COPING WITH CHRONIC STRESS:
AN INVESTIGATION OF THE SOCIAL CONTEXT

by

Ellen Christine Stephenson

B.Sc., McGill University, 2011
M.A., The University of British Columbia, 2014

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The following individuals certify that they have read, and recommend to the Faculty of Graduate and Postdoctoral Studies for acceptance, the dissertation entitled:

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submitted by   Ellen Stephenson  in partial fulfillment of the requirements for

the degree of  Doctor of Philosophy

in            Psychology

Examining Committee:

Dr. Anita DeLongis  
Supervisor

Dr. Christiane Hoppmann  
Supervisory Committee Member

Dr. Jeremy Biesanz  
Supervisory Committee Member

Dr. Kenneth Craig  
University Examiner

Dr. Mark Beauchamp  
University Examiner

Additional Supervisory Committee Members:

Supervisory Committee Member

Supervisory Committee Member
Abstract

Social relationships are important for physical and mental health, but the specific mechanisms involved are much less clear. The stress and coping process is one pathway through which social relationships could influence health and wellbeing. Drawing on a social contextual model of stress and coping, I investigated specific ways that social relationships shape and are shaped by adjustment to chronic stress. Study 1 examined the role of perceived social support availability in a sample of people living with spinal cord injury (SCI) who were coping with chronic pain symptoms. Pain catastrophizing has been consistently associated with worse adjustment to chronic pain, therefore Study 1 focused on understanding the role of support in mitigating the extent and impact of this maladaptive coping response. This intensive longitudinal study found that tangible support was associated with less pain catastrophizing overall and smaller increases in pain when catastrophizing did occur. Implications for people living with SCI and other chronic pain populations are discussed. Study 2 examined the role of stress appraisals in long-term relationship outcomes. Although traditional cognitive models of stress predict that those who appraise stressors as very serious are at greatest risk of poor outcomes, findings in Study 2 support a social contextual model in which shared appraisals have a protective effect on marital outcomes. In this study of stepfamily couples, a joint view of their most serious family problems was associated with a reduced risk of separation or divorce across the next 20 years. Implications for preventive interventions for highly stressed families are discussed. Finally, Study 3 examined how adjustment to chronic stress in one family member affects others in the family system. In this longitudinal study of families caring for a child with a complex chronic health condition, mothers’ experiences of posttraumatic growth were found to predict fewer behavioural problems in their healthy children over time. These findings support a family systems approach
in which the benefits of posttraumatic growth in the face of adversity can also extend from mothers to children. Together these studies underscore some of the mechanisms through which social relationships may promote better health and wellbeing.
Lay Summary

Research has consistently shown that people with more positive social relationships experience better physical and mental health. However, much less is known about the specific mechanisms involved. One possibility is that social relationships promote better health and wellbeing by affecting how people cope with chronic stress in their lives. Across three stressful contexts, I examined how interpersonal relationships shape and are shaped by this coping process. First, I examined how perceptions of social support are associated with less dysfunctional coping patterns in response to daily pain symptoms. Second, I examined whether a shared view of family problems could protect couples at risk of divorce, and whether this was above and beyond perceptions of support. Finally, I examined how adjustment to stressful circumstances is related within families. That is, how the experiences of mothers caring for a chronically ill child affected the wellbeing of her other healthy children over time.
Preface

This dissertation contains a portfolio of three manuscripts that are published or in preparation, along with introductory and concluding chapters. I am the primary contributor and author of the work presented in this dissertation. Formulation of all research questions and analyses of data reported herein were performed by me, with guidance from Dr. Anita DeLongis.

The results reported in Chapter 2 are in preparation to be submitted for publication.


I am lead author of this publication and was responsible for reviewing the relevant literature, formulating the research questions and hypotheses, conducting the analyses, and drafting the manuscript. The project was approved by the UBC Behavioural Research Ethics Board, certificate numbers B04-0721 and H04-80721.

A manuscript resulting from the work reported in Chapter 3 is published in the Journal of Social and Personal Relationships.


This paper was written in collaboration with my advisor, Dr. Anita DeLongis. I was responsible for reviewing relevant literature, formulating the hypotheses, determining the appropriate
analytic approach, conducting the analyses, and drafting the manuscript. The project was approved by the UBC Behavioural Research Ethics Board, certificate number H07-02244. A full list of journal articles written based on data from this longitudinal study of stepfamilies can be found in Appendix A.

A manuscript resulting from the work reported in Chapter 4 is published in the *Journal of Pediatric Psychology*.


This project involved collaboration with researchers and clinicians from nine clinical sites and four universities. The University of British Columbia and Children’s & Women’s Health Centre of BC was approved as the central site in Vancouver (Certification #H08–00124). This large longitudinal study followed families of children with complex chronic health conditions for up to 4 years, collecting data from the children with complex chronic conditions, their parents/caregivers, and their siblings. The work presented herein was the first investigation into the adjustment of the siblings of the children with complex chronic conditions, and I took a lead role in this part of the study. I was responsible for formulating the research questions, reviewing the relevant literature, determining the appropriate analytic approach, conducting the analyses, and drafting the manuscript. A full list of published journal articles written based on this longitudinal study can be found in Appendix B.
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This work would not have been possible without the many research assistants and collaborators involved. Thank you! I am grateful for the funding I received through doctoral fellowships from the Killam Trusts, the Social Sciences and Humanities Research Council of Canada (SSHRC), and the University of British Columbia.
Chapter 1: Introduction

1.1 Importance of social relationships for health and wellbeing

Humans are inherently social beings. Forming and maintaining social ties is one of the most important parts of human life. Although there are many different methods used to quantify the structure, functions, and quality of our social connections, a large and growing body of evidence suggests that social relationships contribute immensely to our physical and mental health. Thirty years ago, House, Landis, and Umberson (1988) published a seminal review of five prospective longitudinal studies providing some of the first evidence for a causal relationship between social integration and reduced mortality risk. In the years since, the body of evidence supporting the link between social relationships and health has grown exponentially to include hundreds of studies and millions of participants (Holt-Lunstad, 2018). Across several different measurement approaches, evidence indicates that more positive social relationships are associated with greater meaning and satisfaction in life (Powdthavee, 2008; Stavrova & Luhmann, 2016), improved mental health (Kawachi & Berkman, 2001), fewer physical health problems (Robles, Slatcher, Trombello, & McGinn, 2014; Smith & Christakis, 2008; Uchino, 2009), and greater longevity (Holt-Lunstad, Smith, & Layton, 2010). The effect of social relationships on health is comparable in size to that of other known risk factors such as smoking, high blood pressure, and obesity (Holt-Lunstad, 2018). As a result, public health policy makers are starting to take notice (Department for Digital, Culture, Media and Sport, 2018; Murthy, 2017; Wister, Beaulieu, Gionet, & Johnson, 2017). To most effectively harness the power of social relationships, we need to understand how they improve physical and psychological health. The key question is no longer do social relationships matter, but what are the mechanisms involved?
One of the pathways through which social relationships are thought to influence health and wellbeing is by shaping adjustment to stress (Cobb, 1976; Cohen, 2004; Dean & Lin, 1977; DeLongis, Folkman, & Lazarus, 1988; Thoits, 2011). Dealing with adversity is something that everyone experiences in some form or another, but the intensity, frequency, and impact of stressful experiences varies substantially. Some people tend to be more resilient, finding ways to successfully manage the demands or challenges of the problems they are facing. Others may experience significant distress, resulting in immediate or even long-lasting declines in health and wellbeing. One of the overarching aims of this dissertation is to identify pathways through which social relationships may promote successful adaptation to stress. The stress-buffering hypothesis posits that the effects of social relationships on health will be most pronounced under highly stressful conditions (Cohen & Wills, 1985). Therefore, we study populations likely to experience high levels of stress on an ongoing basis. Although the types of stressful circumstances addressed in each study are different (i.e., chronic pain, family problems, caring for a child with a severe chronic illness), the potential to benefit from and the need to maintain close relationships is likely to be high in all cases.

I begin by describing the basic theoretical model of stress and coping that underlies this program of research and then address the specific objectives of each study.

1.2 Theoretical foundations

Much of current theory and research on coping with stress stems from Richard Lazarus’s transactional model of stress and coping (Lazarus, 1966, 2000; Lazarus & Folkman, 1984). Rather than defining stress purely based on external events or stimuli in the environment (e.g., Holmes & Rahe, 1967), or physiological or psychological responses within the individual (e.g., Selye, 1956), Lazarus (1984) argued that stress is a function of the interaction between the
individual and his/her environment. He argued that how a given situation is appraised determines whether the individual experiences it as stressful. In this transactional model, cognitive appraisals of how threatening or challenging a situation was (primary appraisal) and resources available to cope with it (secondary appraisal) are key determinants of coping efforts and subsequent adaptation (Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986). Although some situations are more consistently experienced as stressful than others, the transactional model proposes that this is because they are more likely to be appraised as threatening or taxing available coping resources. This model has been applied across a variety of disciplines to describe many different stressful contexts, including workplace demands (Cooper, Dewe, & O’Driscoll, 2001; Lazarus, 1995), interpersonal conflict (Lee-Baggley, Preece, & DeLongis, 2005), pain (Jackson, Wang, & Fan, 2014), chronic illness (Walker, Jackson, & Littlejohn, 2004), aging (Aldwin, 2007), discrimination (Cassidy, O’Connor, Howe, & Warden, 2004), and stress induced in a laboratory setting (Gaab, Rohleder, Nater, & Ehlert, 2005).

Although the idea that person and situation interact throughout the coping process is fundamental to the transactional model, it still describes a process that occurs largely at the individual level. The role of social relationships and broader interpersonal context is largely ignored. For example, events necessitating a coping response were initially limited to the individual’s own experiences. However, events that involve other people in one’s social network can also significantly impact a person’s health and wellbeing (McLeod & Kessler, 1984; R. J. Turner, Wheaton, & Lloyd, 1995). Cognitive appraisals included perceived threats to personal wellbeing and the wellbeing of others (Folkman, Lazarus, Gruen, & DeLongis, 1986), but the model did not consider the perspectives of others in the social environment. The role of the social context was subsumed largely under appraisals of social support. In recent decades,
several extensions to the original transactional model have been proposed to better address dyadic and interpersonal processes (Badr & Acitelli, 2017; Berg & Upchurch, 2007; Bodenmann, 1997; Coyne & DeLongis, 1986; Coyne & Smith, 1991; DeLongis & Holtzman, 2005; DeLongis & O’Brien, 1990; Kayser, Watson, & Andrade, 2007; Revenson, 1994). The social contextual model used here is one under a rubric of dyadic coping models (Bodenmann, Randall, & Falconier, 2017; Revenson, Kayser, & Bodenmann, 2005). A key feature of our social contextual model is that it recognizes that stress does not occur in social isolation. The social context can influence all aspects of the stress and coping process, including which stressors are encountered, how these stressors are appraised, which coping strategies are used, and how effective these strategies are in promoting successful adaptation (DeLongis & Holtzman, 2005; DeLongis, Holtzman, Puterman, & Lam, 2010; Stephenson, King, & DeLongis, 2016). Furthermore, it recognizes the importance of considering both individual and dyadic wellbeing outcomes. Coping responses that benefit one individual’s wellbeing are not assumed to benefit the wellbeing of close others or relationships with them.

