002). Although causal inferences are still limited despite temporal ordering, daily patterns are highly suggestive of a significant transmission of paramedics' work stress and burnout to alternate settings. In considering the short-term and long-term impact of stress experienced by paramedics, roles and contexts external to the workplace should not be overlooked. Indeed, it is in these alternate settings that the real burn may be felt, in relationship functioning or otherwise. These findings also bolster the parallel conceptualization of burnout as a construct which fluctuates from one day to the next. It is certainly easy to imagine an unusually stressful day leading to heightened feelings of emotional exhaustion and depersonalization on the job. In the current sample, daily reports of burnout accounted for significant variance in after work outcomes, reflecting progressive trends in psychology to conceptualize traits as encompassing both within-person stability and within-person variability (Fleeson, 2001).

In combination, cross-sectional and daily analyses depict paramedics as a highly stressed population whose work-related mood, stress, and burnout are not limited to the workplace. Effects appear to extend beyond one's shift and impact psychological functioning at home, highlighting the need for more effective interventions to buffer the transmission of stress and potentially improve employee retention. The current study also investigated the impact of paramedics' work stress on the subsequent stress and mood of their spouses. Significant crossover effects were observed with paramedics' work-related mood only, in that negative affect at work predicted significant increases in the subsequent perceived stress of spouses at home. This finding offers quantitative support for descriptive reports obtained by Regehr (2005) from spouses of paramedics. At the dyadic level, spouses also appear to be at risk of experiencing greater stress as the result of paramedics' work-related experiences. More generally, these findings reflect the previously observed transmission of stress and negative affect between members of a family unit (for a review, see Larson & Almeida, 1999). Research which has shown an adverse effect of occupational stress on marital interaction (e.g., Brock & Lawrence, 2008; Edge, 2008; Karney et al., 2005; Neff & Karney, 2004, 2007, 2009; Repetti, 1989; Story & Repetti, 2006) indicates a need to examine the additional impact on markers of dyadic functioning, such as spousal tension and satisfaction.

Generalizability of the current findings may be limited to a North American sample, and perhaps more narrowly, to Canadian paramedics, although cross-sectional analyses reflect those reported by previous American studies. Implications may be further limited to paramedics in long-term, committed relationships, as these relationships may influence the experience of stress and burnout in the work setting. It is more likely, however, that the fundamental features of emergency medicine, such as exposure to human suffering and

tragedy, are explaining the majority of the variance in occupational stress and burnout due to their highly salient and potentially traumatic qualities. An additional limitation to generalizability may apply to employment status, as the current sample was primarily full-time (compared to just over 50% of the large number of paramedics who applied to participate). Although current findings may be extendable only to full-time workers, studying part-time emergency workers presents a challenge to researchers given the highly unpredictable (and often infrequent) nature of their work schedules. The overwhelming majority of spouses in the current sample (86%) were also women, suggesting that gender may be influencing some of these cross-partner effects. Future studies should aim for more equal numbers of male and female targets and spouses, in order to more accurately assess the role of gender in these daily dyadic processes. Despite potential limitations, this study confirms previous reports of paramedics as a high stress population, and further extends our understanding of how stress and burnout unfold over time. Future studies should examine not only the impact of daily stress on dyadic functioning, but also the impact on adaptive and/or maladaptive coping strategies, in order to better understand the scope of stress transmission and contagion in paramedics and their families.

Table 2.1

Means, Standard Deviations, 95% Confidence Intervals, and Internal Consistency Estimates (Cronbach's α) for Cross-Sectional Measures among Paramedics ($n = 87$)

Variable	<i>M</i>	<i>SD</i>	95% CI	α
Depressive Symptoms	11.93	7.45	10.3–13.5	.75
Post-Traumatic Stress	36.59	14.15	33.6–39.6	.93
Emotional Exhaustion	26.31	10.93	24.0–28.7	.89
Depersonalization	12.89	6.82	11.6–14.5	.77
Personal Accomplishment	37.15	6.16	35.8–38.5	.66

Table 2.2

Means, Standard Deviations, Internal Consistency Estimates (Cronbach's α), and Paired t-Tests (2-tailed) for Daily Diary Measures

Variable	Paramedics		Spouses		α	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
T1 Negative Affect	1.50	.54	1.34	.38	.89	.000
T1 Perceived Stress	1.10	.74	1.05	.72	.62	.400
T2 Negative Affect	1.84	.64	---	---	.88	---
T2 Perceived Stress	.96	.70	---	---	.67	---
T2 Burnout	1.36	1.23	---	---	.79	---
T3 Negative Affect	1.76	.64	1.63	.51	.88	.006
T3 Perceived Stress	1.08	.80	1.06	.74	.71	.674

Note. Means are reflective of paramedics' four consecutive work days. Where measures consisted of multiple items, scores were averaged across items for ease of comparison.

Table 2.3*Bivariate Correlations among Daily Measures (Paramedics and Spouses)*

	2	3	4	5	6	7	8	9	10	11
<i>Paramedic Measures</i>										
1. T1_NA	.62**	.60**	.44**	.32**	.62**	.47**	.22**	.12**	.22**	.21**
2. T1_PS	---	.49**	.63**	.33**	.49**	.69**	.20**	.16**	.21**	.20**
3. T2_NA		---	.52**	.64**	.48**	.47**	.25**	.09	.23**	.20**
4. T2_PS			---	.38**	.42**	.67**	.16**	.17**	.22**	.24**
5. T2_OB				---	.36**	.37**	.09	.08	.16*	.11
6. T3_NA					---	.58**	.16**	.09	.23**	.20**
7. T3_PS						---	.19**	.14**	.25**	.23**
<i>Spouse Measures</i>										
8. T1_NA							---	.41**	.56**	.33**
9. T1_PS								---	.41**	.60**
10. T3_NA									---	.60**
11. T3_PS										---

Note. NA = negative affect; PS = perceived stress; OB = occupational burnout.

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

Table 2.4

Standardized Regression Coefficients from Multilevel Analyses predicting T3 Negative Affect and T3 Perceived Stress from Paramedic's T2 Negative Affect at Work

Independent Variable	Paramedic Effects	Spouse Effects
<i>Predicting T3 Negative Affect</i>		
Intercept	$\beta = 1.29^{***}$ (SE = .24)	$\beta = 1.70^{***}$ (SE = .11)
T1 Negative Affect	$\beta = .19^*$ (SE = .08)	$\beta = .72^{***}$ (SE = .10)
T2 Paramedic Negative Affect	$\beta = .36^{***}$ (SE = .08)	$\beta = .06$ (SE = .20)
<i>Predicting T3 Perceived Stress</i>		
Intercept	$\beta = 1.10^{***}$ (SE = .17)	$\beta = .83^{***}$ (SE = .17)
T1 Perceived Stress	$\beta = .42^{***}$ (SE = .07)	$\beta = .41^{***}$ (SE = .06)
T2 Paramedic Negative Affect	$\beta = .36^{***}$ (SE = .08)	$\beta = .19^{**}$ (SE = .06)

Note. SE = Robust standard error. All models controlled for paramedic gender and spouse gender at Level 2.

* $p < .05$; ** $p < .01$; *** $p < .001$

Table 2.5

Standardized Regression Coefficients from Multilevel Analyses predicting T3 Negative Affect and T3 Perceived Stress from Paramedic's T2 Work Stress

Independent Variable	Paramedic Effects	Spouse Effects
<i>Predicting T3 Negative Affect</i>		
Intercept	$\beta = 1.30^{***}$ (SE = .17)	$\beta = 1.69^{***}$ (SE = .13)
T1 Negative Affect	$\beta = .25^{**}$ (SE = .07)	$\beta = .58^{***}$ (SE = .09)
T2 Paramedic Work Stress	$\beta = .16^*$ (SE = .07)	$\beta = .05$ (SE = .05)
<i>Predicting T3 Perceived Stress</i>		
Intercept	$\beta = 1.45^{***}$ (SE = .19)	$\beta = .85^{***}$ (SE = .19)
T1 Perceived Stress	$\beta = .28^{***}$ (SE = .07)	$\beta = .44^{***}$ (SE = .06)
T2 Paramedic Work Stress	$\beta = .56^{***}$ (SE = .07)	$\beta = .06$ (SE = .07)

Note. SE = Robust standard error. All models controlled for paramedic gender and spouse gender at Level 2.

* $p < .05$; ** $p < .01$; *** $p < .001$

Table 2.6

Standardized Regression Coefficients from Multilevel Analyses predicting T3 Negative Affect and T3 Perceived Stress from Paramedic's T2 Burnout at Work

Independent Variable	Paramedic Effects	Spouse Effects
<i>Predicting T3 Negative Affect</i>		
Intercept	$\beta = 1.26^{***}$ (SE = .22)	$\beta = 1.74^{***}$ (SE = .11)
T1 Negative Affect	$\beta = .28^{***}$ (SE = .07)	$\beta = .63^{***}$ (SE = .09)
T2 Paramedic Burnout	$\beta = .17^{***}$ (SE = .03)	$\beta = .03$ (SE = .02)
<i>Predicting T3 Perceived Stress</i>		
Intercept	$\beta = 1.21^{***}$ (SE = .19)	$\beta = .84^{***}$ (SE = .16)
T1 Perceived Stress	$\beta = .49^{***}$ (SE = .06)	$\beta = .44^{***}$ (SE = .06)
T2 Paramedic Burnout	$\beta = .13^{***}$ (SE = .03)	$\beta = .01$ (SE = .03)

Note. SE = Robust standard error. All models controlled for paramedic gender and spouse gender at Level 2.

* $p < .05$; ** $p < .01$; *** $p < .001$

CHAPTER 3: From the Frying Pan to the Fire: Neuroticism and the Impact of Occupational Burnout on Day-to-Day Marital Tension²

It has been well established that stress and emotion transmit between individuals and across settings (Larson & Almeida, 1999). When examined according to the target's perception in multiple contexts, this process of stress and mood transmission is often referred to as *spillover*. Since earlier studies of stress spillover (Bolger, DeLongis, Kessler, & Schilling, 1989; Bolger, DeLongis, Kessler, & Wethington, 1989; Crouter, 1984), research has continued to document the impact of work stress on the home and family contexts. Neff and Karney (2004) found a negative impact of extramarital stressors (including stressful life events related to work, school, and other domains) on marital adjustment and satisfaction over time. Karney, Story, and Bradbury (2005) similarly observed a long-term impact of extramarital stress on marital discord. On days when spouses report more negative social interactions at work, both husbands and wives have been shown to express more anger and to withdraw more from others at home (Story & Repetti, 2006). These findings were replicated by Edge (2008), who found that work stress was associated with more withdrawal and fewer positive reunions at home. A recent cross-sectional study by Carlson, Ferguson, Perrewe, and Whitten (2011) found that having an abusive or overly critical boss was significantly associated with greater marital tension.

When the effect of stress extends beyond the individual to impact others in the network, it is often referred to as *stress crossover*. Given the evidence for an effect of occupational stress on one's perceptions of marital interactions and distress (Brock & Lawrence, 2008; Edge, 2008; Karney et al., 2005; Neff & Karney, 2004, 2009; Repetti, 1989;

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Story & Repetti, 2006), it is perhaps not surprising that evidence has also accrued for such crossover effects. Stress crossover has been primarily documented from a work-to-home perspective; that is, stress transfers from the work setting to the home setting and impacts a spouse or family member. Evidence for crossover effects was provided by Bolger, DeLongis, Kessler, and Wethington (1989) in their time-lag analyses of married couples. For example, on days when wives reported an argument at work, husbands were more likely to report having a marital dispute in the evening. Wife overload at home was also found to increase on days when husbands reported more overload at work, suggesting that wives may engage in behaviours that compensate for their husbands' work stress (Bolger, DeLongis, Kessler, & Wethington, 1989). More recently, Brock and Lawrence (2008) demonstrated that the marital satisfaction of newlywed wives was influenced by the role strain experienced by their husbands over a three-year period. Collectively, the aforementioned findings speak to the importance of examining the larger social context of stress (i.e., beyond that in which the stress originates). It was the goal of the current study to examine the daily impact of occupational burnout in one member of the marital dyad on subsequent tension between spouses.

Burnout represents one of the most salient maladaptive outcomes of chronic occupational stress (Schaufeli, Leiter, & Maslach, 2009). The leading model of burnout encompasses three dimensions: emotional exhaustion, depersonalization, and reduced personal accomplishment (Maslach, Jackson, & Leiter, 1997). Maslach et al. (1997) argue that it is the interpersonal aspect of burnout that sets it apart from other conceptualizations of work stress. Of the three primary aspects of burnout, depersonalization and personal accomplishment both have an interpersonal focus. Depersonalization refers to negative

emotions and cynical attitudes about one's clients, which can lead workers to view them as deserving of their issues and problems. Reduced personal accomplishment, on the other hand, refers to workers evaluating *themselves* negatively, particularly regarding their work with clients (Maslach et al., 1997). These dimensions of burnout can occur in addition to the principal aspect of burnout, emotional exhaustion. Yet even this factor is somewhat interpersonal in nature, described as feelings of emotional depletion and exhaustion that can restrict an individual's ability to contribute meaningfully to the workplace. Although the transmission of burnout from work to home has not been widely studied, Haar, Roche, and Ten Brummelhuis (2011) reported a reduction in work-family balance (i.e., feelings of interference between the demands of work and family) as a result of increased burnout in a sample of managers and business owners over a four day period.

In a large national sample of 126 different occupations, Dierdorff and Ellington (2008) investigated a specific set of interpersonal factors related to the work setting, including responsibility for others at work and interdependence, defined as the extent to which aspects of job performance are reliant on social relationships. Even after controlling for time pressures, scheduling, and other demands at work, both interdependence and responsibility for others at work predicted interference between work and family demands. Dierdorff and Ellington (2008) concluded that individuals requiring a greater frequency of social interactions and higher interdependence at work are less able to engage in meaningful social interactions at home, possibly due to exhausted social resources on the psychological level. These findings suggest an interpersonal form of stress transmission across settings. Further, the authors found that such transmission was highest among police detectives, firefighters, and family physicians, jobs characterized by greater interdependence. In

contrast, taxi drivers, insurance adjusters, and bank tellers rated the lowest in this regard.

Given the interpersonal aspects of burnout, it seems reasonable to hypothesize that burnout may also transfer to the home setting and impact dyadic functioning. To this end, the current study examined the impact of burnout on day-to-day marital tension in a sample of paramedics and their spouses.