In the following sections of this chapter, I describe how the studies in this dissertation address the role of social relationships in three different contexts involving chronic stress. Each study tests different predictions derived from a social contextual model of stress and coping.

1.3 Study 1: Social support in times of stress

One of the ways that social relationships matter for those under stress is as a source of support. This support can come in many different forms, including the provision of tangible assistance, reassurance that one is loved, cared for, esteemed, and valued, and bestowing a sense of belonging. Support can also serve many distinct functions throughout the coping process. For example, it can be an important resource such that appraisals of support reduce the likelihood
that a given situation will be experienced as stressful (Lazarus & Folkman, 1984). Seeking support is also a strategy for coping with stress (Folkman, Lazarus, Dunkel-Schetter, et al., 1986; Lee-Baggley et al., 2005; Ptacek, Smith, & Dodge, 1994; Skinner, Edge, Altman, & Sherwood, 2003). However, our social contextual model argues that social support can have an even more pervasive impact throughout the coping process, influencing not only how stressors are appraised and which coping strategies are used, but also how effective these strategies are in reducing distress and promoting subsequent adaptation (DeLongis & Holtzman, 2005; Stephenson et al., 2016). Puterman, DeLongis, & Pomaki (2010) found support for this social contextual model, showing that people who reported having more support available to them were less likely to engage in ruminative coping and were less likely to experience increases in negative affect when they did ruminate. In Study 1, I tested whether similar findings could be observed in people living with spinal cord injury.

A spinal cord injury was once a certain cause of death, but medical advances mean that many people now survive decades after their injury (Whiteneck et al., 1992). With this improved survival comes new challenges associated with living with a chronic spinal cord injury, including limitations in functioning, secondary conditions, and medical complications (Sezer, Akkuş, & Uğurlu, 2015). Of the challenges associated with living with a spinal cord injury, pain symptoms are some of the most frequent sources of distress that significantly impact activities of daily living (Jensen, Hoffman, & Cardenas, 2005; Kratz, Ehde, Bombardier, Kalpakjian, & Hanks, 2017; Simpson et al., 2012). Chronic pain has been estimated to affect up to 60-80% of those with SCI, with 30-58% reporting severe, disabling pain (Ravenscroft, Ahmed, & Burnside, 2000; Rintala, Loubser, Castro, Hart, & Fuhrer, 1998; Siddall, McClelland, Rutkowski, & Cousins,
Therefore, understanding how to alleviate these symptoms and the role that social support might play in this process has important implications for people living with spinal cord injury.

Sullivan and others have identified catastrophizing as the key dysfunctional coping response to chronic pain that is associated with poor outcomes over time (Severeijns, Vlaeyen, Van Den Hout, & Weber, 2001; M. J. L. Sullivan et al., 2001; J. A. Turner, Jensen, Warms, & Cardenas, 2002). Therefore, I focused specifically on understanding the role of social support in relation to pain catastrophizing in Study 1. Based on a social contextual model of stress and coping, two pathways were investigated. First, I examined support as a predictor of pain catastrophizing directly. Second, I examined support as a buffer of the effects of catastrophizing on changes in pain and mood over time. That is, I examined whether people with more support resources are less likely to catastrophize and are less vulnerable to the negative effects of pain catastrophizing when it did happen. Findings from Study 1 add to a growing literature that acknowledges the complex interactions between cognitive and social factors in shaping the experience of pain.

1.4 Study 2: Cognitive appraisals of stress in an interpersonal context

As exemplified in Study 1, social support is a key way in which social relationships affect the stress and coping process. However, the idea that measures of social support do not fully capture interpersonal factors involved in the coping process is not new (Coyne & DeLongis, 1986). In Study 2, I consider how cognitive appraisals of stressor severity can be extended to an interpersonal context and examine whether these effects are distinct from the effects of perceptions of social support.

Within transactional models of stress and coping, cognitive appraisal is central to what makes a situation stressful. Traditionally, cognitive appraisal has been viewed largely as an
intraindividual process. In assessing the severity of a potentially stressful situation, researchers have often relied on self-reports of that person’s own perspective. Items often refer to the perceived threat or challenge for that individual. For example, items like, “How serious was this for you?”, How threatening was this for you?”, or “How challenging was this for you?” are commonly used to assess appraisals of the severity of a particular stressor (Chang, 1998; Dunkley et al., 2017; Hanson & Chen, 2010; Klandermans, Hesselink, & van Vuuren, 2010; O’Brien, DeLongis, Pomaki, Puterman, & Zwicker, 2009; Pow, Lee-Baggley, & DeLongis, 2016; Ptacek et al., 1994). However, many stressors do not involve one individual in isolation. In fact, interpersonal tension and conflict are some of the most common and salient sources of stress in everyday life (Almeida, Wethington, & Kessler, 2002; Bolger, DeLongis, Kessler, & Schilling, 1989). Therefore, it may be important to consider perceived severity for the target individual and for involved others. In close relationship and family contexts, focusing solely on one person’s perspective leaves out potentially important information about shared experiences of stress and their consequences. Especially when considering the impact of stress on relationships themselves, a more comprehensive approach to the role of cognitive appraisal may be required (e.g., Bodenmann, Randall, & Falconier, 2017).

Study 2 aimed to extend traditional individualistic models of cognitive appraisal to incorporate the cognitive appraisals of involved others. I tested competing predictions about how cognitive appraisals of family stress operate when we consider not only how serious a problem is for the target individual (i.e., “for you”), but also how serious it is for the other member of the couple (i.e., “for your spouse”). One possibility is that the appraisals of stressor severity are additive such that problems that are appraised as very serious for both partners are associated with the worst outcomes. Another possibility is that joint or shared appraisal within the couple
serves a protective function. If this were the case, couples in which the problem is very serious for the target individual and not their spouse would fair worse than couples in which the problem is very serious for both partners.

A longitudinal study of early family stress in stepfamilies presented a unique opportunity to test these competing predictions and extend individualistic models of cognitive appraisal. There were several key features of this study that made it well suited for investigating shared appraisals of stress. First, the study focused on family problems or challenges. Unlike other types of stressors that could conceivably involve only one member of the couple (e.g., work problems, health symptoms), family stressors are inherently relevant to both dyad members. The question of how serious problems are from each person’s perspective can be meaningfully assessed. Second, the marital context is one in which there are many opportunities to form shared appraisals of serious problems. It is also a context in which the effects of shared appraisal may be especially salient. Finally, stepfamilies are a highly stressed population at increased risk of marital instability (Bray & Berger, 1993; DeLongis & Zwicker, 2017; Sweeney, 2010). Identifying factors that might mitigate the increased risk of divorce has important implications for the wellbeing of adults and children in these families.

1.5 Study 3: Considering coping responses in social context

Whether a given coping response is considered adaptive or maladaptive has often been determined based on whether it is effective in resolving the problem or relieves psychological distress for the target individual. However, it is important to consider other outcomes associated with successful coping. Beyond an individual’s own wellbeing, coping responses can also affect their relationships with others and the wellbeing of others in the social environment. Focusing
solely on optimizing individual wellbeing may lead us to miss factors important to the wellbeing of the broader family system and those within it.

Across a variety of stressful contexts, there is evidence that distress is transmitted within families (Almeida, Wethington, & Chandler, 1999; Dekel & Goldblatt, 2008; Powdthavee & Vignoles, 2008; Thompson & Bolger, 1999). For example, in married couples, depressive symptoms in one partner are associated with an increased risk of depressive symptoms in their spouse (Kouros & Cummings, 2010; Thomeer, Umberson, & Pudrovska, 2013). The onset of depression in parents is also associated with worse psychological functioning in their children (Lieb, Isensee, Höfler, Pfister, & Wittchen, 2002; Silberg, Maes, & Eaves, 2010; Weissman, Warner, Wickramaratne, Moreau, & Olfson, 1997). It is clear that when one person fairs worse, others close to them tend to fair worse as well. However, much less research has examined the transmission of positive changes experienced in the face of adversity. That is, whether similar cross-over effects among family members exist for growth in response to stress. Severe and chronic stressors increase the risk for poor mental health outcomes such as anxiety, depression, and burnout (Taylor & Stanton, 2007), but they can also result in positive experiences of personal growth (Cadell et al., 2014; Linley & Joseph, 2004; Tedeschi, Shakespeare-Finch, Taku, & Calhoun, 2018). Although it is well established that high levels of anxiety and depression can adversely affect others in the family system (Downey & Coyne, 1990; Najman et al., 2000; Siegenthaler, Munder, & Egger, 2012; Woodruff-Borden, Morrow, Bourland, & Cambron, 2002), it is unclear whether the benefits of growth in the face of adversity also extend beyond individual wellbeing to the larger family system as well.

Psychological research has shifted from focusing exclusively on relieving mental illness, to include efforts to promote positive experiences (Seligman & Csikszentmihalyi, 2000;
Seligman, Steen, Park, & Peterson, 2005; Snyder & Lopez, 2009; Wong, 2011), demonstrating that these are not always two sides of the same coin (Westerhof & Keyes, 2010). Therefore, it remains to be seen whether transmission of positive experiences of growth can be observed in the same way that patterns of distress transmission have been observed. In chapter 4, I use data from a longitudinal study of families of children with severe, progressive neurological conditions to investigate whether mothers’ experiences of posttraumatic growth have crossover effects on the functioning of their children over time.

1.6 Summary of research objectives

Figure 1.1 illustrates the social contextual model that underlies this program of research and identifies the specific constructs relevant to each study.

Study 1 investigates the role of perceived support availability in the context of coping with chronic pain among people living with SCI. The key research questions are related to whether perceptions of support are related to a specific coping response (catastrophizing) and its subsequent impact on adaptation.

Study 2 investigates cognitive appraisals of serious family problems as predictors of separation and divorce in stepfamilies. The key research questions are related to whether shared stress appraisals serve a protective function that is distinct from the effects of social support.

Study 3 investigates adjustment in families of children with progressive, non-curable genetic, metabolic, or neurological conditions. The investigation focuses on the mothers’ experiences as a result of caring for a chronically ill child and the impact this has on other healthy children in the family over time. The key research questions are related to which aspects of posttraumatic growth in mothers predict changes in internalizing and externalizing behaviour problems in the children over time.
Figure 1.1 Overview of Social Contextual Model of Stress and Coping

- **Stressors**
  - Study 1: Pain symptoms
  - Study 2: Most serious family problem
  - Study 3: Caring for chronically ill child

- **Cognitive Appraisals & Coping Responses**
  - Study 1: Catastrophizing
  - Study 2: Stressor severity
  - Study 3: Maternal posttraumatic growth

- **Outcomes**
  - Study 1: Subsequent pain intensity and mood
  - Study 2: Marital dissolution
  - Study 3: Behavioural problems in siblings of chronically ill child

**Social and interpersonal context**
- Study 1: Perceived support availability
- Study 2: Stressor severity from both spouses’ perspectives; shared appraisal
- Study 3: Cross-over effect from mother to child; growth in relationships with others
Chapter 2: Perceived Social Support and Pain Catastrophizing in People with Spinal Cord Injury

2.1 Introduction

There are many challenges that people with a spinal cord injury (SCI) must cope with in their everyday lives. Of these, pain is one of the most frequent sources of distress that significantly impacts their daily functioning (Jensen, Hoffman, & Cardenas, 2005; Kratz, Ehde, Bombardier, Kalpakjian, & Hanks, 2017; Simpson et al., 2012). Chronic pain has been estimated to affect up to 80% of those with SCI, with 30-58% reporting severe, disabling pain (Ravenscroft et al., 2000; Rintala et al., 1998; Siddall et al., 2003). Cross-sectional and longitudinal survey studies have provided some insights into which patients are most likely to experience chronic pain following an SCI (Craig, Guest, Tran, Nicholson Perry, & Middleton, 2017; Jensen et al., 2005; Ravenscroft et al., 2000; J. A. Turner et al., 2002; van Leeuwen, Hoekstra, van Kopnenhagen, de Groot, & Post, 2012). However, much less is known about the processes that maintain pain symptoms in everyday life. By using an intensive longitudinal design involving repeated assessments across several days, the current study aimed to fill this knowledge gap. A better understanding of the factors that exacerbate or alleviate pain symptoms could offer insights that significantly improve quality of life for people living with SCI. Of interest in the current investigation was the role that perceived support plays in daily pain experience.

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1 This chapter has been adapted from a version being prepared for submission: Stephenson, E., Lam, M., Cadell, S. & DeLongis, A., (in preparation). Is there someone who can help? Perceived social support availability and daily pain catastrophizing in people with spinal cord injury. It has been modified to fit the format of this dissertation.
2.1.1 Pain catastrophizing

Although pain was initially viewed as a biomedical problem requiring medical or surgical solutions (Melzack & Loeser, 1978), it is now widely accepted that the experience of pain is influenced by a combination of biological, psychological, and social factors (Gatchel, Peng, Peters, Fuchs, & Turk, 2007; Hadjistavropoulos et al., 2011; Turk & Okifuji, 2002). Research based on this biopsychosocial perspective has found that catastrophizing is one of the most important predictors of poor adjustment to chronic pain (Leung, 2012; Severeijns et al., 2001; M. J. L. Sullivan et al., 2001). Pain catastrophizing is characterized by exaggerating the seriousness or threat value of pain sensations, feelings of worry and helplessness, and an inability to inhibit pain related thoughts (Quartana, Campbell, & Edwards, 2009; M. J. L. Sullivan, Bishop, & Pivik, 1995). Pain catastrophizing has been described as a characteristic trait of some individuals, with some people more likely to engage in these negative thought patterns than others (M. J. L. Sullivan et al., 2001, 1995). People who tend to catastrophize in response to pain (“high catastrophizers”) have been found to experience a host of negative outcomes, including increased pain intensity, greater psychological distress, and greater functional disability (Jensen, Moore, Bockow, Ehde, & Engel, 2011; Raichle, Hanley, Jensen, & Cardenas, 2007; Severeijns et al., 2001; M. J. L. Sullivan, Stanish, Waite, Sullivan, & Tripp, 1998; Wollaars, Post, van Asbeck, & Brand, 2007). Although pain catastrophizing does vary systematically between persons, there is also evidence that the extent of pain catastrophizing varies within persons over the course of several hours or days (Darnall et al., 2017; Grant, Long, & Willms, 2002; Holtzman & DeLongis, 2007; Kratz, Davis, & Zautra, 2012; J. A. Turner, Mancl, & Aaron, 2004). One of the advantages of an intensive longitudinal design is that it allows us to investigate not only which people tend to catastrophize in response to pain, but also the characteristics of occasions when
they are more or less likely to do so and what effects these within-person fluctuations in catastrophizing have on subsequent pain and mood. Figure 2.1 illustrates how catastrophizing can fluctuate within a person across 5 consecutive days and shows how the level of catastrophizing that occurs on a typical day can differ for high catastrophizers (right panel) compared to low catastrophizers (left panel). In this research I investigate what differentiates high catastrophizers from low catastrophizers and what effects periods of higher than usual catastrophizing have on subsequent changes in pain and mood. Knowing that a patient is prone to catastrophizing is useful for identifying and targeting those most at risk for poor outcomes. However, we may also want to know what factors drive within-person fluctuations in this pattern of rumination, helplessness, and magnification so as to prevent or mitigate the impact of this coping response.

**Figure 2.1 Illustration of between-person and within-person differences in pain catastrophizing**

![Diagram showing between-person and within-person differences in pain catastrophizing](image)
2.1.2 Social contextual model of pain catastrophizing

Consistent with the biopsychosocial perspective, there is growing recognition that the social context plays an important role in pain catastrophizing (Burns et al., 2015; Holtzman & DeLongis, 2007; M. J. L. Sullivan, 2012). However, there is some debate about whether social support is beneficial in this context. Some authors have cautioned against providing support to those in pain out of concern that it will reinforce maladaptive pain behaviors, like catastrophizing (Fordyce, 1976; Keefe, Dunsmore, & Burnett, 1992). On one hand, a series of studies have found that pain catastrophizers are more expressive in their displays of pain, especially if someone else is present (Keefe et al., 2000; M. J. L. Sullivan, Adams, & Sullivan, 2004; Vervoort et al., 2008, 2011). Sullivan and his colleagues (2001; 2012) proposed that the reason for this is that pain catastrophizers are motivated to engage in interpersonal coping strategies to deal with their pain and catastrophize as a strategy to elicit support from others in their social environment. Consistent with this communal coping model, catastrophizing has been found to predict subsequent increases in social support behaviour (Burns et al., 2015). However, other research would suggest that supportive social relationships provide a context in which catastrophizing and its maladaptive consequences are minimized (Buenaver, Edwards, & Haythornthwaite, 2007; Holtzman & DeLongis, 2007; Kratz et al., 2012). The perception that support is readily available may minimize the need to catastrophize in order to elicit support from others. A social contextual model of coping proposes that social support can facilitate the use of more adaptive forms of coping and mitigate the impact of what might otherwise be a maladaptive response (DeLongis & Holtzman, 2005; DeLongis et al., 2010; Puterman et al., 2010; Stephenson et al., 2016). Rather than expecting catastrophizing and social support to be positively correlated, this model would predict those with more support would be less likely to catastrophize. In terms of clinical
recommendations, a social contextual model would suggest that it may be necessary to foster supportive relationships and ensure that a person’s support needs are met.

2.1.3 Objectives and hypotheses for Study 1

Drawing on a social contextual approach, the current study aimed to clarify the role of perceived social support in the pain experience of people living with SCI. Given some of their functional limitations, social support may be an especially important coping resource for people with SCI. It is clear that social support is associated with better health and wellbeing for people with SCI (R. Müller, Peter, Cieza, & Geyh, 2012), but the impact of this support on catastrophizing in people with SCI has only recently been considered (e.g., Raichle et al., 2007). The current study is the first to investigate how perceptions of support availability affected everyday experiences of pain and catastrophizing among people with SCI. Based on a social contextual model of coping, it was hypothesized that those with less perceived support would be more likely to catastrophize in response to being in pain (hypothesis 1) and that for those with less perceived support, catastrophizing more than usual would be associated with greater subsequent increases in pain (hypothesis 2) and negative mood (hypothesis 3), and decreases in positive mood (hypothesis 4). These hypothesized relationships are depicted in Figure 2.2.

Specific hypotheses about which forms of support would show the strongest effects were not made. It is possible that perceived tangible, belonging, and appraisal support all predict catastrophizing and its consequences, but it is also possible that some effects are specific to one type of support. Given that our theoretical model does not make specific predictions based on the type of social support, we investigated the impact of different forms of support on an exploratory basis.
Figure 2.2 Hypothesized social contextual model of pain catastrophizing

Note: Social support is hypothesized to predict less catastrophizing (H1) and to attenuate the effect of catastrophizing on subsequent changes in pain (H2), negative mood (H3), and positive mood (H4).

2.2 Method

2.2.1 Procedure

Recruitment for this study was completed in conjunction with the British Columbia Paraplegic Association (BCPA). In accordance with confidentiality agreements with their patients, the research team was not granted access to patient names and addresses for recruitment purposes. Rather, the BCPA sent recruitment letters.² The letter invited interested persons to phone our research center at which time the project manager provided a basic overview of the study, determined eligibility, and if appropriate, scheduled a convenient time for an in-person interview. Eligibility criteria required participants to have a diagnosed SCI, be 18 years of age or older, and have a working knowledge of both written and spoken English. Given key differences

² The total number of people invited to participate is unknown. Given the low prevalence of SCI, recruitment letters were sent over a period of several years. Throughout the recruitment process some individuals received multiple invitations to participate. Therefore, the total number of letters sent does not accurately reflect the number of individuals invited to participate.
between early post-acute and long-term adjustment to SCI (Kirchberger et al., 2010), only those who were a minimum one year post-injury were sent recruitment letters.

Those eligible were invited to participate in a study consisting of four phases. As an expression of gratitude for participation, all participants received $15 for each phase of the study they completed, up to a maximum of $60. Participants were instructed that they could opt-out of the study at any time and were not required to complete all four phases of the procedure. The first phase involved an in-person interview conducted by a trained member of the research team at either the participant’s residence or a local rehabilitation center (GF Strong Rehabilitation Centre in Vancouver, BC), according to the participant’s choice. In the second phase, participants were asked to complete a questionnaire booklet. They were given the option to complete the questionnaires on their own, with the assistance of their caregiver or other support person if needed, or with a member of our research team – either over the telephone or in-person. The third phase involved brief telephone interviews (10-15 minutes each) scheduled twice daily for a period of 5 consecutive days. Each day a trained interviewer contacted participants by telephone approximately 6 hours and 12 hours after participants’ waking. These twice daily interviews engaged participants about their experiences in the preceding 6-hour period that day (i.e., “so far today” or “since we last spoke”). Telephone interviews were chosen over other daily diary or experience sampling data collection methods (e.g., personal electronic devices) so that people with a wider range of injuries, including quadriplegics, could participate. The fourth phase involved collecting saliva samples multiple times per day during the same 5-day period that the twice daily interviews were completed. The current investigation uses measures from the first 3 phases and those are described in greater detail below.
2.2.2 Measures

2.2.2.1 Social support

The 12-item version of the Interpersonal Support Evaluation List (ISEL-12; Cohen, Mermelstein, Kamarck, & Hoberman, 1985) was included in the initial questionnaire booklet (procedure phase 2). The ISEL is the most commonly used measure of social support in SCI (R. Müller et al., 2012). It assesses perceptions of the availability of social support from one’s social network. It includes 3 subscales: tangible support (availability of instrumental aid), belonging support (availability of people with whom one can do things) and appraisal support (availability of someone to talk to about one’s problems). Participants were asked to rate the degree to which they felt each statement was true of them by circling one of the following response choices: 1 (definitely false), 2 (probably false), 3 (probably true), and 4 (definitely true). Items were averaged to create scores for the entire 12 items scale (total support, Cronbach’s $\alpha = .88$), and each of the 4 item subscales (tangible support, Cronbach’s $\alpha = .65$; belonging support, Cronbach’s $\alpha = .84$; and appraisal support, Cronbach’s $\alpha = .72$). If items were missing, scores were computed based on the available items for that participant as per the scoring instructions for the ISEL-12.