Paramedics constitute an ideal population in which to study these daily stress transmission processes. The job of a paramedic is one of high interdependence and responsibility for others, factors identified by Dierdorff and Ellington (2008) as predicting higher levels of work-to-home interference. Paramedics typically work in pairs, and are particularly reliant on these work partners, with whom they must attend calls, respond to life-threatening problems, and engage in complex patient care and life support protocol. In many cases, this partnership extends beyond a single shift and lasts many years, constituting a very close and highly interdependent work relationship (Regehr, Goldberg, & Hughes, 2002). In addition, paramedics must regularly coordinate with a variety of allied services, including emergency dispatchers, firefighters, police officers, hospital staff, and physicians. Furthermore, the primary role of a paramedic involves a high degree of responsibility for others in the form of patient care and transport. This further implicates family members and friends of patients, adding to the overall interpersonal complexity and density of the job. Combined with a greater propensity for developing post-traumatic stress disorder (PTSD), burnout, and related symptoms of chronic stress (Alexander & Klein, 2001; Beaton, Murphy, & Pike, 1996; Goldstein, Jamner, & Shapiro, 1992; Patterson, Probst, Leith, Corwin, & Powell, 2005; Regehr & Miller, 2007; Saunders, 2004), paramedics are at particularly high risk of experiencing interference between work and home settings. To date, the research

documenting work-to-home spillover and crossover in this population has been strictly qualitative in nature (e.g., Regehr, 2005), with no quantitative research available on these processes.

An additional focus of the current study is the role of neuroticism in these daily work-to-home processes. Individuals higher on neuroticism generally report more intense and frequent negative affect (Hepburn & Eysenck, 1989) and perceive stressful events (including stressors of an interpersonal nature, such as conflict) as more severe (Bolger & Zuckerman, 1995; Lee-Baggley, Preece, & DeLongis, 2005). These increased levels of negative affect and perceived stress must also be regulated during a stressful experience in addition to the features of the stressor (Penley & Tomaka, 2002). This can result in attention being diverted away from the event, potentially impairing coping efforts and further exacerbating the impact of the stressful encounter (Connor-Smith & Flachsbart, 2007; O'Brien & DeLongis, 1996). In marital relationships, those high in neuroticism tend to make more negative attributions, responding less constructively to spousal tension (Karney, Bradbury, Fincham, & Sullivan, 1994) and experiencing more negative social interactions (Davey, Fincham, Beach, & Brody, 2001). This indicates a potential impact of neuroticism on day-to-day marital functioning. To this end, the current study also examined neuroticism as a moderator of the effect of paramedics' occupational burnout on marital tension. Indeed, previous research has demonstrated mood spillover from one experience or setting to the next among individuals high in neuroticism (Suls & Martin, 2005), implicating it as a potentially important factor in work-to-home stress spillover.

The current study. After a long day's work, one of the first questions couples typically ask each other at first contact is, "how was your day?" For most people, and perhaps especially for most paramedics, there are good days and there are bad days at work, and how individuals engage with their spouses following a stressful day may influence changes in marital tension. It was the goal of the current study to examine the effect of occupational burnout among paramedics and their spouses on day-to-day marital tension. A second goal was to examine the potential moderating role of neuroticism in these relationships. Marital tension has been identified as a salient marker of daily dyadic functioning in previous longitudinal studies of couples (O'Brien, DeLongis, Pomaki, Puterman, & Zwicker, 2009), bolstering its inclusion here as a marker of spillover and crossover effects of work stress. This study utilized an intensive longitudinal design (Bolger & Laurenceau, 2013; Bolger, Stadler, Paprocki, & DeLongis, 2010) comprising daily diary methods in which neuroticism was measured once as an individual difference, while repeated measures of marital tension and occupational burnout were employed within and across days.

Hypotheses. Given the evidence for an impact of burnout on the home setting (Haar et al., 2011; Lambert & Hogan, 2010; Westman, Etzion, & Gortler, 2004), as well as qualitative evidence for stress spillover and crossover in paramedics (Regehr, 2005), it was first hypothesized that higher daily reports of burnout by paramedics would predict increased marital tension at home. In consideration of similar evidence for stress crossover to spouses of paramedics (Regehr, 2005), it was also hypothesized that paramedics' burnout would predict higher subsequent marital tension as reported by spouses on a daily basis. Paramedics' and spouses' levels of neuroticism were expected to exacerbate these associations via within-person and cross-partner effects (i.e., participants' own level of

neuroticism as well as that of their spouses were expected to moderate daily relationships). All hypotheses were tested using hierarchical linear modeling (HLM; Bryk & Raudenbush, 1992), with daily measures nested within couples over time. This strategy offers a number of benefits for the current data set, including handling missing data and accounting for the natural dependence that occurs across repeated measures and between two members of a dyad (Kenny & Cook, 1999).

3.1 Methods

Participants. Target participants included 87 paramedics and their cohabitating spouses. Paramedics were employed in major urban centers throughout Canada with an average of 15.2 years on the job ($SD = 7.7$). Of the total sample, 82 paramedics self-identified as Caucasian, 4 as Asian, and 1 as Hispanic. The mean age of paramedics was 42.1 years ($SD = 8.3$; range = 27 – 62 years) at the time of participation, with the majority of paramedics identifying as male (71). In order to test hypotheses regarding potential crossover effects of occupational burnout, eligibility was contingent upon the participation of a cohabitating romantic partner or spouse during the duration of the study. Sixty-six participating couples were married, with 55 couples having at least one child living in the home with them. Average length of relationship across couples was 13.1 years ($SD = 8.7$), and average length of cohabitation was 11.6 years ($SD = 8.6$). Of the participating spouses, 79 self-identified as Caucasian, 5 as Asian, 2 as First Nations, and 1 as Latin American. The mean age of spouses was 41.3 years ($SD = 9.2$, range = 24 – 74 years), with the majority identifying as female (75). In total, 72 spouses reported employment outside the home at the time of participation (56 full-time).

In an effort to maintain homogeneity, only paramedics working full-time or full-time equivalent hours (minimum 4 shifts per week) were eligible to participate. In order to also maintain comparability across paramedics with respect to work schedules, only paramedics who worked four consecutive shifts at the time of the study were included. Participating paramedics were recruited via brochures and print advertisements at EMS stations (with the cooperation of local services) and via online media (e.g., Facebook). If interested, paramedics were directed to the project website (www.medicscope.com) where they were able to complete an eligibility questionnaire. This questionnaire asked about employment status, schedule information, and relationship status.

Cohabiting spouses and romantic partners of paramedics were invited to participate by their significant others (i.e., paramedics), and therefore received no direct advertisement. Spouse eligibility was determined according to the relevant paramedic's eligibility; thus, collective eligibility of the couple was determined prior to confirmation and subsequent direction. If deemed eligible, paramedics and spouses received e-mail instructions regarding subsequent online phases of participation. Participants' e-mail addresses served as usernames throughout the study, in order to match responses over time. Participating paramedics and their spouses each received a \$40 gift card to a local retail establishment (e.g., Starbucks). Of the 558 initial questionnaires completed by interested paramedics, only 87 met eligibility criteria. The primary reasons for study exclusion were lack of interest from spouses of interested paramedics (49%), not working four consecutive shifts during the course of the study (46%), and not being in a committed relationship and/or not having a cohabiting spouse (41%). With respect to available information on applicants who did not meet eligibility criteria, the current sample differed significantly in employment status, with only

53% of total applicants being full-time compared to 94% of the current sample ($\chi^2 = 29.4$, $p < .001$), reflecting inclusion criteria. No significant differences in certification level were observed between the current sample and those who were excluded.

Procedures and measures. All phases of participation were completed online using a secure server at the University of British Columbia. Questions were made available in online format in order to improve ease, confidentiality, and privacy of responding. Identifying information was collected only for the purpose of mailing honorariums and was not matched to participant responses.

Phase 1. The first phase of participation lasted approximately 30 minutes. Consent was first obtained for all phases of participation in the study. Following the provision of consent, participants completed a short series of online questions about basic demographic information (including age, gender, and ethnicity), length of relationship and length of cohabitation with spouse. For paramedics only, education, training, and experience as a paramedic were assessed. In addition, neuroticism was assessed for paramedics and their spouses using the Big Five Inventory (BFI; John & Srivastava, 1999), a commonly used measure with good validity and reliability in non-clinical samples (John, Naumann, & Soto, 2008). Eight items measured neuroticism (e.g., “Can be moody”, “Worries a lot”, “Gets nervous easily”) on a Likert scale from 1 (“strongly disagree”) to 5 (“strongly agree”).

Following completion of Phase 1, participants were contacted by phone in order to schedule the second phase of the study. This also provided participants the opportunity to ask questions about the study and develop rapport with the research team. Once scheduled and coordinated with both parties, a confirmation e-mail was sent to each participant including a link to the online diary questions (Phase 2) and detailed instructions regarding their

completion. All research assistants conducting phone interviews were trained using the University of Michigan Survey Research Centre's protocol for interviewer training.

Phase 2. The second phase of the study followed paramedics and their spouses across a one-week period that encompassed four consecutive work shifts for the paramedic, with at least one day off work both preceding and following the work period. Paramedics answered questions three times daily: (T1) within 1 to 2 hours of waking (in reference to “the day so far”); (T2) immediately after work (in reference to their time spent at work); and (T3) before bed (in reference to the period of time “since last entry”). Paramedics were not asked to answer any questions during working hours, in order to avoid interfering with the often sensitive nature of the job. Participants were able to opt for daily reminders via e-mail or text message. Across the four work days, 82% of paramedics completed at least nine of the twelve Phase 2 time points, with 89% completing eight of the twelve time points. Spouses completed only two diaries daily at T1 and T3, for a total of eight time points across the paramedics' four work days. Of the participating spouses, 90% completed at least 6 time points, with 94% completing 5 of the 8 time points. Couples with paramedics having more than six missing time points, or with spouses having more than four missing time points were excluded from analyses, maintaining only couples that adhered to a 50% response rate at minimum. Diary data analyzed here are from the four-consecutive days on which paramedics were working. Diary questionnaires were brief (requiring approximately 3 to 5 minutes per time point). Measures included in the diary are described below.

Occupational burnout. In order to capture fluctuations in paramedics' burnout over time, a daily measure of burnout was derived from the Maslach Burnout Inventory – Human Services Survey (MBI-HSS; Maslach, Jackson, & Leiter, 1996) and included at T2. As is

standard with intensive longitudinal designs (Bolger & Laurenceau, 2013), a subset of items were chosen from the larger scale to best represent the target construct. Based on the magnitude of their factor loadings in previous studies (Gil-Monte, 2005; Worley, Vassar, Wheeler, & Barnes, 2008), three items were identified as being reliable indicators of burnout, including two items measuring emotional exhaustion (“I feel burned out from my work” and “I feel like I’m at the end of my rope”) and one item measuring depersonalization (“I’ve become more callous towards people”). This further reflects a general trend in the literature to place primacy on these two aspects of burnout (Worley et al., 2008). Items were reworded for their use in a diary format. The original rating scale of 0 (‘not at all’) to 6 (‘all of the time’) was maintained as an indicator of the frequency of feelings of burnout during the referenced period of time.

Marital tension. Based on previous research using an intensive longitudinal design in married couples (Bolger, DeLongis, Kessler, & Wethington, 1989), marital tension was assessed twice daily (once at T1 for daily baseline measures and once at T3) as a marker of daily dyadic functioning. Paramedics and their spouses were asked, “How much tension or conflict has there been with your spouse/romantic partner?” Participants responded on a 5-point Likert scale ranging from 1 (“none”) to 4 (“a lot”). This item (DeLongis et al., 2004) and a similar single-item measure have been utilized as indicators of marital tension in previous intensive longitudinal studies of dyads (Bolger et al., 2010).

Data analyses. Hypotheses regarding the impact of paramedic burnout on marital tension were tested using hierarchical linear modeling (HLM) software (v6.0; Raudenbush, Bryk, Cheong, & Congdon, 2004), with daily measures nested within couples over time. Using HLM, within-couple variation is modeled at Level 1 and between-couple variation is

modeled at Level 2, allowing for simultaneous examination of both sources of variance. A two-intercept approach incorporating actor and partner effects was utilized (with random intercepts and slopes), in order to better control for the natural non-independence of the data (Cook & Kenny, 2005). All Level 1 predictor variables were grand-mean centered in order to preserve the variance due to the dyad. Centering improves the interpretability of the intercepts in order to reflect the average response of each couple. These decisions were made according to recommendations by Kenny, Kashy, and Cook (2006) for modeling dyadic data involving couples. Partner effects were included for paramedics' burnout, where a variable was created in which paramedics' burnout scores were entered for their respective spouses. Level 2 was used to model between couple variance and to examine the potential moderating role of neuroticism. Given the disproportionate number of paramedics who were female (and likewise, spouses who were male), paramedic gender and spouse gender were also entered at Level 2 as controls. Note that all models were also run controlling for shift (coded 1 for day shift and 2 for night shift) at Level 1 and both length of relationship and length of cohabitation at Level 2. These variables were dropped from analyses presented here due to lack of significant effects.

Regarding power in HLM, Kenny et al. (2006) noted that of studies examining both members of dyads (to date), the median number of dyads was 101, with as few as 25 in some studies. In order to have sufficient power to accurately approximate consequential non-independence of dyadic data, they recommend having a minimum of 44 dyads when running two-tailed tests of between-dyad effects of independent variables (at an alpha of .05). Nevertheless, it has been suggested that even when non-independence cannot be detected (by means of correlations among dyad members' responses), the safest course of action is to

assume non-independence in dyadic research. Kenny et al. (2006) add that increasing the number of repeated measures in a study of dyads further improves power and significantly reduces the likelihood of committing Type II error. Kenny and Cook (1999) had previously noted that power is better preserved when both members of a couple are examined together in the same analyses. This was accomplished in the current analyses by incorporating both actor and partner effects. Regarding the inclusion of neuroticism at Level 2, traditional estimates of power were utilized. Hosmer & Lemeshow (2000) recommend a minimum of 10 cases per variable. In the current Level 2 analyses, no more than 4 couple-level variables (paramedic gender, spouse gender, paramedic neuroticism, and spouse neuroticism) were entered simultaneously, making the current sample of 87 couples sufficient in this regard.

3.2 Results

Descriptive statistics are presented for all variables in Table 3.1. Paired *t*-tests revealed a significant difference in neuroticism scores between paramedics and spouses, with spouses reporting higher neuroticism on average. Among the diary measures, no significant differences between paramedics and spouses were observed. Alphas (see Table 3.1) indicated high internal reliability for measures of neuroticism and daily burnout.