2.2.2.2 Pain intensity

In each of the twice-daily interviews, patients were asked to report their pain intensity during the preceding 6 hours (i.e., “so far today” or “since we last spoke”) on a numerical rating scale (NRS) ranging from 0 (no pain) to 10 (pain as bad as it could be). This NRS has shown good validity in previous research, demonstrating significant associations with other measures of pain intensity (Jensen, Karoly, & Braver, 1986). It has been found to capture both between-

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3 The full list of items and scoring instructions are available at http://www.psy.cmu.edu/~scohen/.
person and within-person variation in pain intensity in previous intensive longitudinal studies of people with chronic pain (Grant et al., 2002; Holtzman & DeLongis, 2007; Keefe et al., 2004).

2.2.2.3 Pain catastrophizing

In each of the twice-daily interviews, if participants reported experiencing any pain, they were asked to respond to 3 statements describing how they thought or felt about their pain during the preceding 6 hours (i.e., “so far today” or “since we last spoke”). These statements were:

1) You felt like you couldn’t stand it anymore.
2) It was awful and you felt that it overwhelmed you.
3) There was nothing you could do to reduce the intensity of the pain.

Ratings were made on a 5-point rating scale: 1 (not at all), 2 (a little), 3 (somewhat), 4 (moderately), and 5 (a lot). These items were originally drawn from the Coping Strategies Questionnaire (Rosenstiel & Keefe, 1983) and the Pain Catastrophizing Scale (M. J. L. Sullivan et al., 1995) and have been used to assess between-person and within-person variation in catastrophizing in previous intensive longitudinal research of people coping with chronic pain (Holtzman & DeLongis, 2007). The scale showed adequate reliability for both within-person change (R_c = .67) and between person differences (R_{KF} = .98) in the current sample (Cranford et al., 2006; Shrout & Lane, 2012).

2.2.2.4 Mood

Negative mood and positive mood were each assessed using the average of three items from the Affects Balance Scale (Derogatis, 1975). Participants were asked to indicate the extent to which each word described how they felt in at that moment on a 7-point rating scale from 1 (not at all) to 7 (very much). Negative mood words were sad, hopeless, and worthless. Positive mood words were happy, glad, and cheerful. Both negative mood and positive mood scales
showed good reliability for both within-person change (negative mood $R_C = .69$; positive mood $R_C = .89$) and between person differences (negative mood $R_{KF} = .97$; positive mood $R_{KF} = .99$) in the current sample (Cranford et al., 2006; Shrout & Lane, 2012).

2.2.2.5 Demographic and SCI characteristics

Table 2.1 describes sample characteristics assessed in the initial in-person interview including level, type, cause, and time of the SCI. Level of injury refers to the lowest point on the spinal cord where motor and/or sensory function is either decreased or absent (Maynard et al., 1997). Type of injury details the amount of damage to the width of the spinal cord. A complete injury suggests damage to the spinal cord such that no sensory and motor function exists below the level of injury. With partial or incomplete injuries, some motor and/or sensory function remains intact below the level of injury (Palmer, Kriegsman, & Palmer, 2008). Participants were asked to describe the event leading up to their SCI which was then coded as traumatic (e.g., motor vehicle accidents, falls, work-related injuries, sports injuries) or non-traumatic causes (e.g., infections, spinal cord vascular disease; World Health Organization, 2013).

2.2.3 Participants

Ninety-seven interested individuals living with SCI contacted our research coordinator and met eligibility requirements. Of these, 94 completed the initial interview (phase 1), 86 participants completed the initial questionnaire booklet (phase 2), and 88 completed at least one of the twice daily interviews (phase 3). Completion rates for these twice daily interviews were high with 51 participants (58%) completing all 10 interviews, 33 participants (38%) completing 7-9 interviews, and the remaining 4 participants (5%) completing 3 or fewer interviews. The focus of the current investigation is on catastrophizing in response to pain, thus participants who reported no pain, and thus no pain catastrophizing (i.e., pain = 0 in all interviews
completed), were excluded. To be included in the current analysis participants had to have completed both phases 2 and 3 of the study procedure \((n = 81)\), have reported at least some pain during phase 3 \((n = 79)\), and have completed at least 2 consecutive interviews during phase 3 \((n = 88)\). This resulted in a final analytic sample of 74 participants. The demographic characteristics of these participants are summarized in Table 2.1 and are consistent with estimates from larger population-based studies (Lenehan et al., 2012; Noonan et al., 2012). The majority were men who were injured in recreation or motor vehicle accidents as young adults. There were no significant differences in the demographic characteristics of the participants included in the current analysis compared to those excluded.
Table 2.1 Sample characteristics for Study 1

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean (SD)</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at time of participation</td>
<td>49.43 (12.58)</td>
<td></td>
</tr>
<tr>
<td>Age when SCI occurred</td>
<td>31.73 (15.02)</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>52 (71%)</td>
<td></td>
</tr>
<tr>
<td>Females</td>
<td>21 (29%)</td>
<td></td>
</tr>
<tr>
<td>Education level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some schooling</td>
<td>24 (32%)</td>
<td></td>
</tr>
<tr>
<td>High school diploma</td>
<td>21 (28%)</td>
<td></td>
</tr>
<tr>
<td>Bachelor’s degree</td>
<td>12 (16%)</td>
<td></td>
</tr>
<tr>
<td>Post-Baccalaureate</td>
<td>3 (4%)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>14 (19%)</td>
<td></td>
</tr>
<tr>
<td>Employment status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full-time</td>
<td>7 (9%)</td>
<td></td>
</tr>
<tr>
<td>Part-time</td>
<td>5 (7%)</td>
<td></td>
</tr>
<tr>
<td>Self-employed</td>
<td>8 (11%)</td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>22 (30%)</td>
<td></td>
</tr>
<tr>
<td>Retired/disability benefits</td>
<td>17 (23%)</td>
<td></td>
</tr>
<tr>
<td>Not reported</td>
<td>15 (20%)</td>
<td></td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>62 (84%)</td>
<td></td>
</tr>
<tr>
<td>Asian</td>
<td>2 (3%)</td>
<td></td>
</tr>
<tr>
<td>Native American</td>
<td>3 (4%)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>6 (9%)</td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>19 (26%)</td>
<td></td>
</tr>
<tr>
<td>Married/common-law</td>
<td>41 (55%)</td>
<td></td>
</tr>
<tr>
<td>Divorced/separated</td>
<td>12 (16%)</td>
<td></td>
</tr>
<tr>
<td>Widowed</td>
<td>2 (3%)</td>
<td></td>
</tr>
<tr>
<td>Level of injury</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper cervical (C1-C4)</td>
<td>12 (16%)</td>
<td></td>
</tr>
<tr>
<td>Lower cervical (C5-C8)</td>
<td>24 (32%)</td>
<td></td>
</tr>
<tr>
<td>Upper thoracic (T1-T5)</td>
<td>12 (16%)</td>
<td></td>
</tr>
<tr>
<td>Lower thoracic (T6-T12)</td>
<td>19 (26%)</td>
<td></td>
</tr>
<tr>
<td>Lumbar (L1-L5)</td>
<td>4 (5%)</td>
<td></td>
</tr>
<tr>
<td>Brown-Séquard syndrome</td>
<td>1 (1%)</td>
<td></td>
</tr>
<tr>
<td>Injury severity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complete</td>
<td>37 (53%)</td>
<td></td>
</tr>
<tr>
<td>Incomplete</td>
<td>33 (47%)</td>
<td></td>
</tr>
<tr>
<td>Cause of injury</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traumatic</td>
<td>63 (86%)</td>
<td></td>
</tr>
<tr>
<td>Non-traumatic</td>
<td>10 (14%)</td>
<td></td>
</tr>
</tbody>
</table>
2.2.4 Data analysis

Because twice daily assessments were nested within individuals, multilevel regression analysis was used to model variation at level 1 (within-persons) and level 2 (between-persons) simultaneously. The multilevel regression models were run in R using the lme4 and lmerTest packages (Bates, Mächler, Bolker, & Walker, 2015; Kuznetsova, Brockhoff, & Christensen, 2017). The maximal random effects structure, including random intercepts and random slopes for all level 1 predictors was estimated. Following Bolger and Laurenceau’s (2013) recommendations for intensive longitudinal data analysis using multilevel modeling, all continuous variables were first rescaled so that zero represents a meaningful value, the grand mean for the sample in this case (see Table 2.2). Next, between-person and within-person variation in level 1 predictors were separated by computing person-means and deviations from those means (i.e., person-mean centered scores). This means that the factors associated with trait level differences (e.g., being a high catastrophizer) were assessed independently of the factors associated with temporary shifts within a person (e.g., catastrophizing more than one usually does on a given occasion).

To test the first hypothesis, the extent of pain catastrophizing was predicted by perceived support availability, while controlling for concurrent pain intensity. To test the second hypothesis, pain intensity at the subsequent time point ($i + 1$) was predicted by person-mean and person-mean centered catastrophizing at timepoint $i$, perceived support availability, and the cross-level interaction between the two variables (i.e., person-centered catastrophizing $\times$ perceived support availability). Person-centered pain at timepoint $i$ was also controlled so that the results could be interpreted in terms of subsequent changes in pain. Similar models predicting subsequent mood (rather than pain), controlling for current mood, were used to test hypotheses 3
and 4. If a significant interaction effect was found, the online tool developed by Preacher, Curran, and Bauer (2006) was used to determine the significance of the simple slopes. For each hypothesis, separate models were run for total support, tangible support, belonging support, and appraisal support to assess whether the type of support influenced the results.