Independent *t*-tests (2-tailed) revealed no significant differences in either paramedic reports of neuroticism or spouse reports of neuroticism according to gender, $t = 1.01$ ($df = 25.3$, $p = .322$) and $t = 1.87$ ($df = 14.0$, $p = .082$), respectively. Additionally, male and female paramedics did not differ significantly in their mean scores (averaged across days) on any diary measures of interest. Independent *t*-tests revealed similar results for spouses, with no significant differences between male and female participants. It should be noted, however, that significantly disproportionate numbers of men and women participated as spouses and

paramedics, respectively. As such, caution should be taken when interpreting tests of gender differences. Similar caution should be extended to interpretations of differences between paramedics and spouses.

Bivariate correlations among all variables are displayed in Table 3.2. Both paramedic and spouse ratings of T1 marital tension displayed significant correlations with T3 marital tension, indicating the importance of controlling for T1 reports in multivariate analyses. A small but significant correlation was also observed between paramedic burnout at the end of their work shift and spouses' marital tension at T3 ($r = .15$). Partners' evaluations of marital tension were significantly correlated at both time points ($r_s = .39$ and $.40$), further supporting the decision to use HLM to account for the natural dependence between paramedics' and spouses' scores. Paramedic neuroticism displayed weak but significant associations with all diary measures of paramedic burnout and tension ($r_s = .10$ to $.23$). A weak association was also observed between paramedic neuroticism and T3 marital tension for spouses. Similar patterns were revealed for spouse neuroticism, which displayed a weak but significant association with marital tension at T3 for paramedics.

In order to test the hypothesis that burnout experienced by paramedics at work would predict higher subsequent levels of marital tension at home for both paramedics and spouses, the following model of work-to-home effects was tested:

$$\begin{aligned} \text{T3 marital tension}_{ti} = & \text{medic} [\beta_{1ip}] + \text{spouse} [\beta_{2is}] + \beta_{3ip} (\text{paramedic's T1 marital} \\ & \text{tension})_{ti} + \beta_{4is} (\text{spouse's T1 marital tension})_{ti} + \beta_{5ip} (\text{paramedic's T2 burnout})_{ti} + \beta_{6is} \\ & (\text{partner effect of paramedic's T2 burnout})_{ti} + r_{ti} \end{aligned}$$

where $\text{T3 marital tension}_{ti}$ is tension at home before bed at time point t for couple i ; (medic) is a dummy indicator which is 1 for all paramedics and 0 for all spouses; (spouse) is

a dummy indicator which is 1 for all spouses and 0 for all paramedics; β_{1ip} is the intercept for paramedics and β_{2is} is the intercept for spouses; (paramedic's T1 marital tension)_{ti} is the paramedic's T1 marital tension at time point t for couple i; β_{3ip} is the relationship between paramedic's T1 marital tension and paramedic's T3 marital tension; (spouse's T1 marital tension)_{ti} is the spouse's T1 marital tension at time point t for couple i; β_{4is} is the relationship between spouse's T1 marital tension and spouse's T3 marital tension; (paramedic's T2 burnout)_{ti} is the paramedic's T2 burnout at time point t for couple i; β_{5ip} is the relationship between paramedic's T2 burnout and paramedic's T3 marital tension; (partner effect of paramedic's T2 burnout)_{ti} is the partner effect of paramedic's T2 burnout at time point t for couple i, where paramedic's T2 burnout scores are entered for the spouse; β_{6is} is the relationship between paramedic's T2 burnout and spouse's T3 marital tension; and r_{ti} is the within-couple error. These results are presented in Table 3.3.

This model was repeated including paramedic and spouse neuroticism (grand-mean centered) at Level 2. Within-person and cross-partner neuroticism effects were tested with the following Level 2 model:

$$\text{paramedic } [\beta_{1ip}] = \gamma_{10} + \gamma_{11} (\text{paramedic gender}) + \gamma_{12} (\text{paramedic neuroticism}) + \gamma_{13} (\text{spouse neuroticism}) + u_{1i}$$

$$\text{spouse } [\beta_{2is}] = \gamma_{20} + \gamma_{21} (\text{spouse gender}) + \gamma_{22} (\text{paramedic neuroticism}) + \gamma_{23} (\text{spouse neuroticism}) + u_{2i}$$

$$\beta_{3ip} (\text{paramedic's spousal tension upon waking}) = \gamma_{30} + u_{3i}$$

$$\beta_{3is} (\text{spouse's marital tension upon waking}) = \gamma_{40} + u_{4i}$$

$$\beta_{5ip} (\text{paramedic's burnout at Y2}) = \gamma_{50} + \gamma_{51} (\text{paramedic neuroticism}) + \gamma_{52} (\text{spouse neuroticism}) + u_{5i}$$

β_{6is} (paramedic's burnout at work, aligned for the spouse) = $\gamma_{60} + \gamma_{61}$ (paramedic neuroticism) + γ_{62} (spouse neuroticism) + u_{6i}

where γ_{11} is the relationship between paramedics' intercept and paramedics' gender; γ_{12} and γ_{13} represent the relationships between paramedics' intercept and paramedic neuroticism and spouse neuroticism, respectively; γ_{21} is the relationship between spouses' intercept and spouses' gender; γ_{22} and γ_{23} represent the relationships between spouses' intercept and paramedic neuroticism and spouse neuroticism, respectively; γ_{51} represents the interaction between paramedics' neuroticism and paramedics' T2 burnout; γ_{52} represents the interaction between spouses' neuroticism and paramedics' T2 burnout; γ_{61} represents the interaction between paramedics' neuroticism and the partner effect of paramedics' T2 burnout; and γ_{62} represents the interaction between spouses' neuroticism and the partner effect of paramedics' T2 burnout. These results are also presented in Table 3.3.

According to initial multilevel analyses (before entering neuroticism at Level 2), paramedics' T2 burnout emerged as a significant predictor of T3 marital tension for spouses only. Coefficients were positive, indicating that marital tension increased for spouses as paramedics' burnout also increased. T2 burnout did not predict T3 marital tension for paramedics. A multilevel model examining the cross-level moderation effects was subsequently run with previous Level 1 and current Level 2 parameters (see Table 3.3). The Level 2 model revealed significant associations between paramedic neuroticism and both paramedics' T3 marital tension and spouses' T3 marital tension. These associations were positive, suggesting that higher levels of neuroticism predicted increases in marital tension. There were no main effects of spouse neuroticism on T3 marital tension for either paramedics or spouses.

However, there was a significant cross-level interaction that emerged in the multilevel analyses: paramedic neuroticism interacted with paramedic burnout to predict changes in paramedics' T3 marital tension. In order to interpret this interaction, tests of simple slopes were calculated based on procedures outlined by Aiken and West (1991). Points were plotted according to high (+1 SD) and low (-1 SD) levels of both predictor (daily burnout) and moderator (neuroticism). See Figure 3.1 for a graph of these simple slopes. Paramedics' T2 burnout predicted decreases in paramedics' T3 marital tension when paramedic neuroticism was low ($p = .038$). No significant relationship was observed between paramedic burnout and T3 marital tension at high levels of paramedic neuroticism, although there appeared to be a slight (non-significant) increase in T3 marital tension over time.

3.3 Discussion

The current study examined stress transmission among married couples by investigating the impact of day-to-day occupational burnout on changes in dyadic functioning via marital tension. In examining work-to-home spillover among paramedics, no significant impact was observed of occupational burnout on paramedics' subsequent reports of marital tension. When examining stress crossover effects to spouses of paramedics, a notable impact of burnout was observed. Specifically, paramedic burnout was associated with increases in marital tension for their spouses. These results may reflect a differential impact of burnout on paramedics and their spouses, in so much that an interpersonal impact (via marital tension) appears to occur for spouses but not targets. It is possible that on days when paramedics are more burned out, spouses must compensate for their partners' exhaustion by engaging in more responsibilities in the home, thus experiencing more marital tension. Indeed, previous research has reported more compensatory behaviours at home as

the result of spouses' increased work stress (Bolger, DeLongis, Kessler, & Wethington, 1989). Combined with these compensatory behaviours, additional methods of support provision on the part of the spouse may allow the paramedic to disengage socially and escape opportunities for conflict. On the other hand, tension may result from greater reactivity on the part of the paramedic, or due to the spouses' protective buffering of their burned out partners. Defined as a strategy of hiding concerns and yielding to one's partner to avoid conflict, Coyne and Smith (1991, 1994) have observed negative outcomes (e.g., increased distress) for spouses who adopt this response pattern, despite potential benefits for the partner experiencing the stress.

Nonetheless, the current multilevel analyses are consistent with previous research demonstrating positive associations between occupational stress and marital interaction/satisfaction (Brock & Lawrence, 2008; Edge, 2008; Karney et al., 2005; Neff & Karney, 2004, 2009; Repetti, 1989; Story & Repetti, 2006) and between burnout and work-family conflict (Haar et al., 2011; Lambert & Hogan, 2010; Westman, Etzion, & Gortler, 2004). They further extend qualitative evidence for stress spillover and crossover previously found in paramedics (e.g., Regehr, 2005).

Paramedic neuroticism emerged as a significant moderator of the impact of occupational burnout on paramedics' reports of marital tension before bed. A closer look at this interaction revealed significance at low levels of paramedic neuroticism only. At high levels of neuroticism, paramedic burnout resulted in a minor (and non-significant) increase in marital tension. When paramedic neuroticism was lower, days with higher occupational burnout were associated with decreases in marital tension. No significant moderation effect was observed between neuroticism and burnout on spouses' reports of marital tension.

At first glance, these findings may appear inconsistent with previous research that has demonstrated amplifications of stress contagion, marital tension, and marital dysfunction as the result of high neuroticism (Davey et al., 2001; Karney et al., 1994; Suls & Martin, 2005). Indeed, it was expected that both within-person and cross-partner effects would be exacerbated by higher levels of paramedic and spouse neuroticism. By considering the fundamental nature of burnout, however, an alternative explanation may be available. In the transmission of burnout across settings and individuals, the potential role of neuroticism has not been previously examined, yet burnout differs significantly from other conceptualizations of stress. In fact, burnout is considered an outcome of chronic stress at work (Maslach et al., 1997), potentially restricting the present application of previous research on the interactive nature of neuroticism, stress, and dyadic functioning. In the current study and for those higher in neuroticism, burnout was not associated with changes in marital tension. These findings suggest that for those higher on neuroticism, day-to-day marital tension remains high regardless of degree of burnout. This is consistent with previous research identifying those high in neuroticism as prone to greater marital dysfunction and negative attributions more generally (Hepburn & Eysenck, 1989; Lee-Baggeley et al., 2005; Karney et al., 1994).

At lower levels of neuroticism, however, a significant impact of occupational burnout on marital tension was observed among paramedics. Interestingly, among those paramedics lower on neuroticism, higher burnout was associated with decreases in marital tension. Here it may be useful to consider the highly interpersonal nature of burnout; that is, high burnout is marked by an impairment or depletion of social resources (Maslach et al., 1997). For those paramedics lower in neuroticism, decreases in marital tension on days when they are burned out may be explained by such impairment. That is, when paramedics are more burned out,

they may have a diminished capacity to engage interpersonally at home, and for those lower in neuroticism this may manifest in the avoidance of opportunities for spousal tension and conflict. This is further supported by Dierdorff and Ellington (2008), who concluded that occupations requiring a higher interdependence at work (e.g., nurses, police detectives, firefighters) are more likely to experience depleted social resources at home. Paramedics would similarly be characterized as having a high degree of interdependence on the job (Regehr, Goldberg, & Hughes, 2002), which may be reducing their overall likelihood of encountering subsequent marital tension and conflict by means of avoidant coping strategies. Alternatively, when those lower in neuroticism are feeling burned out, they may be able to more effectively seek out and obtain support from their spouses, reducing perceptions of marital tension as a result. That higher levels of neuroticism may interfere with these adaptive interpersonal processes is worth noting, and further reflects findings that those high in neuroticism cope less effectively with stress (Connor-Smith & Flachsbart, 2007; O'Brien & DeLongis, 1996).

Significant cross-partner effects were observed only in the main effects of paramedic neuroticism on spouses' reports of marital tension, suggesting that partner neuroticism is impacting spousal perceptions of marital tension on a day-to-day basis. The interaction between paramedics' burnout and neuroticism did not predict changes in spouses' perceptions of marital tension nor did spouses' own neuroticism impact this relationship. Given that a significant effect of paramedic burnout on spouses' marital tension remains when controlling for neuroticism, the current findings suggest a differential impact of partner's neuroticism and burnout. It appears that neuroticism and burnout each

independently impact spousal perceptions of marital tension, but do not interact in the crossover.

A limitation of the current study is that it was not possible to fully separate the effects of target vs. spouse role from that of male vs. female or of husband vs. wife, given that most paramedics were men and most spouses were women. Previous research has shown a greater influence of husbands' mood and stress on key outcomes for wives. Compensatory behaviours have also been observed more frequently among wives in response to husbands' stress (Bolger, DeLongis, Kessler, & Wethington, 1989). In the current sample, the overwhelming majority of spouses (86%) were women, suggesting that gender may be underlying some of these cross-partner effects. Future studies should aim for more equal numbers of male and female targets and spouses, in order to more accurately assess the role of gender in these daily dyadic processes.

Although data collected here are limited by their self-report nature, obtaining repeated measures close to their real-time occurrence helped to reduce potential retrospective contamination (Tennen, Affleck, Coyne, Larsen, & DeLongis, 2006). A major strength of this study was its examination of both members of the dyad. This allowed us to account for greater variance at within- and between-couple levels, better approximating these processes within an interpersonal context. These findings also bolster the conceptualization of burnout as a construct which fluctuates from one day to the next. It is certainly easy to imagine an unusually stressful day leading to heightened feelings of emotional exhaustion and depersonalization on the job. In the current sample, daily reports of burnout accounted for significant variance in after work outcomes, reflecting progressive trends in psychology to

conceptualize traits as encompassing both within-person stability and within-person variability (Fleeson, 2001).

Given that the study focused on paramedics and their spouses, generalizability may be limited. With the focus here on interpersonal outcomes of occupational stress via burnout, it may be that findings are only generalizable to other human service professions (e.g., nurses, physicians). Nevertheless, these findings are consistent with previous research documenting similar outcomes of work stress in paramedics (e.g., Patterson et al., 2005; Regehr & Miller, 2007). Despite potential restrictions on generalizability, this study extends our understanding of how occupational stress and burnout unfold over time and transmit across settings and between individuals. Although the intricacies and complexities of daily burnout transmission may differ from stress transmission more generally, the current findings speak to the potential role of occupational burnout in the day-to-day functioning of couples. In particular, minor day-to-day changes in occupational burnout appear to disrupt dyadic functioning and adjustment. In many instances, such conclusions persist even after controlling for neuroticism. Future studies should attempt to replicate the potentially unique interactions between neuroticism and daily burnout in other populations, as well as confirm potential pathways through which these daily processes may occur. The current findings would benefit from replication using observational designs of couples facing occupational burnout and how they interact to cope with this stress.