2.3 Results

2.3.1 Sample description

The maximum possible level 1 sample size was \( N = 740 \) (10 interviews \( \times \) 74 participants). Ninety-two percent of these interviews were completed \( (N = 678) \). However, the analysis included only occasions when pain catastrophizing was assessed, and subsequent pain or mood was reported \( (N = 511) \). The number of entries per person ranged from 1 to 9 with a median of 7. Grand means, variability, and the correlations between daily interview variables (i.e., pain, catastrophizing, and mood) and perceived support availability are summarized in Table 2.2. Pain, catastrophizing, and mood all varied substantially within-persons and between-persons. ICCs of 0.54-0.64 indicate that 54% to 64% of the observed variance is between-persons.
Table 2.2 Bivariate correlations, means, standard deviations, and interclass correlations

<table>
<thead>
<tr>
<th></th>
<th>Pain</th>
<th>Catastrophizing</th>
<th>Negative Mood</th>
<th>Positive Mood</th>
<th>Total support</th>
<th>Tangible support</th>
<th>Belonging support</th>
<th>Appraisal support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Catastrophizing</td>
<td>.57***</td>
<td>.69***</td>
<td>.24*</td>
<td>-.15</td>
<td>-.20+</td>
<td>-.22+</td>
<td>-.26*</td>
<td>-.04</td>
</tr>
<tr>
<td>Negative Mood</td>
<td>.21***</td>
<td></td>
<td>.35**</td>
<td>-.13</td>
<td>-.20+</td>
<td>-.29*</td>
<td>-.22</td>
<td>-.02</td>
</tr>
<tr>
<td>Positive Mood</td>
<td>-.22***</td>
<td>-.18***</td>
<td></td>
<td>-.44***</td>
<td>-.25*</td>
<td>-.18</td>
<td>-.36**</td>
<td>-.09</td>
</tr>
<tr>
<td>Mean</td>
<td>3.76</td>
<td>1.80</td>
<td>1.55</td>
<td>4.59</td>
<td>3.07</td>
<td>3.16</td>
<td>2.90</td>
<td>3.14</td>
</tr>
<tr>
<td>SD</td>
<td>2.13</td>
<td>0.91</td>
<td>1.01</td>
<td>1.55</td>
<td>0.67</td>
<td>0.70</td>
<td>0.87</td>
<td>0.73</td>
</tr>
<tr>
<td>Scale range</td>
<td>0-10</td>
<td>1-5</td>
<td>1-7</td>
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<td>1-4</td>
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<tr>
<td>ICC</td>
<td>0.60</td>
<td>0.54</td>
<td>0.56</td>
<td>0.64</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>511</td>
<td>511</td>
<td>510</td>
<td>502</td>
<td>74</td>
<td>74</td>
<td>74</td>
<td>74</td>
</tr>
</tbody>
</table>

Within-person correlations used person-centered scores and are presented below the diagonal. Between-person correlations use person means and are presented above the diagonal. *p < .10, *p < .05, **p < .01, ***p < .001.
2.3.2 Multilevel regression analyses

2.3.2.1 Hypothesis 1: Perceived support predicts extent of pain catastrophizing

The results of the multilevel regression analyses predicting the extent of pain catastrophizing from pain intensity and perceived support are summarized in Table 2.3. Catastrophizing tends to be higher for people who report higher levels of pain ($b = 0.27$, $SE = 0.04$, $t(70) = 7.66$, $p < .001$) and at times when their pain is worse than usual ($b = 0.25$, $SE = 0.03$, $t(50) = 8.91$, $p < .001$). Although total support availability was not significantly associated with the extent of pain catastrophizing (Model 1a in Table 2.3), perceived tangible support availability was associated with the extent of catastrophizing in response to pain (Model 1b in Table 2.3). Compared to people who reported more tangible support, people who reported less tangible support tended to engage in more catastrophizing when they were in pain ($b = -0.18$, $SE = 0.09$, $t(69) = -2.06$, $p = .043$).
Table 2.3 Extent of catastrophizing as a function of pain intensity and perceived support availability

<table>
<thead>
<tr>
<th></th>
<th>Model 1a: Total Support</th>
<th>Model 1b: Tangible Support</th>
<th>Model 1c: Belonging Support</th>
<th>Model 1d: Appraisal Support</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>$B$</td>
<td>95% CI</td>
<td>$p$</td>
<td>95% CI</td>
</tr>
<tr>
<td>Intercept</td>
<td>0.00</td>
<td>-0.12 – 0.12</td>
<td>.992</td>
<td>0.00</td>
</tr>
<tr>
<td>Mean Pain</td>
<td>0.27</td>
<td>0.20 – 0.34</td>
<td>&lt;.001</td>
<td>0.27</td>
</tr>
<tr>
<td>∆ Pain</td>
<td>0.25</td>
<td>0.20 – 0.31</td>
<td>&lt;.001</td>
<td>0.25</td>
</tr>
<tr>
<td>Total Support</td>
<td>-0.14</td>
<td>-0.32 – 0.03</td>
<td>.119</td>
<td></td>
</tr>
<tr>
<td>Tangible Support</td>
<td>-0.18</td>
<td>-0.34 – 0.01</td>
<td>.043</td>
<td></td>
</tr>
<tr>
<td>Belonging Support</td>
<td></td>
<td></td>
<td></td>
<td>-0.10</td>
</tr>
<tr>
<td>Appraisal Support</td>
<td></td>
<td></td>
<td></td>
<td>-0.06</td>
</tr>
</tbody>
</table>

**Fixed Effects**

Delta Pain refers to person-mean centered pain intensity scores.

**Random Effects**

<table>
<thead>
<tr>
<th></th>
<th>Intercept Variance</th>
<th>0.237</th>
<th>0.232</th>
<th>0.238</th>
<th>0.241</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>∆ Pain Variance</td>
<td>0.023</td>
<td>0.023</td>
<td>0.023</td>
<td>0.023</td>
</tr>
<tr>
<td></td>
<td>Residual Variance</td>
<td>0.223</td>
<td>0.223</td>
<td>0.224</td>
<td>0.224</td>
</tr>
</tbody>
</table>

N participants / N observations: 74 / 511 / 74 / 511 / 74 / 511 / 74 / 511
2.3.2.2 Hypothesis 2: Perceived support attenuates the effect of catastrophizing on subsequent changes in pain

The results of the multilevel regression analyses predicting subsequent changes in pain from catastrophizing and perceived support are summarized in Table 2.4. Although total support availability was not found to moderate the within-person relationship between catastrophizing and subsequent pain (Model 2a in Table 2.4), there was a significant interaction between catastrophizing and perceived tangible support availability (Model 2b in Table 2.4). This interaction is depicted in Figure 2.3. People who reported having higher levels of tangible support available to them were less likely to experience subsequent increases in pain when they engaged in more catastrophizing than usual ($b = -0.41, SE = 0.18, t(40) = -2.35, p = .024$). Within-person fluctuations in catastrophizing were only predictive of subsequent increases in pain for those who reported low levels of tangible support (i.e., a score more than 0.60 standard deviations below the mean).
Table 2.4 Lagged analysis predicting subsequent changes in pain

<table>
<thead>
<tr>
<th></th>
<th>Model 2a: Total Support</th>
<th>Model 2b: Tangible Support</th>
<th>Model 2c: Belonging Support</th>
<th>Model 2d: Appraisal Support</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>95% CI</td>
<td>p</td>
<td>B</td>
</tr>
<tr>
<td>Intercept</td>
<td>-0.20</td>
<td>-0.50 – 0.11</td>
<td>.218</td>
<td>-0.20</td>
</tr>
<tr>
<td>Mean Catastrophizing</td>
<td>1.67</td>
<td>1.22 – 2.11</td>
<td>&lt;.001</td>
<td>1.69</td>
</tr>
<tr>
<td>Δ Pain</td>
<td>-0.04</td>
<td>-0.20 – 0.11</td>
<td>.551</td>
<td>-0.05</td>
</tr>
<tr>
<td>Δ Catastrophizing</td>
<td>0.13</td>
<td>-0.15 – 0.41</td>
<td>.352</td>
<td>0.13</td>
</tr>
<tr>
<td>Total support</td>
<td>-0.09</td>
<td>-0.56 – 0.38</td>
<td>.705</td>
<td></td>
</tr>
<tr>
<td>Δ Catastrophizing × Total Support</td>
<td>-0.25</td>
<td>-0.59 – 0.11</td>
<td>.176</td>
<td></td>
</tr>
<tr>
<td>Tangible support</td>
<td>-0.01</td>
<td>-0.48 – 0.46</td>
<td>.973</td>
<td></td>
</tr>
<tr>
<td>Δ Catastrophizing × Tangible Support</td>
<td>-0.41</td>
<td>-0.76 – 0.07</td>
<td>.024</td>
<td></td>
</tr>
<tr>
<td>Belonging support</td>
<td></td>
<td></td>
<td></td>
<td>-0.15</td>
</tr>
<tr>
<td>Δ Catastrophizing × Belonging Support</td>
<td>-0.16</td>
<td>-0.44 – 0.12</td>
<td>.276</td>
<td></td>
</tr>
<tr>
<td>Appraisal Support</td>
<td></td>
<td></td>
<td></td>
<td>0.00</td>
</tr>
<tr>
<td>Δ Catastrophizing × Appraisal Support</td>
<td>-0.09</td>
<td>-0.44 – 0.26</td>
<td>.595</td>
<td></td>
</tr>
</tbody>
</table>

**Random Effects**

<p>| | | | | | |</p>
<table>
<thead>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept Variance</td>
<td>1.537</td>
<td>1.541</td>
<td>1.527</td>
<td>1.540</td>
<td></td>
</tr>
<tr>
<td>Δ Pain Variance</td>
<td>0.084</td>
<td>0.085</td>
<td>0.084</td>
<td>0.084</td>
<td></td>
</tr>
<tr>
<td>Δ Catastrophizing Variance</td>
<td>0.049</td>
<td>0.023</td>
<td>0.063</td>
<td>0.063</td>
<td></td>
</tr>
<tr>
<td>Residual Variance</td>
<td>1.719</td>
<td>1.714</td>
<td>1.719</td>
<td>1.720</td>
<td></td>
</tr>
</tbody>
</table>

N/Participants: N/Observations | 74 / 511 | 74 / 511 | 74 / 511 | 511

Δ indicates person-mean centered scores.
Figure 2.3 Cross-level interaction between tangible support and catastrophizing.