Table 3.1

Means, Standard Deviations, Internal Consistency Estimates (Cronbach's α), and Paired t-Tests (2-tailed) for All Measures

Variable	Paramedics		Spouses		α	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Neuroticism	2.49	.77	2.79	.76	.79	.016
T1 Marital Tension	2.06	.61	1.99	.50	---	.059
T2 Burnout	1.36	1.23	---	---	.79	---
T3 Marital Tension	2.15	.87	2.21	.79	---	.323

Note. Means are reflective of paramedics' four consecutive work days. Where measures consisted of multiple items, scores were averaged across items for ease of comparison.

Table 3.2*Bivariate Correlations among All Variables (Paramedics and Spouses)*

	2	3	4	5	6	7
1. Paramedic Neuroticism	.10*	.23**	.16**	-.03	.00	.12**
2. Paramedic T1 Marital Tension	---	.00	.28**	.02	.39**	.30**
3. Paramedic T2 Burnout		---	.00	.06	-.03	.15*
4. Paramedic T3 Marital Tension			---	.14**	.13**	.40**
5. Spouse Neuroticism				---	.00	.14**
6. Spouse T1 Marital Tension					---	.18**
7. Spouse T3 Marital Tension						---

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

Table 3.3*Standardized Regression Coefficients from Multilevel Analyses predicting T3 Marital**Tension for Paramedics and Spouses*

Independent Variable	Paramedic Effects	Spouse Effects
Intercept	$\beta = 2.18^{***}$ (SE = .35)	$\beta = 2.12^{***}$ (SE = .18)
T1 Marital Tension	$\beta = .18$ (SE = .16)	$\beta = .40^{**}$ (SE = .16)
T2 Paramedic Burnout	$\beta = -.00$ (SE = .05)	$\beta = .10^*$ (SE = .05)
<i>Examining Cross-Level Moderating Effects of Neuroticism</i>		
Intercept	$\beta = 2.30^{***}$ (SE = .34)	$\beta = 2.10^{***}$ (SE = .18)
Paramedic Neuroticism	$\gamma = .17^*$ (SE = .08)	$\gamma = .15^*$ (SE = .07)
Spouse Neuroticism	$\gamma = .10$ (SE = .07)	$\gamma = .08$ (SE = .07)
T1 Marital Tension	$\beta = .18$ (SE = .15)	$\beta = .43^{**}$ (SE = .16)
T2 Paramedic Burnout	$\beta = -.02$ (SE = .05)	$\beta = .09^*$ (SE = .05)
x Paramedic Neuroticism	$\gamma = .14^{**}$ (SE = .06)	$\gamma = -.08$ (SE = .05)
x Spouse Neuroticism	$\gamma = -.04$ (SE = .06)	$\gamma = -.01$ (SE = .05)

Note. SE = Robust standard error. All models controlled for paramedic gender and spouse gender at Level 2.

Gender did not predict changes in T3 marital tension for either paramedics or spouses.

* $p < .05$; ** $p < .01$; *** $p < .001$

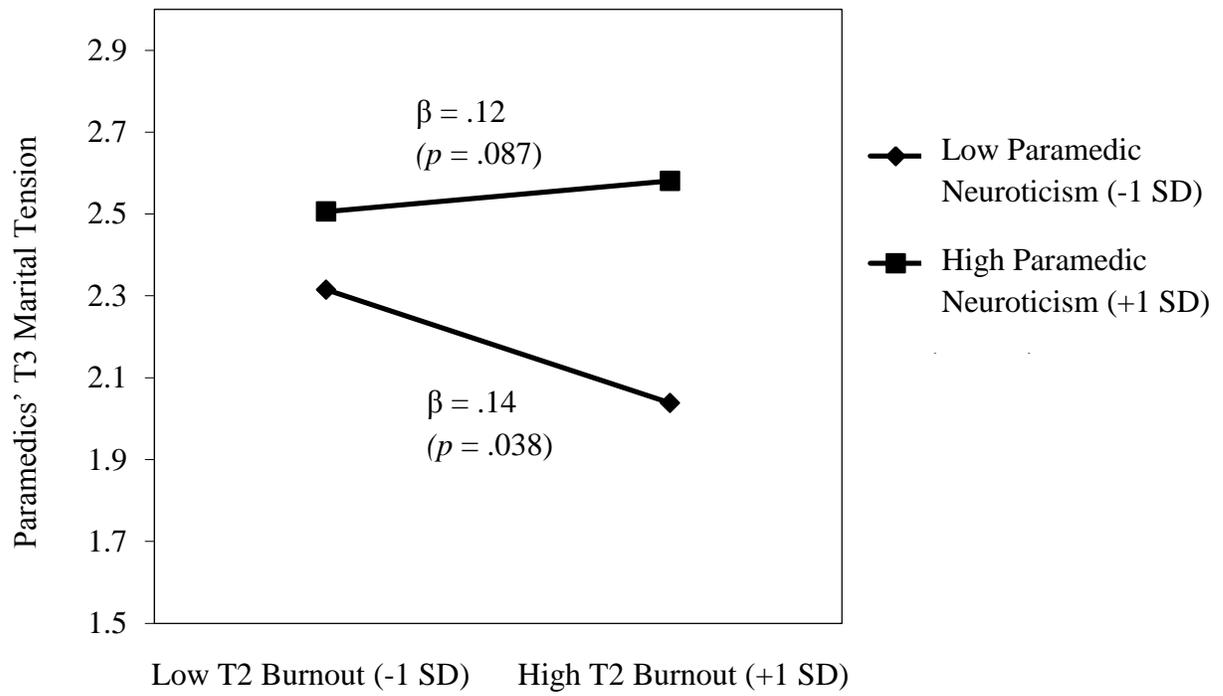


Figure 3.1. Cross-level interaction between daily T2 burnout (Level 1) and paramedic neuroticism (Level 2) predicting paramedics' T3 marital tension.

CHAPTER 4: When Couples Disconnect: Rumination and Withdrawal as Maladaptive Responses to Everyday Stress³

Relationships have emerged as important contexts in which to study stress and coping processes. In particular, marital relationships involve complex interactions that are continuously influenced by stress and coping, including that which occur in other settings and contexts (Karney, Story, & Bradbury, 2005; Neff & Karney, 2004; Story & Repetti, 2006). In turn, relationships shape a number of stress-related outcomes on both individual and dyadic levels, including stress adaptability and coping effectiveness (O'Brien, DeLongis, Pomaki, Puterman, & Zwicker, 2009). As noted by O'Brien and DeLongis (1996), the examination of interpersonal factors reflects a transactional-relational model of stress and coping (Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986), in which stress and coping unfold as a dynamic interplay between person and context. Within the marital context specifically, it has been shown that the response of a partner or spouse has a meaningful impact on one's coping. For example, individuals have been shown to engage in more maladaptive coping strategies if they have a critical spouse, while having a supportive spouse predicts more adaptive strategies (Manne & Zautra, 1989). Holtzman, Newth, and DeLongis (2004) found that partner support predicted both adaptive coping responses and greater coping effectiveness. Simply being satisfied with a spouse's response appears to further contribute to coping effectiveness and psychological adjustment in couples (Holtzman et al., 2004; Holtzman & DeLongis, 2007).

One means by which researchers have accounted for the interpersonal context is the examination of relationship-focused coping strategies. These efforts involve the regulation

³ This chapter has been adapted from King, D. B., & DeLongis, A. (under review). When couples disconnect: Rumination and withdrawal as maladaptive responses to everyday stress. It has been modified to fit the format of this thesis.

and maintenance (successful or otherwise) of social relationships during stressful episodes (Lee-Baggley, Preece, & DeLongis, 2005; O'Brien & DeLongis, 1996). Generally, findings indicate that the consideration of this dyadic information significantly improves the predictive value of models of coping (O'Brien & DeLongis, 1996), further supporting the study of stress and coping processes within a broader social framework. Of the coping strategies studied in couples, rumination and interpersonal withdrawal appear to be especially harmful to the long-term functioning and adjustment of dyads (DeLongis & Holtzman, 2005; DeLongis, Holtzman, Puterman, & Lam, 2010; Puterman, DeLongis, & Pomaki, 2010). It was the goal of the current study to examine the interactions between these two maladaptive coping responses in couples and the subsequent impact on marital tension and conflict.

Rumination is a passive, self-focused, and negatively oriented way of responding to physical and emotional stress. It is repetitive in nature and involves persistent thinking about one's feelings and problems, often with negative psychological consequences (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008; Treynor, Gonzalez, & Nolen-Hoeksema, 2003). Repetitive thinking that is focused on negative self-related content appears to be the key deleterious component of rumination (Mor & Winquist, 2002; Nolen-Hoeksema et al., 2008; Segerstrom, Stanton, Alden, & Shortridge, 2003). Evidence from experimental and prospective studies suggests that an individual's tendency to ruminate about life stressors impairs psychological adjustment and exacerbates depressive symptomology in individuals (Morrow & Nolen-Hoeksema, 1990; Robinson & Alloy, 2003) and in couples (Puterman et al., 2010). Despite evidence for rumination as a stable, dispositional trait (Treynor et al., 2003), daily diary research has documented meaningful within-person variability in rumination on a day-to-day basis. Increases in daily rumination over a one-week period have

been shown to predict increases in negative affect over the course of the day (Puterman et al., 2010), supporting the examination of daily reports of this maladaptive response. Further, studies of state rumination have explained significant variance in negative affect beyond that explained by trait measures of rumination alone (Moberly & Watkins, 2008).

Despite some evidence for short-term benefits following a stressful encounter (DeLongis & Preece, 2002; Repetti, 1989), interpersonal withdrawal has been related to poor psychological adjustment for couples across a number of studies. For example, among couples coping with lung cancer, withdrawing from communication was related to higher distress for both patients and their partners (Badr & Carmack Taylor, 2008). Piotrkowski (1979) also found that repeated withdrawal in response to job stress led to heightened family conflict over time. In combination with other maladaptive responses from one's partner, interpersonal withdrawal has been shown to predict concurrent and long-term marital dissatisfaction (Heavey, Christenen, & Malamuth, 1995) as well as poor psychological adjustment in the form of increased negative affect (King & DeLongis, 2013a). In particular, spouse withdrawal has been proposed to play a key role in rumination, in so much that rumination can be exacerbated by the withdrawal of one's partner. DeLongis et al. (2010) suggested that without someone there to help an individual disengage from the cyclical processes associated with rumination, there may be a greater tendency to engage in them, rather than successfully deal with the stressor. This was reflected by previous observations of partner support as a buffer of rumination, whereby greater support from one's spouse reduced the impact of rumination on daily mood (Puterman et al., 2010). In a study of work-related rumination, Cropley and Purvis (2003) observed a higher frequency of ruminative thoughts after work when participants were left alone by their family and friends. It has been

suggested that intimate relationships may bolster well-being by helping individuals to exit the cycle of rumination once it begins (Watson & Andrews, 2002). If one's partner withdraws, however, the individual is left to his or her own devices, reducing the likelihood of successfully disengaging from this cycle. One might imagine a particularly detrimental pattern of marital interaction whereby one spouse ruminates and the other withdraws. The current study sought to examine this pattern.

Perspectives on collaborative coping may lend well to our understanding of such maladaptive patterns of marital interaction. Research has suggested that collaborative forms of coping (defined as couples' efforts to pool resources and solve a problem jointly; Berg et al., 2008) are particularly effective strategies for couples, having demonstrated positive associations with dyadic adjustment across studies (Bodenmann et al., 2007; Coyne & Smith, 1994). For example, dyadic forms of coping involving communication, support, and joint problem-solving have been shown to predict marital quality over a two year period (Bodenmann, Pihet, & Kayser, 2006). More active spouse engagement was also related to more positive relationship evaluations in a sample of cancer patients, reflecting previous observations in husbands coping with myocardial infarction (Coyne & Smith, 1994). Further, Badr and Acitelli (2005) observed a significant association between dyadic adjustment and relationship talk (i.e., talking about the state of the relationship together) in couples dealing with chronic illness. Together, these findings underscore the importance of spouse engagement, collaboration, and taking a "we" approach during times of stress (Acitelli & Badr, 2005), to which responses of withdrawal are incongruent (Bodenmann et al., 2007).

There is evidence to suggest that traumatic extramarital experiences can impair and reduce engagement in effective coping strategies in couples (Johnson, 2002; Kramer, Ceschi,

Van der Linden, & Bodenmann, 2005). Work stress has similarly been documented for its negative impact on relationship-focused coping efforts at home (Repetti, 1989). The current study investigated these interpersonal dynamics (namely, the impact of occupational burnout on subsequent coping efforts at home) in a sample of couples in which one member was regularly exposed to traumatic forms of work stress via employment as a paramedic. It has been estimated that between one fourth and one third of paramedics show traumatic stress symptoms in the high to severe range at any given time (Alexander & Klein, 2001; Regehr, Goldberg, & Hughes, 2002), levels which are consistent with a clinical diagnosis of post-traumatic stress disorder (Regehr & Millar, 2007). Given additional qualitative evidence for the instrumental role of spouses in paramedics' coping (Regehr, 2005), this was an ideal population in which to study the interpersonal context of stress and coping. This high-stress occupation allowed for the additional examination of work-related antecedents of rumination and withdrawal.

The current study. With a principal interest in examining rumination and spouse withdrawal as they relate to extramarital stress and marital functioning, the goal of the current study was two-fold. First, contextual factors external to the dyad were examined for their impact on dyadic functioning; specifically, work-related antecedents of daily rumination and withdrawal at home in couples dealing with high levels of work stress were of interest. Both theory (Bodenmann et al., 2007) and survey data of couples (Repetti, 1989) have emphasized the importance of extramarital stress (including work stress) in dyadic adjustment and coping.

Also of interest was the extent to which daily rumination and spouse withdrawal were associated with marital tension and conflict. Tension has been identified as a marker of daily

dyadic functioning and coping effectiveness in previous longitudinal studies of couples (O'Brien et al., 2009), making it an ideal indicator of coping effectiveness on the dyadic level. In regards to coping responses, paramedics' rumination and their spouses' withdrawal were of specific interest. This facilitated an examination of the extent to which (1) individuals exposed to high levels of extramarital stress might engage in more rumination, (2) the impact of this rumination on marital tension, and (3) the impact of rumination on marital tension in the context of spouse withdrawal. The interaction between rumination and spouse withdrawal was of particular interest, given previous suggestions of a moderating role of spouse withdrawal on rumination (DeLongis et al., 2010). This further allowed for an implicit investigation of collaborative coping, to the extent that withdrawing from the relationship is indicative of a lack of collaboration, a lack of support provision, and/or a disengagement from the relationship.

It has been demonstrated that coping responses vary by situation (Folkman et al., 1986), including aspects of one's social environment (O'Brien & DeLongis, 1996). As analytical strategies have evolved, daily process methods (using an intensive longitudinal design; Bolger & Laurenceau, 2013) have proven especially useful in capturing stress and coping as a dynamic process occurring within a context (DeLongis & Holtzman, 2005). As such, the current study examined these processes using daily diary methods, obtaining repeated measures from couples over time. This approach reflects previous longitudinal studies of state rumination (Puterman et al., 2010) and interpersonal withdrawal (O'Brien & DeLongis, 1996) in couples.

Hypotheses. With regard to work-related antecedents of rumination and spouse withdrawal, it was expected that higher levels of work stress and burnout as reported by

paramedics would predict higher levels of paramedic rumination. This was based on previous studies demonstrating increased rumination and an inability to “unwind” at home resulting from high work stress (Cropley & Purvis, 2003; Kompler, Taris, & van Veldhoven, 2011; Querstret & Cropley, 2012). Given the research supporting an impact of occupational stress on marital interaction and satisfaction (Neff & Karney, 2004, 2009; Repetti, 1989; Story & Repetti, 2006), as well as evidence for increased interpersonal withdrawal following a stressful work day (Repetti, 1989), it was also hypothesized that paramedics’ work stress and burnout would predict higher levels of withdrawal for both paramedics and their spouses. These hypotheses were further supported by evidence suggesting that highly stressful extramarital experiences may impair and/or reduce engagement in effective coping strategies in couples (Kramer et al., 2005).

Regarding the daily impact of these coping responses, both paramedic rumination and spouse withdrawal were expected to exacerbate paramedics’ and spouses’ reports of marital tension. This hypothesis was based on the abundant evidence for maladaptive outcomes of rumination (Morrow & Nolen-Hoeksema, 1990; Puterman et al., 2010; Robinson & Alloy, 2003) and withdrawal (Badr & Carmack Taylor, 2008; King & DeLongis, 2013a; Piotrkowski, 1979) on both individual and dyadic levels. Of paramount interest to the current study was the interaction between paramedic rumination and spouse withdrawal. This allowed for the examination of the potential impact of spouse withdrawal on rumination in these couples, a particularly deleterious scenario outlined by DeLongis et al. (2010). It was hypothesized that on days when paramedics ruminated more, the impact on marital tension for both paramedics and spouses would be exacerbated if spouses withdrew from the relationship. This further reflects a collaborative coping perspective in which engagement

and cooperation predict better marital adjustment than disengagement (Berg et al., 2008; Bodenmann et al., 2007; Coyne & Smith, 1994).

4.1 Methods

Participants. Target participants included 87 paramedics and their cohabitating spouses. Paramedics were employed in major urban centers in Canada with an average of 15.2 years on the job ($SD = 7.7$). Of these, 82 paramedics self-identified as Caucasian, 4 as Asian, and 1 as Hispanic. The mean age of paramedics was 42.1 years ($SD = 8.3$; range = 27 – 62 years) at the time of participation, with the majority of paramedics identifying as male (71). Previous research by King and DeLongis (2013b) has identified this sample of paramedics as experiencing higher-than-average levels of depressive symptomology, post-traumatic stress, and professional burnout.

In order to test hypotheses regarding spouse effects, eligibility was contingent upon the participation of a cohabitating romantic partner or spouse during the duration of the study. Sixty-six participating couples were married, with 55 couples having at least one child living with them. Average length of relationship was 13.1 years ($SD = 8.7$), while average length of cohabitation was 11.6 years ($SD = 8.6$). Of the participating spouses, 79 self-identified as Caucasian, 5 as Asian, 2 as First Nations, and 1 as Latin American. The mean age of spouses was 41.3 years ($SD = 9.2$, range = 24 – 74 years), with the majority being female (75). In total, 72 spouses reported being employed outside the home at the time of participation (56 full-time).

In order to maintain homogeneity, only paramedics working full-time or full-time equivalent hours (minimum 4 shifts per week) were eligible to participate. In order to also maintain similar daily diary schedules, all participating paramedics were required to work

similar shift patterns at the time of participation (specifically, 4 consecutive shifts).

Participating paramedics were recruited via brochures and print advertisements at EMS stations (with the cooperation of local services) and via online media (e.g., Facebook). If interested, paramedics were directed to the project website (www.medicscope.com) where they were able to complete an eligibility application. This application asked basic questions about employment status, schedule information, and relationship status.

Cohabiting spouses and romantic partners of paramedics were invited to participate by their significant others (i.e., paramedics), and therefore received no direct advertisement. Spouse eligibility was determined according to the relevant paramedic's eligibility; thus, collective eligibility of the couple was determined prior to confirmation and subsequent direction. If deemed eligible, paramedics and spouses received e-mail instructions regarding subsequent online phases of participation. Participants' e-mail addresses served as usernames throughout the study, in order to match responses over time. Participating paramedics and their spouses each received a \$40 gift card to a local retail establishment (e.g., Starbucks). Of the 558 initial questionnaires completed by interested paramedics, only 87 met eligibility criteria. The primary reasons for study exclusion were lack of interest from spouses of interested paramedics (49%), not working four consecutive shifts during the course of the study (46%), and not being in a committed relationship and/or not having a cohabiting spouse (41%). With respect to available information on applicants who did not meet eligibility criteria, the current sample differed significantly in employment status, with only 53% of total applicants being full-time compared to 94% of the current sample ($\chi^2 = 29.4$, $p < .001$), reflecting inclusion criteria. No significant differences in certification level were observed between the current sample and those who were excluded.

Procedures and measures. All phases of participation were completed online using a secure server at the University of British Columbia. Questions were made available in online format in order to improve ease, confidentiality, and privacy of responding. Identifying information was collected only for the purpose of mailing honorariums and was not matched to participant responses.

Phase 1. Consent was first obtained for all phases of participation in the study. Following the provision of consent, participants completed a short series of online questions about basic demographic information (including age, gender, and ethnicity), length of relationship and cohabitation with partner, and education, training, and experience as a paramedic (paramedics only). At the end of this questionnaire, information was gathered as to when participants would like to be called for Phase 2 scheduling. Following completion of Phase 1, participants were contacted by phone in order to schedule the second phase of the study. This also provided participants the opportunity to ask questions about the study and develop rapport with the research team. Once scheduled and coordinated with both parties, a confirmation e-mail was sent to each participant including a link to the online daily diary questions (Phase 2) and detailed instructions regarding their completion. All research assistants conducting phone interviews were trained using the University of Michigan Survey Research Centre's protocol for interviewer training.

Phase 2. The second phase of the study followed paramedics and their spouses across a one-week period that encompassed four consecutive work shifts for the paramedic, with at least one day off work both preceding and following the work period. Paramedics answered questions three times daily: (T1) within 1 to 2 hours of waking (in reference to "the day so far"); (T2) immediately after work (in reference to their time spent at work); and (T3) before

bed (in reference to the period of time “since last entry”). Paramedics were not asked to answer any questions during working hours, in order to avoid interfering with the often sensitive nature of the job. Participants were able to opt for daily reminders via e-mail or text message. Across the four work days, 82% of paramedics completed at least nine of the twelve Phase 2 time points, with 89% completing eight of the twelve time points. Spouses completed only two diaries daily at T1 and T3, for a total of eight time points across the paramedics’ four work days. Of the participating spouses, 90% completed at least 6 time points, with 94% completing 5 of the 8 time points. Couples with paramedics having more than six missing time points, or with spouses having more than four missing time points were excluded from analyses, maintaining only couples that adhered to a 50% response rate at minimum. Diary data analyzed here are from the four-consecutive days on which paramedics were working. Diary questionnaires were brief (requiring approximately 3 to 5 minutes per time point). Measures included in the diary are described below.

Perceived stress. The four-item abbreviated version of the Perceived Stress Scale was completed by paramedics (PSS; Cohen, Kamarck, & Mermelstein, 1983) at T1 (for baseline measures) and T2. Although the original version of the PSS assesses the stressfulness of events within the past month, item wording was adjusted to address perceived stress occurring. Stress (e.g., feeling “that difficulties were piling up so high that you could not overcome them”) were rated on a scale of 0 (‘never’) to 4 (‘a lot’). Reliability and validity of the PSS have been supported in a number of studies (Cohen, Tyrrell, & Smith, 1993). Previously, the scale has been related to outcome measures of physical health and mood (Cohen et al., 1993), suggesting it is an appropriate tool for addressing the current study’s questions of interest.

Occupational burnout. Burnout represents one of the most salient maladaptive outcomes of chronic occupational stress (Schaufeli, Leiter, & Maslach, 2009). Maslach et al. (1997) argue that it is the interpersonal aspect of burnout that sets it apart from other conceptualizations of work stress. The leading model of burnout comprises three main dimensions: emotional exhaustion, depersonalization, and reduced personal accomplishment (Maslach, Jackson, & Leiter, 1997).

In order to capture fluctuations in paramedics' burnout over the four day period, a daily measure of burnout was derived from the Maslach Burnout Inventory – Human Services Survey (MBI-HSS; Maslach, Jackson, & Leiter, 1996) and included at T2. Based on the magnitude of their factor loadings in previous studies (Gil-Monte, 2005; Worley, Vassar, Wheeler, & Barnes, 2008), three items were identified as being reliable indicators of burnout, including two items measuring emotional exhaustion (“I feel burned out from my work” and “I feel like I’m at the end of my rope”) and one item measuring depersonalization (“I’ve become more callous towards people”). This further reflects a general trend in the literature to place primacy on these two aspects of burnout (Worley et al., 2008). Items were reworded for their use in a daily diary format. The original rating scale of 0 (‘not at all’) to 6 (‘all of the time’) was maintained as an indicator of the frequency of feelings of burnout during the referenced period of time. Previous research, although limited, has supported the predictive value of daily burnout variability in key outcomes related to the home and family context (Haar, Roche, & Ten Brummelhuis, 2011).

Coping. At T3, both paramedics and spouses were asked to indicate the extent to which they engaged in rumination and interpersonal withdrawal in response to “the most bothersome event or problem,” reflecting previous daily diary methodology employed by

DeLongis et al. (2004) to examine coping responses employed by couples in the home setting. State rumination was measured using three items from the previously validated Rumination-Reflection Questionnaire (RRQ; Trapnell & Campbell, 1999), derived based on the magnitude of factor loadings from factor analyses by Trapnell and Campbell (1999) and reworded slightly for appropriate temporal references. The final three items included (1) “ruminated or dwelled on things that happened,” (2) “often played back in my mind how I acted in the situation,” and (3) “rehashed in my mind the things I said or did.” Interpersonal withdrawal was measured using the interpersonal withdrawal subscale from the Brief Ways of Coping Inventory (Lee-Bagley et al., 2005). These items referenced the extent to which participants (1) “withdrew from the other person(s) involved,” (2) “gave the other person(s) involved the ‘silent treatment’,” and (3) “sulked.” All items measuring rumination and withdrawal were rated on a scale of 1 (‘not at all’) to 3 (‘a lot’), with higher scores representing a higher degree of engagement in each response.

Marital tension. Based on previous daily diary research in married couples (Bolger et al., 1989), marital tension was assessed twice daily (once at T1 for daily baseline measures and once at T3) as a marker of daily dyadic functioning. Paramedics and their spouses were asked, “How much tension or conflict has there been with your spouse/romantic partner?” Participants responded on a 5-point Likert scale ranging from 1 (“none”) to 4 (“a lot”). Similar single-item measures have proven valid and reliable indicators of marital tension in daily process studies of dyads (Bolger, Stadler, Paprocki, & DeLongis, 2010).

Data analyses. Hypotheses were tested using hierarchical linear modeling (HLM) software (v6.0; Raudenbush, Bryk, Cheong, & Congdon, 2004), with daily measures nested within couples over time. Using HLM, within-couple variation is modeled at Level 1 and

between-couple variation is modeled at Level 2, allowing for simultaneous examination of both sources of variance. A two-intercept approach incorporating actor and partner effects was utilized (with random intercepts and slopes), in order to better control for the natural non-independence of the data (Cook & Kenny, 2005). All Level 1 predictor variables were grand-mean centered in order to preserve the variance due to the dyad. Centering improves the interpretability of the intercepts in order to reflect the average response of each couple. These decisions were made according to recommendations by Kenny, Kashy, and Cook (2006) for modeling dyadic data involving couples. Partner effects were included for paramedics' burnout, where a variable was created in which paramedics' burnout scores were entered for their respective spouses. Interaction terms were calculated for both paramedics and spouses by multiplying Level 1 variables of interest (i.e., paramedic rumination and spouse withdrawal) and including them in subsequent analyses.

Where T3 marital tension was the outcome variable of interest, T1 reports of marital tension were included as controls. Given the disproportionate number of paramedics who were female (and likewise, spouses who were male), paramedic gender and spouse gender were also entered at Level 2 as controls. All models were also run controlling for shift work (coded 1 for day shift and 2 for night shift) at Level 1 and both length of relationship and length of cohabitation at Level 2. These latter variables were dropped from analyses due to lack of significant effects.

Regarding power in HLM, Kenny et al. (2006) note that of the studies examining both members of dyads (to date), the median number of dyads is 101, with as few as 25 in some studies. In order to have sufficient power to accurately approximate consequential non-independence of dyadic data, they recommend having a minimum of 44 dyads when running

two-tailed tests of between-dyad effects of independent variables (at an alpha of .05). Nevertheless, it has been suggested that even when non-independence cannot be detected (by means of correlations among dyad members' responses), the safest course of action is to assume non-independence in dyadic research. Kenny et al. (2006) add that increasing the number of repeated measures in a study of dyads further improves power and significantly reduces the likelihood of committing Type II error. Kenny and Cook (1999) had previously noted that power is better preserved when both members of a couple are examined together in the same analyses. This was accomplished in the current analyses by incorporating both actor and partner effects.