The right panel shows the predicted within-person slope for the relationship between catastrophizing and subsequent pain for individuals at 3 levels of tangible support (1 SD below the sample mean, the sample mean, and 1 SD above the sample mean). The left panel plots the predicted within-person slopes for the relationship between catastrophizing and subsequent pain for all possible tangible support scores. The shaded area represents the 95% confidence interval and tangible support values to the left of the dashed line represent statistically significant slopes ($p < .05$).
2.3.2.3 Hypothesis 3: Perceived support attenuates the effect of catastrophizing on subsequent changes in negative mood

The results of the multilevel regression analyses predicting subsequent changes in negative mood from catastrophizing and perceived support are summarized in Table 2.5. Within-person fluctuations in catastrophizing were not significantly associated with subsequent negative mood, above and beyond the effect of current negative mood, and no form of perceived support was found to moderate this relationship. Thus, the hypothesis that perceived support would attenuate the effect of catastrophizing on subsequent changes in negative mood was not supported. However, belonging support was directly associated with negative mood. Those with higher levels of belonging support reported significantly lower levels of negative mood on average ($b = -0.25$, $SE = 0.10$, $t(73) = -2.60$, $p = .011$).
### Table 2.5 Lagged analysis predicting subsequent changes in negative mood

<table>
<thead>
<tr>
<th></th>
<th>Model 3a: Total Support</th>
<th>Model 3b: Tangible Support</th>
<th>Model 3c: Belonging Support</th>
<th>Model 3d: Appraisal Support</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B  95% CI  p</td>
<td>B  95% CI  p</td>
<td>B  95% CI  p</td>
<td>B  95% CI  p</td>
</tr>
<tr>
<td>Intercept</td>
<td>-0.09 (-0.25 – 0.08) .303</td>
<td>-0.08 (-0.25 – 0.08) .315</td>
<td>-0.09 (-0.25 – 0.08) .294</td>
<td>-0.08 (-0.25 – 0.08) .323</td>
</tr>
<tr>
<td>Mean Catastrophizing</td>
<td>0.36 (0.13 – 0.59) .003</td>
<td>0.36 (0.13 – 0.60) .003</td>
<td>0.34 (0.11 – 0.56) .005</td>
<td>0.40 (0.18 – 0.63) &lt;.001</td>
</tr>
<tr>
<td>Δ Negative mood</td>
<td>0.13 (-0.02 – 0.28) .010</td>
<td>0.13 (-0.03 – 0.28) .108</td>
<td>0.13 (-0.02 – 0.28) .096</td>
<td>0.12 (-0.03 – 0.28) .111</td>
</tr>
<tr>
<td>Δ Catastrophizing</td>
<td>0.01 (-0.11 – 0.13) .860</td>
<td>0.01 (-0.11 – 0.13) .884</td>
<td>0.01 (-0.11 – 0.13) .865</td>
<td>0.01 (-0.11 – 0.13) .872</td>
</tr>
<tr>
<td>Total support</td>
<td>-0.25 (-0.49 – 0.00) .51</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Δ Catastrophizing × Total Support</td>
<td>0.10 (-0.07 – 0.26) .255</td>
<td>-0.17 (-0.42 – 0.07) .164</td>
<td>0.09 (-0.08 – 0.25) .323</td>
<td></td>
</tr>
<tr>
<td>Tangible support</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Δ Catastrophizing × Tangible Support</td>
<td></td>
<td>0.09 (-0.08 – 0.25) .323</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belonging support</td>
<td></td>
<td></td>
<td>-0.25 (-0.44 – 0.06) .011</td>
<td></td>
</tr>
<tr>
<td>Δ Catastrophizing × Belonging Support</td>
<td></td>
<td>0.08 (-0.05 – 0.21) .244</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appraisal Support</td>
<td></td>
<td></td>
<td></td>
<td>-0.09 (-0.31 – 0.14) .439</td>
</tr>
<tr>
<td>Δ Catastrophizing × Appraisal Support</td>
<td></td>
<td>0.06 (-0.10 – 0.22) .474</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Random Effects

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept Variance</td>
<td>0.441</td>
<td>0.454</td>
<td>0.423</td>
<td>0.463</td>
</tr>
<tr>
<td>Δ Negative mood Variance</td>
<td>0.129</td>
<td>0.129</td>
<td>0.128</td>
<td>0.129</td>
</tr>
<tr>
<td>Δ Catastrophizing Variance</td>
<td>0.053</td>
<td>0.056</td>
<td>0.053</td>
<td>0.056</td>
</tr>
<tr>
<td>Residual Variance</td>
<td>0.324</td>
<td>0.323</td>
<td>0.324</td>
<td>0.324</td>
</tr>
</tbody>
</table>

N Participants / N Observations: 74 / 509

Δ indicates person-mean centered scores.
2.3.2.4 Hypothesis 4: Perceived support attenuates the effect of catastrophizing on subsequent changes in positive mood

The results of the multilevel regression analyses predicting subsequent changes in positive mood from catastrophizing and perceived support are summarized in Table 2.6. Within-person fluctuations in catastrophizing were not significantly associated with subsequent positive mood, above and beyond the effect of current positive mood, and no form of perceived support was found to moderate this relationship. Thus, the hypothesis that perceived support would attenuate the effect of catastrophizing on subsequent changes in positive mood was not supported. However, belonging support and appraisal support were found to be directly associated with positive mood. Those with higher levels of belonging support reported significantly higher levels of positive mood on average ($b = 0.56, SE = 0.17, t(67) = 3.25, p = .002$). Those with higher levels of appraisal support reported significantly higher levels of positive mood on average ($b = 0.60, SE = 0.20, t(66) = 3.01, p = .004$).
Table 2.6 Lagged analysis predicting subsequent changes in positive mood

<table>
<thead>
<tr>
<th>Model 4a: Total Support</th>
<th>Model 4b: Tangible Support</th>
<th>Model 4c: Belonging Support</th>
<th>Model 4d: Appraisal Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>( B )</td>
<td>95% CI</td>
<td>( p )</td>
<td>( B )</td>
</tr>
<tr>
<td>Intercept</td>
<td>-0.00</td>
<td>-0.29 – 0.28</td>
<td>0.976</td>
</tr>
<tr>
<td>Mean Catastrophizing</td>
<td>-0.24</td>
<td>-0.63 – 0.17</td>
<td>0.258</td>
</tr>
<tr>
<td>( \Delta ) Positive Mood</td>
<td>0.10</td>
<td>-0.01 – 0.21</td>
<td>0.068</td>
</tr>
<tr>
<td>( \Delta ) Catastrophizing</td>
<td>0.08</td>
<td>-0.10 – 0.26</td>
<td>0.394</td>
</tr>
<tr>
<td>Total support</td>
<td>0.70</td>
<td>0.28 – 1.13</td>
<td>0.002</td>
</tr>
<tr>
<td>( \Delta ) Catastrophizing ( \times ) Total Support</td>
<td>0.14</td>
<td>-0.09 – 0.37</td>
<td>0.249</td>
</tr>
<tr>
<td>Tangible support</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( \Delta ) Catastrophizing ( \times ) Tangible Support</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belonging support</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( \Delta ) Catastrophizing ( \times ) Belonging Support</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appraisal Support</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( \Delta ) Catastrophizing ( \times ) Appraisal Support</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fixed Effects

Random Effects

| Intercept Variance | 1.362 | 1.490 | 1.357 | 1.380 |
| \( \Delta \) Positive Mood Variance | 0.040 | 0.038 | 0.041 | 0.038 |
| \( \Delta \) Catastrophizing Variance | 0.157 | 0.147 | 0.148 | 0.155 |
| Residual Variance | 0.753 | 0.754 | 0.753 | 0.752 |

\( N_{\text{Participants}} / N_{\text{Observations}} \) | 72 / 502 | 72 / 502 | 72 / 502 | 72 / 502

\( \Delta \) indicates person-mean centered scores.
2.4 Discussion

The findings from this study point to the adaptive value of supportive relationships in coping with pain. Consistent with a social contextual model (DeLongis et al., 2010; Stephenson et al., 2016), the findings suggest that perceived social support affects both the extent of pain catastrophizing and its consequences. However, the specific hypotheses were only partially supported, given that significant effects were only observed for some of the support subscales. This underscores the need for greater specificity in theories of social support. Although many researchers have acknowledged that social support is not a single unitary construct (Cutrona & Russell, 1990; Rafaeli & Gleason, 2009; Schulz & Schwarzer, 2003), the conditions under which specific forms of support are expected to have different effects on adjustment are not always clear. Based on our findings in people with SCI, instrumental forms of support appear to be more important for coping with pain symptoms, whereas emotional forms of support appear to be more closely related to emotional wellbeing.

Perceived tangible support was found to predict the extent of pain catastrophizing and its impact on subsequent changes in pain. A perceived lack of tangible support may be especially concerning for people with SCI. Given their mobility limitations, many activities of daily living are difficult or impossible to accomplish without assistance. Thus, the perceived availability of adequate tangible support may be especially important for reducing the feelings of helplessness characteristic of pain catastrophizing. For example, the belief that there is nothing one can do to improve the situation may be especially salient for people who do not feel they have adequate support and rely on others for assistance with their daily routines. Instrumental aid could be required to prevent painful secondary health complications such as urinary tract infections and pressure ulcers, or to employ pain management strategies such as taking medication or engaging
in physical activity. Consequently, a perceived lack of tangible support could generate more negative cognitive appraisals of pain and one’s ability to cope, increasing pain intensity over time. A perceived lack of belonging or appraisal support, in contrast, may not have the same implications. Future research is needed to determine whether these effects of tangible support are specific to people with SCI, or if they generalize to other populations experiencing chronic pain and/or activity limitations.

Perceived belonging support and appraisal support were not found to predict the extent of pain catastrophizing or attenuate its effects on subsequent pain or mood. However, perceiving that someone is available to do things with (belonging support) and that someone is available to discuss one’s problems (appraisal support) were associated with improved mood overall (i.e., less negative affect, more positive affect). This is consistent with other cross-sectional findings showing that perceived emotional support and a sense of belonging more generally are associated with improved mood and lower rates of depression in a variety of populations, including people living with SCI (Cacioppo & Cacioppo, 2014; R. Müller et al., 2012; Santini, Koyanagi, Tyrovolas, Mason, & Haro, 2015) More research is needed to determine the pathways through which perceptions of belonging and appraisal support benefit emotional wellbeing. Based on the current findings, it is possible that improvements in mood stem from more positive appraisals of one’s social relationships, but it is also possible that improved appraisals of one’s social relationships result from improvements in mood.

The current investigation focused on perceptions of global support availability. This does a good job capturing appraisals of potential support across a variety of sources (e.g., family members, friends, care workers), but may or may not reflect support received. For many adults, the perception that someone in their social network is available to provide support can be
maintained without ever needing to draw on this support. Unless a need for support arises, the validity of the perception that support is available is never challenged. Consequently, perceived support availability may reflect a positive view of one’s social connections that is loosely related to what would happen should it ever be required. As such, a distinction between perceived support availability and support receipt is often made within the social support literature (Pow & DeLongis, 2018; Uchino, 2009; Wethington & Kessler, 1986). However, for people with SCI there may be a unique relationship between perceived support availability and support receipt (Gilad, Lavee, & Innes-Kenig, 2009). Among those who rely on others for support frequently in their everyday lives, the perception that support is available may be more closely related to their experiences receiving support when it was necessary. Need for support has been found to increase the correlation between measures of perceived support and received support (Melrose, Brown, & Wood, 2015). Furthermore, sense of support availability is more clearly differentiated from metacognitions about the relationship among married men with SCI compared to married men without any long-term disability (Gilad et al., 2009). Nevertheless, future studies that assess social support exchanges in daily life from a variety of sources may help clarify the relationship between support received and perceived support availability among people with SCI. It is unclear to what extent efforts to increase perceived support availability need to focus on changing cognitive appraisals of available support or on improving the actual availability of specific forms of support.