4.2 Results

Descriptive statistics are first presented for all daily measures (Table 4.1). Alphas indicated good internal reliability for all daily diary measures, particularly rumination and withdrawal, supporting decisions regarding reduced item pools for use in a daily format. According to *t*-tests, spouses reported significantly higher levels of T3 rumination and interpersonal withdrawal. Bivariate correlations among daily measures (see Table 4.2) revealed a high correlation between paramedics' T1 perceived stress and T2 perceived stress ($r = .63$). Significant correlations were also observed between T1 and T3 marital tension for both paramedics and spouses ($r_s = .28$ and $.37$, respectively), supporting the inclusion of T1 reports of marital tension as control variables in models predicting T3 marital tension. A very high correlation ($r = .77$) was also observed between T3 rumination and T3 interpersonal withdrawal for paramedics (compared to $r = .22$ for spouses).

First, in order to test the hypothesis that paramedics' T2 perceived stress and burnout would predict T3 rumination and withdrawal for paramedics and spouses, a general model of work-to-home transmission was tested:

$$\text{T3 coping response}_{ti} = \text{medic} [\beta_{1ip}] + \text{spouse} [\beta_{2is}] + \beta_{3ip} (\text{paramedic's T2 negative perceived stress})_{ti} + \beta_{4is} (\text{partner effect of paramedic's T2 perceived stress})_{ti} + \beta_{5ip} (\text{paramedic's T2 burnout})_{ti} + \beta_{6is} (\text{partner effect of paramedic's T2 burnout})_{ti} + r_{ti}$$

where $\text{T3 coping response}_{ti}$ is either T3 rumination or T3 withdrawal at time point t for couple i ; medic is a dummy indicator which is 1 for all paramedics and 0 for all spouses; spouse is a dummy indicator which is 1 for all spouses and 0 for all paramedics; β_{1ip} is the intercept for paramedics and β_{2is} is the intercept for spouses; $(\text{paramedic's T2 perceived stress})_{ti}$ is the paramedic's T2 perceived stress at time point t for couple i ; β_{3ip} is the relationship between paramedic's T2 perceived stress and paramedic's T3 coping response; $(\text{partner effect of paramedic's T2 perceived stress})_{ti}$ is the partner effect of paramedic's T2 perceived stress at time point t for couple i , where paramedic's T2 perceived stress scores are entered for the spouse; β_{4is} is the relationship between paramedic's T2 perceived stress and spouse's T3 coping response; $(\text{paramedic's T2 burnout})_{ti}$ is the paramedic's T2 burnout at time point t for couple i ; β_{5ip} is the relationship between paramedic's T2 burnout paramedic's T3 coping response; $(\text{partner effect of paramedic's T2 burnout})_{ti}$ is the partner effect of paramedic's T2 burnout at time point t for couple i , where paramedic's T2 burnout scores are entered for the spouse; β_{6is} is the relationship between paramedic's T2 burnout and spouse's T3 coping response; and r_{ti} is the within-couple error.

Results from these multilevel models are presented in Table 4.3. Paramedics' T2 perceived stress at work demonstrated a significant and positive association with T3

rumination, suggesting that rumination increased for paramedics on days with greater work stress. T2 burnout did not impact T3 rumination for paramedics, nor did paramedics' T2 work measures have any impact on spouses' T3 rumination. Regarding models of interpersonal withdrawal, paramedics' T2 perceived stress at work was associated with increased T3 withdrawal, while T2 burnout had no such effect. In contrast, T2 burnout as reported by paramedics did demonstrate a significant and positive association with spouses' T3 withdrawal, while paramedics' T2 perceived stress was non-significant for spouses.

Second, in order to examine the association between coping responses and marital tension for both paramedics and spouses, as well as the interaction between paramedic rumination and spouse withdrawal, the following model was tested:

$$T3 \text{ marital tension}_{ti} = \text{medic} [\beta_{1ip}] + \text{spouse} [\beta_{2is}] + \beta_{3ip} (\text{paramedic's T1 marital tension})_{ti} + \beta_{4is} (\text{spouse's T1 marital tension})_{ti} + \beta_{5ip} (\text{paramedic's T3 rumination})_{ti} + \beta_{6is} (\text{partner effect of paramedic's T3 rumination})_{ti} + \beta_{7ip} (\text{spouse's T3 withdrawal})_{ti} + \beta_{8is} (\text{partner effect of spouse's T3 withdrawal})_{ti} + \beta_{9ip} (\text{actor effect of paramedic rumination x spouse withdrawal})_{ti} + \beta_{10is} (\text{partner effect of paramedic rumination x spouse withdrawal})_{ti} + r_{ti}$$

where $T3 \text{ marital tension}_{ti}$ is marital tension at time point t for couple i ; (medic) is a dummy indicator which is 1 for all paramedics and 0 for all spouses; (spouse) is a dummy indicator which is 1 for all spouses and 0 for all paramedics; β_{1ip} is the intercept for paramedics and β_{2is} is the intercept for spouses; β_{3ip} , β_{5ip} , β_{7ip} are the relationships between paramedic's T3 marital tension and paramedic's T1 marital tension, paramedic's T3 rumination, and spouse's T3 withdrawal, respectively; β_{4ip} , β_{6ip} , β_{8ip} are the relationships between spouse's T3 marital tension and spouse's T1 marital tension, paramedic's T3

rumination, and spouse's T3 withdrawal, respectively; (actor effect of paramedic rumination x spouse withdrawal) $_{ti}$ is the paramedic effect of the interaction between paramedic rumination and spouse withdrawal; β_{9ip} is the relationship between this interaction and paramedic's T3 marital tension; (partner effect of paramedic rumination x spouse withdrawal) $_{ti}$ is the spouse effect of the interaction between paramedic rumination and spouse withdrawal; β_{10is} is the relationship between this interaction and spouse's T3 marital tension; and r_{ti} is the within-couple error. Results from these models are presented in Table 4.4.

Controlling for reports of T1 marital tension, paramedics' T3 rumination displayed significant and positive associations with both paramedics' and spouses' T3 marital tension. T3 marital tension was similarly associated with spouses' T3 interpersonal withdrawal for spouses, but not for paramedics. Although cross-spousal effects were observed with rumination, regression coefficients and significance levels indicated particularly strong within-person effects; that is, paramedics' rumination accounted for a particularly high degree of variance in paramedics' marital tension.

In regards to the interaction between paramedics' rumination and spouses' withdrawal, this effect was significant at $p < .01$ for both paramedics and spouses. Paramedics' burnout interacted significantly with spouses' withdrawal to predict increases in both paramedics' and spouses' T3 marital tension. In order to interpret these interactions, tests of simple slopes were calculated based on procedures outlined by Aiken and West (1991). Points were plotted according to high (+1 SD) and low (-1 SD) levels of paramedics' rumination and spouses' withdrawal, predicting T3 marital tension for paramedics (see Figure 4.1) and T3 marital tension for spouses (see Figure 4.2). At higher levels of spouses' withdrawal, the association between paramedics' rumination and paramedics' T3 marital

tension appeared to be exacerbated, although paramedics' rumination predicted significant increases in T3 marital tension at both levels of spouse withdrawal. Paramedics' rumination also predicted significant increases in spouses' T3 marital tension when spouses' withdrawal was high. No significant relationship was observed between paramedics' rumination and spouses' T3 marital tension when spouses' withdrawal was low, although there appeared to be a slight (non-significant) increase in T3 marital tension over time.

4.3 Discussion

The purpose of the current study was to examine the role of work stress and burnout in both dyadic coping and marital tension among couples. Multilevel analyses offered support for the first hypothesis regarding the impact of work stress and burnout on coping responses in the home. Paramedics' perceived stress at work predicted subsequent increases in their own levels of rumination and interpersonal withdrawal at home. In the current sample, work stress was operationalized as the *perception* of stress and can therefore be interpreted as a relatively intrapersonal construct. This might explain why an impact on paramedics' rumination was observed, which has also been described as self-focused and intrapsychic (DeLongis et al., 2010), but not on spouses' coping.

Although paramedics' reports of work stress were not associated with spouses' subsequent reports of rumination, paramedics' burnout at work was associated with subsequent increases in interpersonal withdrawal, but not rumination, among their spouses. Maslach et al. (1997) have argued that burnout is associated with an impairment or depletion of social resources. Findings are consistent with this in that spouses appear to pick up on the paramedic's disengagement and need for interpersonal space, and so they withdraw. Burnout may be one potential pathway through which work stress crosses over to the spouse and

impacts dyadic functioning and coping. Dierdorff and Ellington (2008) suggested that jobs of a highly interdependent nature (i.e., characterized by greater reliance on and responsibility for others) are more likely to experience conflict and interference between work and home settings, further supporting this conclusion.

At the bivariate level, paramedics' and spouses' reports of rumination and withdrawal correlated positively, as did paramedics' own rumination and withdrawal. As suggested by DeLongis et al. (2010), rumination and withdrawal can be conceptualized as components of a vicious cycle, in which rumination leads to greater withdrawal and continuing engagement in passive coping responses. Such a vicious cycle may be explaining these correlations; that is, a high correlation may have been observed between rumination and withdrawal because they are exacerbating one another, with rumination leading to negative affect, which in turn allows for further rumination and withdrawal (DeLongis et al., 2010). Given that cross-spousal relationships were also observed amongst these variables, a similar feedback loop may be occurring at the dyadic level, in that spouses may be responding to their partners' rumination by withdrawing, exacerbating the rumination and leading to additional withdrawal. Although the current study was not able to determine such causality, future studies should investigate these dyadic processes in greater detail, as well as determine if such relationships exist in other populations.

In the analysis of marital tension as an indicator of coping effectiveness, hypotheses were well supported. Paramedics' rumination had a strong effect on their own reports of marital tension, while spouses' withdrawal similarly led to increases in their own marital tension over time. Paramedics' rumination also demonstrated an association (albeit weaker) with spouses' reports of marital tension, depicting rumination as a particularly deleterious

pattern of responding on the dyadic level, at least in terms of tension. That is, rumination by one spouse appears to impact the dyad as a unit, affecting both partners' perceptions of marital tension. Collectively, these findings are consistent with previous evidence for maladaptive outcomes of rumination (Morrow & Nolen-Hoeksema, 1990; Puterman et al., 2010; Robinson & Alloy, 2003) and withdrawal (Badr, Acitelli, & Taylor, 2008; King & DeLongis, 2013a; Piotrkowski, 1979).

An examination of the interaction between rumination and spouse withdrawal revealed a significant effect for both paramedics and their spouses, supporting hypotheses. Findings here suggest that paramedics' rumination was associated with increases in marital tension, yet this effect was attenuated on days when their spouses withdrew less from the relationship. This is consistent with the moderating role of spouse withdrawal on rumination proposed by DeLongis et al. (2010); specifically, that the withdrawal of one's spouse may allow rumination to continue uninterrupted, worsening as a result. It further supports models of collaborative coping (e.g., Acitelli & Badr, 2005; Badr & Acitelli, 2005; Berg et al., 2008) which have argued for the importance of couples to not disengage and withdraw from the relationship during times of stress. The same conclusion can be drawn for the current sample of spouses, whose reports of marital tension were similarly exacerbated by their partners' rumination when they engaged in more interpersonal withdrawal. When they withdrew less, however, their partners' rumination had no significant impact on their marital tension. Again, the value of a collaborative response to stress is bolstered, as disengagement from the relationship appears to be particularly detrimental to both members of the dyad. Whether this is via lack of support provision or reduced joint problem-solving (or both) should be of interest to future research. As suggested by DeLongis et al. (2010), the presence of a

supportive other with whom one can discuss his/her problems may facilitate resolution. Nevertheless, it can be inferred from the current analyses that relationship engagement and taking a “we” approach during stressful events is a more effective response for couples than disengagement, even when one spouse’s work environment is defined by abnormally high levels of stress. This reflects the larger literature on dyadic coping that has shown positive associations between collaboration and marital adjustment (Badr & Acitelli, 2005; Berg et al., 2008; Bodenmann et al., 2007; Coyne & Smith, 1994).

Generalizability of the current findings may be limited to individuals working in emergency, human service, or health-related occupations. Although paramedic and spouse reports were limited by their self-report nature, obtaining repeated measures close to their real-time occurrence helped to reduce potential retrospective contamination (Tennen, Affleck, Coyne, Larsen, & DeLongis, 2006). In interpreting the observed differences between paramedic and spouse reports of withdrawal and rumination, as well as differences in antecedents and outcomes of coping, it is important to consider the gender composition of the paramedics (82% male) and spouses (86% female) in the current sample. Differences in response patterns (e.g., higher reports of end-of-day rumination and withdrawal among spouses) may be due to differences between husbands and wives or, more generally, between men and women.

A strength of this study was its examination of both members of the dyad. This allowed us to account for greater variance at within- and between-couple levels, better approximating these processes within an interpersonal context. The current findings help to explain contextual factors related to two particularly maladaptive coping responses, rumination and interpersonal withdrawal. In addition to documenting extramarital

antecedents (i.e., stress and burnout at work) of these coping responses, evidence has been offered for an interaction between partners' responses, whereby one spouse's withdrawal appears to exacerbate the impact of the partner's rumination on the dyad. Future research should examine the interaction of other potentially maladaptive coping strategies (e.g., confrontation) on markers of dyadic adjustment, including but not limited to marital tension and satisfaction.

Table 4.1

Means, Standard Deviations, Internal Consistency Estimates (Cronbach's α), and Paired t -Tests (2-tailed) for All Daily Measures

Variable	Paramedics		Spouses		α	p
	M	SD	M	SD		
T1 Perceived Stress	1.10	.74	---	---	.65	---
T1 Marital Tension	2.06	.61	1.99	.50	---	.059
T2 Perceived Stress	.96	.70	---	---	.67	---
T2 Burnout	1.36	1.23	---	---	.79	---
T3 Rumination	.94	.79	1.24	.69	.92	.000
T3 Withdrawal	.80	.67	1.05	.57	.88	.000
T3 Marital Tension	2.15	.87	2.21	.79	---	.323

Note. Means are reflective of paramedics' four consecutive work days. Where measures consisted of multiple items, scores were averaged across items for ease of comparison.

Table 4.2*Bivariate Correlations among Daily Measures (Paramedics and Spouses)*

	2	3	4	5	6	7	8	9	10	11
<i>Paramedic Measures</i>										
1. T1_PS	.31**	.63**	.33**	.26**	.22**	.21**	.19**	.16**	.06	.16**
2. T1_MT	---	.10	.00	.24**	.29**	.28**	.30**	.18**	.20**	.24**
3. T2_PS		---	.38**	.21**	.19**	.17**	.16**	.17**	.06	.15*
4. T2_OB			---	.11	.10	.00	.15*	.08	.12*	.24**
5. T3_RM				---	.77**	.46**	.27**	.04	.22**	.31**
6. T3_WD					---	.50**	.28**	.12**	.22**	.30**
7. T3_MT						---	.40**	.07	.13**	.24**
<i>Spouse Measures</i>										
8. T1_MT							---	.14**	.28**	.37**
9. T3_RM								---	.22**	.23**
10. T3_WD									---	.73**
11. T3_MT										---

Note. PS = perceived stress; MT = marital tension; OB = occupational burnout; RM = rumination; WD = interpersonal withdrawal.