The current investigation is among the first to employ an intensive longitudinal design to study the everyday experiences of people living with SCI. Repeatedly interviewing participants about their experiences over the last few hours rather than the last few weeks or months has some notable advantages. Recall bias is minimized by asking participants to report on their
experiences closer to their real-time occurrence (Broderick et al., 2008). The repeated
assessments capture more than a static snapshot of experience. In addition to identifying who
tends to catastrophize in response to pain, we were able to assess temporal relationships between
within-person shifts in catastrophizing, pain, and mood, and to identify people for whom these
within-person relationships were especially pronounced. However, there are also some inherent
challenges and limitations when conducting intensive longitudinal research. It is more
demanding for the participants and the research team. In this case, participants spoke with the
same interviewer at ten scheduled times across 5 days. Efforts were made to accommodate the
participants’ schedules, but a small number of interviews were not completed because they could
not be reached. Other data collection methods, such as electronic diaries, can offer more
flexibility in terms the timing and frequency of assessments throughout the day (May,
Junghaenel, Ono, Stone, & Schneider, 2018). However, telephone interviews allowed us to
include participants with a wider range of injuries and functional abilities and achieve higher
completion rates than observed in studies using more frequent electronic assessments (Kratz,
Ehde, et al., 2017; Kratz, Kalpakjian, & Hanks, 2017). Nevertheless, the relatively small number
of participants and assessments per person does limit statistical power. Only larger between-
person differences could be detected, and more complex temporal patterns within and across
days could not be investigated here.

The population of people living with a spinal cord injury is relatively small,
comprising an estimated 86,000 individuals in Canada (Noonan et al., 2012). Efforts were
made to include as many individuals as possible in our research. However, we do not know to
what extent the findings generalize to those with more recent injuries or to those who were
unwilling to participate. The current investigation was also limited to experiences when at least
some pain was reported. It is common in daily diary research for coping responses to only be assessed when stressors occurred (e.g., Puterman et al., 2010); however, it would also be interesting to know whether the same cognitions and behaviors occur in the absence of a stressor. Persistent worry and negative cognitions in absence of pain symptoms could be part of what makes high catastrophizers especially prone to poor adjustment in the long-term. A recent study of daily stressors in middle-aged adults in the United States found that lingering stressor-related negative affect was associated with worse health outcomes 10 years later (Leger, Charles, & Almeida, 2018).

A challenge inherent in the biopsychosocial approach is that pain is determined by complex interactions between many factors. This study provides evidence for one pathway through which the combination of cognitions and social context influence pain symptoms. Although there are many ways in which these experiences of catastrophizing and social support could be unique to people living with SCI, it remains to be seen whether these findings will generalize to a wider range of pain populations. Despite concerns about providing support to those in pain, our findings add to a growing literature demonstrating the potential value of fostering satisfying social relationships for coping with chronic pain (Cano & Williams, 2010; Holtzman & DeLongis, 2007). Cognitive behavioural interventions targeting high catastrophizing (e.g., Darnall, Sturgeon, Kao, Hah, & Mackey, 2014) may benefit from addressing appraisals of the person’s social context and available support.
Chapter 3: Appraisals of Family Stress and Marital Stability in Stepfamilies

3.1 Introduction

A marital relationship is one of the most important social relationships for most adults and maintaining this relationship under stressful conditions can be incredibly challenging. Not only are stepfamilies at increased risk of divorce (Ambert, 2009), but they also experience a greater number and variety of stressors than traditional nuclear families (Bray & Berger, 1993). However, most research examining predictors of divorce has focused on first marriages. Relatively little is known about specific risk factors for divorce in remarriages (DeLongis & Zwicker, 2017; Sweeney, 2010). The current study addresses this gap in the literature, by focusing on characteristics of serious family problems or challenges as potential predictors of divorce.

3.1.1 Stepfamilies and remarriage

Remarriages and stepfamilies are an increasingly common family structure (Guzzo, 2015). In Canada and the United States, more than half of adults who divorce eventually remarry and one in three marriages is a remarriage for one or both partners (Ambert, 2009; Lewis & Kreider, 2015). Many remarrying individuals bring children from a previous union into their new household to form a stepfamily. In addition, the rate of common-law unions is increasing, resulting in a concomitant increase in stepfamilies formed through cohabitation (Sweeney, 2010). In Canada, 13% of families composed of a couple with children are stepfamilies and 10% of children spend at least some of their time living in a stepfamily context (Ambert, 2009; 2015).

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4 This chapter has been adapted from a version has been accepted for publication: Stephenson, E. & DeLongis, A. (2018). A 20-year prospective study of marital separation and divorce in stepfamilies: Appraisals of family stress as predictors. *Journal of Social and Personal Relationships*. doi: 10.1177/0265407518768445. It has been modified to fit the format of this dissertation.
Vézina, 2012). Compared to first marriages, there is a higher rate of divorce among remarriages (Lewis & Kreider, 2015); however, this risk is especially pronounced when there are children from a previous union (Ambert, 2009; Teachman, 2008). In the United States, nearly 50% of children from divorced families go through a second divorce of their custodial parent (Ambert, 2009).

The loss of a marital relationship through divorce can have significant adverse effects for the adults and children involved. With divorce, adults potentially stand to lose an important source of social support (McPherson, Smith-Lovin, & Brashears, 2006), experience poorer physical and mental health (Sbarra, 2015), and face decreased financial stability (Finnie, 1993). Children from divorced families generally experience lower psychological well-being, more behavioral problems, and poorer self-concept, social relationships, and academic achievement relative to children from traditional nuclear families (Amato, 2001). These problems tend to worsen with multiple family transitions (Fomby & Cherlin, 2007). Given the cost of marital instability for adults and children, it is important to identify factors that mitigate the risk of divorce in stepfamilies.

Stepfamilies experience a greater number and variety of stressors than traditional nuclear families (Bray & Berger, 1993). Given their more complex family structure, there are potential sources of stress that are unique to stepfamilies (Schramm & Adler-Baeder, 2012). The additional challenges that stepfamilies face in turn may contribute to their increased risk of marital dissolution (Slattery, Bruce, Halford, & Nicholson, 2011). Understanding how spouses in stepfamilies respond to the increased stress they experience may be key to identifying families at risk of poorer outcomes and targeting them for early preventive interventions.
3.1.2 Theoretical models of the role of stress appraisals in families

Traditional cognitive models of stress and coping have argued that appraisals of stressors as more serious increase the risk of poor outcomes (Folkman, Lazarus, Dunkel-Schetter, et al., 1986; Lazarus & Folkman, 1984). However, a social contextual model of stress argues that the relationship between stress appraisal and outcomes depends on the social context in which it occurs (DeLongis & Holtzman, 2005; DeLongis et al., 2010; DeLongis & Zwicker, 2017; Stephenson et al., 2016). Among married couples the spouse is a key part of that social context, resulting in a conjoined process of stress appraisal and coping, often referred to as dyadic coping (Badr & Acitelli, 2017; Berg & Upchurch, 2007; Revenson et al., 2005). Within social contextual and dyadic coping frameworks, both spouses’ perspectives need to be considered to fully understand the consequences of family stress. Joint or shared appraisals of stress are expected to facilitate adjustment in models of dyadic coping (Acitelli & Badr, 2005; Berg et al., 2009; Bodenmann et al., 2017; Lyons, Mickelson, Sullivan, & Coyne, 1998). Consequently, traditional cognitive models and social contextual or dyadic models of stress and coping result in different predictions regarding stress appraisals in a marital context.

Both models are applied here to understand the consequences of family stress experienced in stepfamilies. The traditional cognitive model of stress predicts that any stressors that are appraised as more serious will be associated with generally poorer outcomes (DeLongis et al., 1988; Lazarus & DeLongis, 1983; Lazarus & Folkman, 1984). Dyadic or shared appraisals have not been explicitly addressed in this model. Instead the effects of the social context are subsumed under appraisals of social support. However, stressor severity is a key part of this model. Considering family stress severity at the level of the couple, stressors that are appraised as very serious from both spouses’ perspectives would have the highest total severity and would
be expected to be associated with the poorest marital outcomes. In contrast, a social contextual model argues that shared spouse appraisals, or even the perception of such, can facilitate successful adaptation to stress. Given this, predictions based on this model contrast with the traditional cognitive model in that a shared stress appraisal is expected to serve a protective function, even when both appraise the stressor as serious. Couples in which both partners perceive a family stressor as very serious would be expected to be at lower risk of poor marital outcomes compared to couples in which one partner appraised the stressor as very serious and the other did not. Similarly, spouses who perceive their partner to share their concerns about family stressors are expected to have better marital outcomes than spouses who perceive their partner as not sharing their concerns.

3.1.3 Objectives of the current study

The current study examined the impact of couples’ stress appraisals on marital stability over time. At baseline, we asked each member of the couple to independently report the seriousness of their most serious family problem. We asked each to report this both from their own perspective and their spouse’s perspective. First, we investigated whether participants who perceived this family problem as more serious were at increased risk of separating over time (path $a$ in Figure 3.1). Second, we investigated whether participants’ perceptions of how serious their spouse considered the family problem additionally impacted the risk of relationship dissolution (path $b$ in Figure 3.1). We tested competing predictions about the direction of this relationship. That is, we examined whether participants’ perceptions of their spouses’ assessment of the family problem was associated with an increased risk of marital dissolution (traditional cognitive model) or decreased risk of marital dissolution (social-contextual model).
Figure 3.1 Hypothesized relationships between stress appraisals and marital dissolution.

Note: Both traditional cognitive and social-contextual models predict a positive relationship for path $a$. Based on the traditional cognitive model, path $b$ is hypothesized to be positive, whereas based on the social-contextual model path $b$ is hypothesized to be negative.

Next, we investigated the role of spouse agreement on their most serious problem. That is, we examined whether both spouses had independently identified the same family stressor as “most serious”. This allowed us to examine the impact of each spouse perceiving the other appraised the problem as serious, while controlling for spouse agreement on the most serious family stressor. If spouse agreement is an important predictor of marital outcomes, then interventions could be focused on helping spouses to come to agreement on their most serious family problems. On the other hand, if perceptions of how the spouse views the problem have an independent impact on the risk of marital dissolution, then a focus of marital therapy could be to shift perceptions of the spouse. Finally, given that support from the spouse is a key component of both traditional and social contextual models of stress (DeLongis et al., 2010; Folkman,
Lazarus, Dunkel-Schetter, et al., 1986), we investigated whether the effects of stress appraisals were above and beyond the effects of perceived support from the spouse.