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

Table 4.3

Standardized Regression Coefficients from Multilevel Analyses predicting T3 Rumination and Interpersonal Withdrawal from Paramedic's T2 Perceived Stress and Burnout at Work

Independent Variable	Paramedic Effects	Spouse Effects
<i>Predicting T3 Rumination</i>		
Intercept	$\beta = .93^{**}$ (SE = .33)	$\beta = 1.17^{***}$ (SE = .17)
T2 Paramedic Perceived Stress	$\beta = .24^{**}$ (SE = .08)	$\beta = -.02$ (SE = .05)
T2 Paramedic Burnout	$\beta = .01$ (SE = .05)	$\beta = .05$ (SE = .04)
<i>Predicting T3 Interpersonal Withdrawal</i>		
Intercept	$\beta = 1.02^{**}$ (SE = .33)	$\beta = 1.06^{***}$ (SE = .15)
T2 Paramedic Perceived Stress	$\beta = .15^*$ (SE = .08)	$\beta = .07$ (SE = .06)
T2 Paramedic Burnout	$\beta = .01$ (SE = .04)	$\beta = .09^{**}$ (SE = .03)

Note. SE = Robust standard error. All models controlled for paramedic gender and spouse gender at Level 2.

* $p < .05$; ** $p < .01$; *** $p < .001$

Table 4.4*Standardized Regression Coefficients from Multilevel Analyses predicting T3 Marital**Tension for Paramedics and Spouses*

Predicting T3 Marital Tension

Independent Variable	Paramedic Effects	Spouse Effects
Intercept	$\beta = 2.43^{***}$ (SE = .20)	$\beta = 2.35^{***}$ (SE = .12)
T1 Marital Tension	$\beta = .09$ (SE = .10)	$\beta = .26^{**}$ (SE = .08)
T3 Paramedic Rumination	$\beta = .41^{***}$ (SE = .06)	$\beta = .16^{**}$ (SE = .06)
T3 Spouse Withdrawal	$\beta = .14$ (SE = .08)	$\beta = .47^{***}$ (SE = .09)
T3 Paramedic Rumination x Spouse Withdrawal	$\beta = .18^*$ (SE = .08)	$\beta = .26^{**}$ (SE = .10)

Note. SE = Robust standard error. All models controlled for paramedic gender and spouse gender at Level 2.

* $p < .05$; ** $p < .01$; *** $p < .001$

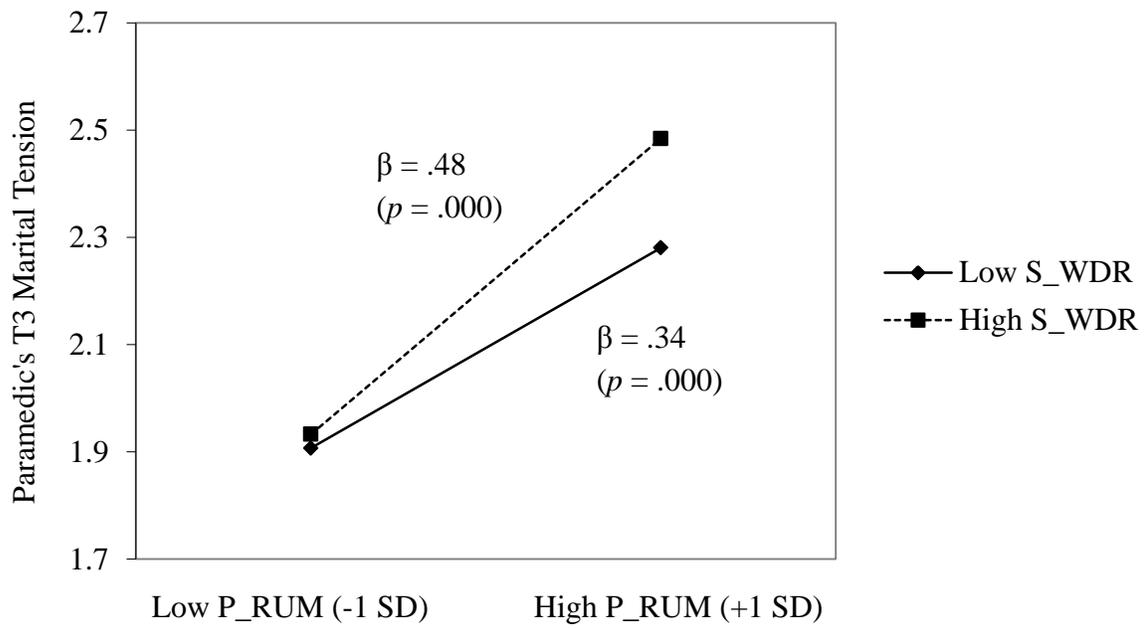


Figure 4.1. Interaction between paramedics' T3 rumination (P_RUM) and spouses' T3 withdrawal (S_WDR) predicting paramedics' T3 marital tension.

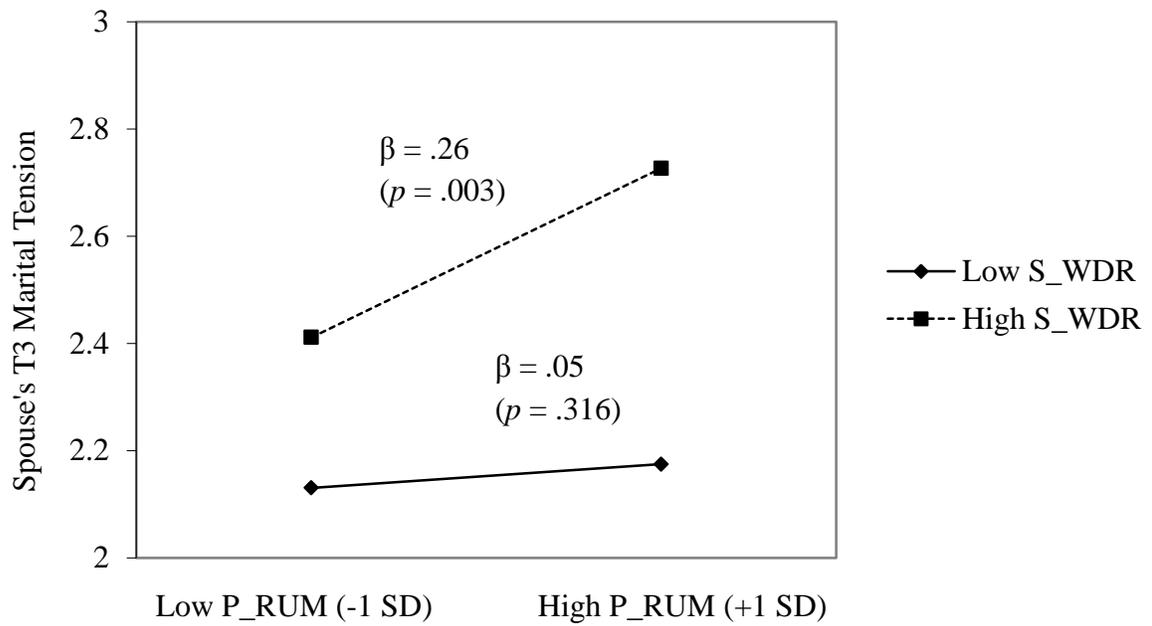


Figure 4.2. Interaction between paramedics' T3 rumination (P_RUM) and spouses' T3 withdrawal (S_WDR) predicting spouses' T3 marital tension.

CHAPTER 5: General Discussion

The current body of research investigated stress transmission and contagion effects in a sample of paramedics and their spouses. Such effects were observed across three studies examining the impact of occupational stress and burnout experienced by paramedics on markers of individual adjustment and dyadic functioning for both members of the couple. Study 1 identified paramedics as experiencing high levels of depressive symptoms, post-traumatic stress, and burnout. Previous qualitative evidence for daily stress transmission to the home setting was also supported, whereby work stress, negative affect, and burnout predicted subsequent outcomes at home for both partners. Study 2 examined the impact on dyadic functioning (as moderated by neuroticism), demonstrating significant predictive value of paramedics' burnout in subsequent marital tension in the home. Lastly, Study 3 provided evidence for an impact of work stress and burnout on coping in the home setting. Higher levels of occupational stress predicted increased engagement in maladaptive coping responses (namely, rumination and interpersonal withdrawal), which in turn interacted to exacerbate marital tension.

Together, these findings help to explain the intricacies of stress transmission and contagion in couples dealing with high levels of stress, underscoring the highly interdependent and consequential nature of intimate relationships during stressful times. This research further highlights the importance of examining the larger social context in studies of stress and coping, identifying a number of ways in which daily stress processes unfold and interact to predict outcomes on both individual and dyadic levels.

In this discussion, I will first offer an integrative summary of the studies contained herein. Subsequently, I will discuss implications of this research, first in relation to the

population at hand (i.e., paramedics and their spouses) and more generally in terms of married couples and dyads. Finally, I will review strengths and limitations of the research and offer suggestions for future lines of inquiry.

5.1 Summary of Research Findings

Given that previous research has identified paramedics as experiencing high levels of burnout, post-traumatic stress, and related symptoms (Alexander & Klein, 2001; Patterson et al., 2005; Regehr, 2005; Regehr, Goldberg, & Hughes, 2002; Regehr & Miller, 2007; Saunders, 2004), it was first important to establish the stress-related psychological adjustment of the population at hand. From a purely descriptive perspective, Study 1 confirmed what might be best described as clinically relevant symptoms of chronic work stress in the current sample of paramedics. Specifically, approximately half of participating paramedics reported clinically significant levels of depressive symptomology. Furthermore, nearly one third were likely to meet the diagnostic criteria for PTSD at the time of study involvement, reflecting previous reports that between one fourth and one third of paramedics report trauma symptoms in the high to severe range (Alexander & Klein, 2001; Regehr, 2005).

According to criteria by Maslach et al. (1996), an alarming 74% of the current paramedics also reported one or more symptoms of burnout in the high range, with 47% reporting high burnout on at least two subscales of the Maslach Burnout Inventory. Depersonalization emerged as the most highly rated component of burnout (67%), indicating that the majority of these full-time or full-time equivalent paramedics are struggling to engage personally and emotionally with their patients. Half of paramedics also reported high levels of emotional exhaustion on the MBI, underscoring the potential emotional impact of

occupational stress. When compared to normative data from a group of nurses and physicians, the current sample scored significantly higher on both emotional exhaustion and depersonalization, suggesting that the job of a paramedic is especially prone to feelings of burnout. Previous research has defined the work setting of paramedics as characteristically low in both control and support (Regehr & Millar, 2007). Indeed, compared to nurses and physicians who work in more controlled settings (i.e., hospitals) with multiple support staff, the lack of tangible support and control experienced by paramedics is great. These factors have likely contributed to the observed normative differences, highlighting the need for data specific to paramedics and EMTs. Current data support previous claims that paramedics experience levels of stress uncharacteristic of other professions. Although the current study did not examine causal antecedents of burnout, depressive symptoms, and post-traumatic stress, it is reasonable to suspect that features and responsibilities unique to the job are implicated to some degree. Such findings should raise concern regarding the long-term impact of an occupation that is indispensable to pre-hospital care and emergency services more broadly.

A closer examination of day-to-day stress processes offered several insights into the underlying mechanisms of these observations. Across studies, the daily work stress and burnout reported by paramedics predicted important outcomes in the home setting for both paramedics and their spouses. In support of basic mood transmission, paramedics' negative affect at work predicted increases in their subsequent negative affect and perceived stress at home. Stress transmission was also observed by means of a positive association between work-related stress and subsequent stress in the home setting. Lastly, work-related burnout led to increases in both negative affect and perceived stress at home for paramedics. These

findings indicate multiple pathways through which stress at work may spill over into the home setting, reflecting the stress spillover research more generally (Larson & Almeida, 1999) and confirming qualitative reports of stress transmission in this population (Patterson et al., 2005; Regehr, 2005; Regehr, Goldberg, & Hughes, 2002). Yet the impact of work stress did not end there, extending to subsequent coping responses in the home. On days when they reported more work-related stress, paramedics also reported more rumination and interpersonal withdrawal at home, responses shown to further exacerbate marital tension in Study 3. These findings are in line with previous evidence for an impact of occupational stress on marital processes (e.g., Brock & Lawrence, 2008; Edge, 2008; Karney et al., 2005; Neff & Karney, 2004, 2009; Repetti, 1989; Story & Repetti, 2006).

Additional support for a relational impact of paramedics' work stress was acquired by reports of similar outcomes for participating spouses. Significant crossover effects were observed with paramedics' work-related mood, in that paramedics' negative affect at work predicted subsequent increases in the perceived stress of their spouses. At the dyadic level, spouses also appear to be at risk of experiencing greater stress as the result of paramedics' work-related experiences. More generally, these findings support the transmission of stress and negative affect between members of a family unit (Larson & Almeida, 1999). Although Study 2 did not reveal a direct impact of paramedics' burnout on their own reports of marital tension, such burnout was associated with increases in perceptions of marital tension for their spouses. These results may indicate a differential impact of burnout on partners, in so much that an interpersonal impact (via marital tension) appears to occur for spouses but not targets. As discussed in Chapter 3, it is possible that on days when paramedics are more burned out, spouses must compensate for their partners' exhaustion by engaging in more responsibilities

in the home, and this in turn may lead to spouses of paramedics experiencing more marital tension. Indeed, previous research has reported these types of compensatory behaviours at home as the result of spouses' increased work stress (Bolger, DeLongis, Kessler, & Wethington, 1989). Combined with these compensatory behaviours, additional methods of support provision on the part of the spouse may allow the paramedic to disengage socially and escape opportunities for conflict. Findings from Study 3, however, suggest that spouses are also more likely to withdraw from the relationship on days when paramedics are more burned out, which appears to further impact marital tension for both partners.

The confluence of findings across studies offers substantial support for stress transmission and contagion in couples. Higher stress and burnout at work contributed to higher rates of stress, negative affect, rumination, and withdrawal for paramedics at home, indicating poor psychological adjustment for paramedics as the result of work-related experiences. Spouses of paramedics also felt the burn, although on a more interpersonal level. In addition to an observed association between paramedics' work-related affect and spouses' subsequent stress, burnout reported by paramedics impaired dyadic functioning via increased marital tension and interpersonal withdrawal for spouses. Paramedics' tendency to ruminate as a result of their work stress was also associated with increased withdrawal for spouses, suggesting additional pathways through which work stress may impact daily dyadic functioning.

Study 3 further revealed significant interactions between paramedics' rumination and spouses' withdrawal in the home setting, in so much that spouse withdrawal worsened the impact of paramedic rumination on marital tension for both paramedics and spouses. Although causal links to the work setting per se cannot be established, it is important to

consider these findings in light of the observation that paramedics' reports of work stress and burnout led to increased engagement in these maladaptive responses. Paramedics' neuroticism was also found to impact the relationship between burnout at work and paramedics' reports of marital tension at home. Although main effects did not reveal an association between paramedic burnout and marital tension over time, higher burnout was associated with a significant drop in paramedics' marital tension for those paramedics low on neuroticism. As noted in Chapter 3, this may be due to reduced social resources (originating from the work setting) that result in the avoidance of negative interactions at home. Alternatively, paramedics lower in neuroticism may be able to more effectively seek out and obtain support from their spouses, reducing perceptions of marital tension as a result. That higher neuroticism may interfere with these adaptive interpersonal processes is worth noting, and further supports findings that those high in neuroticism cope less effectively with stress (Connor-Smith & Flachsbart, 2007; O'Brien & DeLongis, 1996). These findings more generally highlight the importance of examining personality in studies of daily stress and coping processes, in line with models that conceptualize stress and coping as unfolding from a dynamic interplay of person and situation (DeLongis & Gruen, 1986; DeLongis & O'Brien, 1990; Folkman et al., 1986; Lazarus & Folkman, 1984).

Collectively, the findings presented here indicate complex interactions among person-level and couple-level processes that occur across contexts to predict psychological adjustment. Findings also speak to the importance of examining daily markers of adjustment at both individual and dyadic levels. A number of implications can be drawn for paramedics and EMTs specifically, as well as couples and dyads more broadly.

5.2 Implications

As previously noted, paramedics play an essential role in Canadian health services (Martin-Misener et al., 2009), and the demand for paramedics is growing, with many regions experiencing a shortage (Service Canada, 2011). Yet, this research identifies and confirms paramedics as a subgroup of the population at particularly high risk of depression, PTSD, and burnout.

At this juncture, it may be helpful to consider the position of paramedics in the long chain of healthcare services. In addition to the transport of patients to hospitals, paramedics are also responsible for advanced forms of life support prior to patient off-load. These may include first aid, intravenous therapy, medication administration, cardiopulmonary resuscitation (CPR), and psychiatric management. Although firefighters in Canada also respond to many 911 calls involving injury, illness, and physical distress, their protocols do not extend beyond physical rescue, extrication, and basic first aid and CPR. Such services occur while awaiting the arrival of paramedics, who subsequently “take over” and engage in more advanced life support procedures. During patient care responsibilities, paramedics must also coordinate with 911 dispatchers, local police, and hospital staff, all the while facing a heightened risk of infectious disease, violence, and assault (Beaton, Murphy, Johnson, Pike, & Corneil, 1998; Regehr, Goldberg, & Hughes, 2002). As previously highlighted by Regehr and Miller (2007), the work environment of Canadian paramedics is characterized by high demand, low control, and low support from supervisors and coworkers, a combination of factors shown to exacerbate occupational stress (Karasek & Theorell, 1990). It is worth noting, however, that low control is an intrinsic aspect of this job; that is, the work setting of paramedics is highly unpredictable and ever-shifting, encompassing private homes,

businesses, public spaces, and outdoor locations in diverse environments and neighbourhoods. Call volume also varies widely, and in most instances, lunches and breaks must be taken whenever possible, adding to the unpredictability and lack of control on the job.

Nevertheless, the high demand nature of the job could be attenuated by increases in funding and staffing. Although the high demand nature of patient care is somewhat intrinsic to the job (and therefore unavoidable), on-the-job support and high demand by means of high call volume are two organizational factors that could be improved. In light of these issues, and in consideration of previous surveys documenting high turn-over rates due to burnout in this population (Patterson et al., 2005), the current findings underscore the importance of minimizing demand and maximizing support – not only for the well-being of individuals employed as paramedics, but also for the maintenance of pre-hospital care services more generally. Paramedics are, quite literally, at the front of the front-line health service, yet their own health is being threatened on a regular basis. Hypothetically, a reduction in demand along with increased support from management would likely improve not only employee retention but also the well-being of paramedics and their families. The findings presented in this dissertation highlight the potential impact of the job on individual health and well-being, and by extension, beg that organizational aspects of the job be reconsidered and improved where possible. Possible solutions include increased staffing to reduce daily demands and work load, mandatory debriefing services following traumatic or high-stress calls, and/or more supportive performance evaluations for purposes of quality assurance.

This research also reveals the potential impact of these occupational features on factors external to the workplace, namely psychological adjustment and relationship

functioning at home. In addition to potential outcomes for employee retention and the quality of pre-hospital care in Canada, the negative effects on individual paramedics appear to be far-reaching, with increased levels of work stress and burnout leading to heightened stress, negative affect, and marital tension at home. Perhaps most notably, burnout is interfering with paramedics' ability to engage in effective coping strategies once they leave work. This appears to further aggravate marital tension for both paramedics and their spouses on a day-to-day basis, potentially contributing to long-term impairments in marital adjustment and satisfaction. The subsequent impact on other individuals in the home, such as children of paramedics, is currently unknown but also worth considering. Across studies, work-related factors reported by paramedics predicted changes in spouses' own perceived stress, marital tension, and interpersonal withdrawal. Not only does this underscore the potential deleterious nature of the job, but it also begs for greater attention to such psychosocial processes on the part of EMS organizations. Although some debriefing services are in place for paramedics, the breadth of these services should be reexamined, not only for the health and well-being of employees, but also that of their spouses and families. Indeed, the occupational burnout experienced by paramedics appears to be particularly harmful to dyadic functioning according to the current set of analyses. Efforts should be made to more effectively buffer the impact of burnout, individual or otherwise, which may be contributing to the abnormally high levels of depressive symptoms and post-traumatic stress observed in this sample. Without question, a 29% incidence rate of PTSD symptoms should be cause for alarm.

Although generalizability may be limited, a number of implications for dyadic functioning and marital adjustment exist. These findings confirm the transmission of mood and stress across settings and between individuals, further implicating the transmission of

work-related burnout. In fact, daily burnout surfaced as the most consistent predictor of stress-related outcomes for spouses of paramedics in the current sample. To be precise, paramedics' burnout was associated with subsequent increases in marital tension and interpersonal withdrawal for their spouses. These results implicate burnout as a particularly salient route of stress contagion in couples, further supporting the examination of daily fluctuations in burnout. Such an interpretation reflects the conceptualization of burnout as involving an impairment or depletion of social resources (Maslach et al., 1997). Individuals who are more burned out at work may have a diminished capacity to engage interpersonally at home, thereby impairing adjustment on the dyadic level. As a phenomenon that unfolds as the result of chronic stress and interpersonal strain at work (Maslach et al., 1997), burnout appears to be an important factor in understanding how extramarital stress may affect the daily functioning of relationships and the interactions of couples at home.

Current findings also suggest that the examination of individuals' coping responses in isolation is insufficient when explaining outcomes on the dyadic level. Supporting previous studies that have documented the importance of a spouse's response to one's coping effectiveness (Holtzman et al., 2004; Holtzman & DeLongis, 2007), it was observed in Study 3 that rumination and withdrawal interacted to exacerbate marital tension for both partners. On days when paramedics engaged in more rumination, the impact on marital tension worsened if spouses withdrew from the relationship. Consistent with DeLongis et al. (2010), who proposed a moderating role of spouse withdrawal on rumination, these results reinforce the importance of collaborative coping; in other words, the importance of not disengaging and withdrawing from relationships during times of stress. Given that marital tension increased for both partners when one partner withdrew, disengagement from the relationship

appears to be a particularly maladaptive behaviour for couples. This is in line with the larger literature on dyadic coping which has shown positive associations between collaboration and marital adjustment (Badr & Acitelli, 2005; Berg et al., 2008; Bodenmann et al., 2007; Coyne & Smith, 1994). The current research extends this literature by documenting a pattern of coping that may be particularly maladaptive for day-to-day dyadic functioning.

Combined with findings indicating a moderating effect of neuroticism in these daily processes, this set of studies bolsters the consideration of person-level, couple-level, and contextual factors in research on couples. This further supports the utility of a transactional-relational framework of stress (Lazarus & Folkman, 1984) in such populations. Indeed, the examination of personality variables as well as interactions between partners' coping responses explained additional variance in the day-to-day impact of stress in the current analyses. Furthermore, these findings emphasize the importance of examining processes and phenomena that originate and develop outside of the home and external to the relationship, reflecting Bodenmann et al.'s (2007) proposition that everyday extramarital stressors are especially deleterious. In the current research, day-to-day occurrences of occupational stress and burnout appear to have the potential to disrupt daily dyadic functioning and adjustment.

5.3 Strengths and Limitations

Despite these implications, a number of limitations of this research should be noted. First, generalizability of these findings may be limited, if not to paramedics then to emergency workers (e.g., firefighters and police officers) and/or emergency healthcare practitioners (e.g., emergency room nurses and physicians) more generally. It may be that specific features of paramedicine (e.g., exposure to human suffering and tragedy) are driving these associations, limiting their generalizability; or alternatively, factors such as high

interdependence on the job, patient care, and/or emergency responding may be explaining the majority of these findings, in which case they would generalize to very similar occupations. On the other hand, findings may be generalizable to all occupations characterized by a similar level of stress and burnout, or by a comparable combination of high demand, low control, and low support. An additional limitation to generalizability may apply to employment status, as the current sample was primarily full-time (compared to just over 50% of the large number of paramedics who applied to participate). Although current findings may be extendable only to full-time workers, studying part-time emergency workers presents a challenge to researchers given the highly unpredictable (and often infrequent) nature of their work schedules. Given the high rates of depressive symptomology, post-traumatic stress, and burnout in the current sample, a self-selection bias may also be at play, leading to further limitations on generalizability. That is, interest and subsequent participation in this research may have been largely driven by these sample characteristics, potentially limiting generalizability beyond paramedics who are high in these stress-related variables. Despite these potential limitations, the current findings support previous literature on stress spillover and crossover, as well as literature on rumination and interpersonal withdrawal, suggesting that somewhat common associations among the variables of interest were identified. That the observed relationships were mere products of the day-to-day responsibilities and duties of paramedics is doubtful. Findings are also consistent with previous research documenting similar outcomes of work stress in paramedics throughout North America (Patterson et al., 2005; Regehr & Miller, 2007), suggesting some degree of generalizability.

Given the gender composition of the current sample, it was not possible to fully separate the effect of target vs. spouse from that of male vs. female or of husband vs. wife,

given that most paramedics were men and most spouses were women, and nearly all were in heterosexual unions. As a result, conclusions may be extendable only to male paramedics and their female spouses. While this may appear limiting, it nevertheless reflects data from the 2006 Canadian Census, which identified 76% of Canadian paramedics (including members of management) as male (Statistics Canada, 2006). As such, implications for paramedics and their spouses specifically may be no less applicable. In terms of generalizability to married couples, however, caution should be taken when making comparisons to stress and burnout originating in the work environments of wives rather than husbands. Such disproportionate numbers of males and females in either role also restricted valid statistical comparisons based on gender. Future studies should aim for more equal numbers of male and female targets and spouses, and a greater inclusion of non-heterosexual couples, in order to more accurately assess the role of gender in these daily dyadic processes.

Although paramedic and spouse reports were limited by their self-report nature, obtaining repeated measures close to their real-time occurrence helped to reduce potential retrospective contamination (Tennen, Affleck, Coyne, Larsen, & DeLongis, 2006). It is worth noting, however, that this population was a particularly sensitive one when it came to the administration of repeated, daily questionnaires. In consideration of the unique stressors and high demands faced by paramedics, it was the goal of the current research to minimize any potential amplification of stress on the job due to participation in the study. In line with these ethical concerns, repeated measures during the work shift were avoided, as were random experience sampling methods. One might imagine, for example, the problems arising from paramedics trying to complete daily diaries on days when they cannot find time for lunch, or similarly, from paramedics being paged to answer questions while performing CPR.

The potential impact on job performance, and by extension patient care, could not be risked. That being said, additional time points would have proven useful in order to improve reliability and examine more dynamic relationships across days. For example, obtaining responses from paramedics immediately following high-stress calls would have facilitated alternative lines of inquiry. A major strength of this research, however, was its examination of both members of dyads, as well as the incorporation of both actor and partner effects in multilevel models. This allowed us to account for greater variance at within- and between-couple levels, therefore better approximating these processes within an interpersonal context while also controlling for the natural interdependence in the data.

Future directions of this research include time-lag analyses of daily diary data to determine the impact of stress, marital tension, and similar variables on next-day outcomes of interest. In order to investigate the long-term effects of work stress and burnout on dyadic adjustment, a follow-up study of participating paramedics and their spouses would be useful. Obtaining more detailed reports of marital tension would further supplement our understanding of these daily processes. Similarly, more detailed reports of tension with children in the home, as well as tension with co-workers in the workplace, would allow us to account for additional contextual variables beyond those occurring within marital dyads. While it was the initial goal of the current research project to obtain information from work partners of paramedics as well as their spouses, this proved more difficult than originally conceived, as in most cases, partners were less cooperative and/or not consistently paired with target paramedics during the four consecutive work shifts. Information on these triads, if obtained, would have facilitated the examination of dynamic interactions between dyads in two distinct settings.

5.4 Concluding Remarks

The studies presented in this dissertation highlight the potential for stress to not only transfer across settings, but also transmit between individuals, underscoring the highly interdependent nature of intimate relationships. In addition to substantial evidence for stress spillover and crossover, the current set of studies highlights the consequential role of occupational burnout in these dynamic relationships. Furthermore, it bolsters the importance of examining stress and coping processes on a daily basis and as unfolding from a dynamic interplay of person and situation (DeLongis & Holtzman, 2005; Folkman et al., 1986), supported presently by the examination of both neuroticism and cross-spousal interactions. Previous research has stressed the importance of considering the broader social context in studies of stress and coping (e.g., Neff & Karney, 2004; O'Brien et al., 2009; O'Brien & DeLongis, 1996; Story & Repetti, 2006). The current findings strengthen support for this perspective, while offering new insights into potential pathways of stress transmission across work and home settings in couples.

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