3.2 Method

Data from the current study were drawn from a larger prospective study of psychosocial processes in stepfamilies (DeLongis, Capreol, Holtzman, O’Brien, & Campbell, 2004; DeLongis & Preece, 2002; King & DeLongis, 2013; Lee-Baggley et al., 2005; Lee-Flynn, Pomaki, DeLongis, Biesanz, & Puterman, 2011; O’Brien, DeLongis, et al., 2009; Puterman et al., 2010). There were three waves of data collection across 20 years; the current investigation used data from the first and third waves of data collection, and those procedures and measures are discussed below.

3.2.1 Procedure

Participants were recruited from the Lower Mainland of British Columbia, Canada by means of newspaper and radio advertisements, school newsletters, posters on community bulletin boards, and solicitation at local stepfamily groups. To be eligible to participate, respondents had to be fluent in English, be married or living together for at least two years in a marriage-like or common-law relationship, and have at least one child from a previous union (of either spouse) living in the home for more than 3 months of the year.

Interested couples that met eligibility criteria were mailed a summary of the research goals and procedures, a consent form, and a preliminary form that assessed demographic variables. Those participants who returned their consent forms were contacted to complete a

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5 Couples who had been living together for 2 years were considered to be in a common-law marriage according to British Columbia law and were granted legal rights and responsibilities of married couples. Both legally married and common-law married couples eligible to participate and are both referred to as “married” here.
telephone interview. Members of each couple were interviewed separately by different research assistants and informed that all responses would be kept confidential and not shared with their spouse. Interviews were conducted by trained, female undergraduate students and were audiotaped, with the permission of participants, for accurate coding of open ended-questions and assurance that standardized procedures were being followed. Initial interviews were conducted with 164 wives and 153 husbands from 170 couples in 1991-1993. Socio-demographic characteristics of these couples are summarized in Table 1. In 2009, we re-contacted families to obtain information about their marital status and invited them to participate in a follow-up interview. If the couple could not be contacted, public registries were used to obtain additional data on marital status when possible (Hunt & White, 1998). At follow-up, marital statuses were obtained for 112 (66%) of the original 170 couples. Of the 58 remaining couples, 12 had previously declined to participate in follow-up interviews, so no attempt was made to contact them. Attempts to contact the remaining 46 couples were unsuccessful.
Table 3.1 Sample characteristics at enrolment for Study 2

<table>
<thead>
<tr>
<th>Variable</th>
<th>Married or common-law (n = 71)</th>
<th>Separated or divorced (n = 41)</th>
<th>Unknown (n = 58)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Marital status at enrollment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Legally married</td>
<td>80.0%</td>
<td>70.7%</td>
<td>74.5%</td>
</tr>
<tr>
<td>Common-law marriage</td>
<td>20.0%</td>
<td>29.3%</td>
<td>25.5%</td>
</tr>
<tr>
<td>Mean number of years legally married (SD)</td>
<td>3.52 (2.65)</td>
<td>3.04 (3.49)</td>
<td>3.74 (2.82)</td>
</tr>
<tr>
<td>Mean number of years living together (SD)</td>
<td>4.61 (3.05)</td>
<td>4.74 (3.51)</td>
<td>4.30 (3.26)</td>
</tr>
<tr>
<td><strong>Family type</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stepmother only</td>
<td>19.7%</td>
<td>14.6%</td>
<td>24.1%</td>
</tr>
<tr>
<td>Stepfather only</td>
<td>22.5%</td>
<td>24.4%</td>
<td>19.0%</td>
</tr>
<tr>
<td>Both stepmother and stepfather</td>
<td>57.7%</td>
<td>61.0%</td>
<td>56.9%</td>
</tr>
<tr>
<td>Mean number of children (SD)</td>
<td>3.47 (1.50)</td>
<td>3.29 (1.38)</td>
<td>3.63 (1.85)</td>
</tr>
<tr>
<td><strong>Mutual children</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>61.4</td>
<td>73.2</td>
<td>71.2</td>
</tr>
<tr>
<td>1</td>
<td>28.6</td>
<td>22.0</td>
<td>21.2</td>
</tr>
<tr>
<td>2 or more</td>
<td>10.0</td>
<td>4.9</td>
<td>7.7</td>
</tr>
<tr>
<td>Mean family income in $1,000 (SD)</td>
<td>87.11 (55.10)</td>
<td>70.58 (30.37)</td>
<td>76.34 (37.74)</td>
</tr>
<tr>
<td>Husband’s age (SD)</td>
<td>41.07 (6.28)</td>
<td>40.95 (5.74)</td>
<td>40.33 (7.97)</td>
</tr>
<tr>
<td>Wife’s age (SD)</td>
<td>38.29 (5.62)</td>
<td>39.08 (5.49)</td>
<td>36.62 (6.17)</td>
</tr>
<tr>
<td><strong>Husband’s highest level of education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than high school</td>
<td>5.6%</td>
<td>19.5%</td>
<td>16.3%</td>
</tr>
<tr>
<td>High school diploma</td>
<td>14.1%</td>
<td>26.8%</td>
<td>28.6%</td>
</tr>
<tr>
<td>Some college or university</td>
<td>80.3%</td>
<td>53.7%</td>
<td>55.1%</td>
</tr>
<tr>
<td><strong>Wife’s highest level of education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than high school</td>
<td>7.0%</td>
<td>12.2%</td>
<td>9.4%</td>
</tr>
<tr>
<td>High school diploma</td>
<td>21.1%</td>
<td>19.5%</td>
<td>24.5%</td>
</tr>
<tr>
<td>Some college or university</td>
<td>71.8%</td>
<td>68.3%</td>
<td>66.0%</td>
</tr>
<tr>
<td><strong>Husband’s ethnicity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>87.3%</td>
<td>92.5%</td>
<td>97.1%</td>
</tr>
<tr>
<td>Asian</td>
<td>3.6%</td>
<td>2.5%</td>
<td>2.9%</td>
</tr>
<tr>
<td>Native/Aboriginal</td>
<td>0.0%</td>
<td>2.5%</td>
<td>0.0%</td>
</tr>
<tr>
<td>African heritage</td>
<td>3.6%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Other</td>
<td>5.5%</td>
<td>2.5%</td>
<td>0.0%</td>
</tr>
<tr>
<td><strong>Wife’s ethnicity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>98.2%</td>
<td>88.9%</td>
<td>97.1%</td>
</tr>
<tr>
<td>Asian</td>
<td>1.8%</td>
<td>2.8%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Native/Aboriginal</td>
<td>0.0%</td>
<td>2.8%</td>
<td>2.9%</td>
</tr>
<tr>
<td>African heritage</td>
<td>0.0%</td>
<td>2.8%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Other</td>
<td>0.0%</td>
<td>2.8%</td>
<td>0.0%</td>
</tr>
</tbody>
</table>
3.2.2 Baseline measures

3.2.2.1 Appraisals of family stressor severity

During the initial interview participants were asked to describe one family problem or challenge they considered to be the most serious. Examples of the types of problems described are given in Table 3.2. Participants were asked to rate the seriousness of the problem from their own perspective (“From your perspective, how serious would you say this problem is?”) and from the perspective of their spouse (“From your husband’s/wife’s perspective, how serious would he/she say this problem is?”). Ratings were given on a scale from 1 to 5, where 1 means not at all serious and 5 means very serious. Together these two items allowed us to capture the perceived severity of the most serious family stressor and how each participant perceives his/her spouse’s appraisal of the severity of this problem relative to his/her own perspective.

3.2.2.2 Agreement about most serious problem

Although participants did not know what problem their partner reported when asked to describe what he/she considered to be the most serious family problem, we were able to compare the descriptions of the problems described to identify whether the partners had identified similar problems. Two research assistants independently coded whether the husband and wife in each couple described the same problem (agreement = 1) or different problems (agreement = 0). The two coders made the same ratings 82% of the time (κ = 0.65). For cases when the two original coders rating were incongruent, ratings from a third coder were used.
<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency among wives</th>
<th>Frequency among husbands</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem or challenge raising/parenting child(ren)/stepchild(ren)</td>
<td>50%</td>
<td>48%</td>
<td>Wife’s description: I guess just having a household of teens in that [we are] in those years when everything you say or do is wrong. The emotional turmoil that always comes from that. There are so many of them (kids). There is always someone to be logger heads with. They're trying to assert independence. Issue of moving ahead. Things that stem from them growing up and not necessarily related to being a step-family.</td>
</tr>
<tr>
<td>Step-parent/Stepchild relationship</td>
<td>23%</td>
<td>20%</td>
<td>Husband’s description: My relationship with my step-son. We don’t get along as well as I would like. It’s gotten to the point where he doesn’t dislike me, but he doesn’t really like me a lot, and that’s probably the main hurdle right now.</td>
</tr>
<tr>
<td>Conflict or disagreement with spouse</td>
<td>22%</td>
<td>20%</td>
<td>Wife’s description: The trust issue. A lack of trust towards my partner. When I first met him, he said he was an honest and trustworthy man. But now, I find that he sometimes is a huge liar. And in the last four months or so we ran into it again.</td>
</tr>
<tr>
<td>Conflict involving ex-spouse(s)</td>
<td>16%</td>
<td>19%</td>
<td>Wife’s description: Communication with my ex-husband. I have sole custody of our two boys, and he has strict visitation rights. He wants flexibility, but he doesn't have it. He is unreliable at picking the boys up on time. [My ex-husband] wants them on Christmas every year, and favors the oldest boy, [who] gets caught in the middle.</td>
</tr>
<tr>
<td>Integrating stepparent into family</td>
<td>8%</td>
<td>10%</td>
<td>Wife’s description: Feeling apart from the family. [My husband and his son] are father and son. I am friend to [step-son’s name]. Not feeling included, although I usually am - but</td>
</tr>
<tr>
<td>Category</td>
<td>Wife’s description</td>
<td>Husband’s description</td>
<td></td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Child(ren)’s adjustment to stepfamily</td>
<td>That’s how I feel about it. Me feeling I cannot be the mother. Lack of confidence with the triangle. Wife’s description: I think it would have to be [my daughter] and how her feelings are in the marriage. She was used to living with just me. She and I were… I was single for almost twelve years, and she was just small, and I raised her from the time she was very small. And suddenly she's sharing me and she's feeling left out…</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not enough time for spouse, self, or other</td>
<td>9%</td>
<td>Husband’s description: We're on the go all the time – don't have time to spend with them all. Need to stop working and spend more time with [the kids].</td>
<td></td>
</tr>
<tr>
<td>Financial</td>
<td>7%</td>
<td>Wife’s description: Financial. We are both working now. [It’s] tough to make enough money to meet our needs (i.e., lawyer fees from [husband’s] recent settlement with his ex-partner over maintenance of my stepchild) … [We’d] like to have enough money available to buy a house, but [we are] not in financial position to right now.</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>7%</td>
<td>Husband’s description: Depression. My wife's depression brought about by my heart surgery.</td>
<td></td>
</tr>
</tbody>
</table>
3.2.2.3  Support from spouse

To assess the extent to which participants felt supported by their spouse in coping with the problem they had identified as most serious, ratings on three items were averaged (“To what extent does your husband/wife say or do things that help you with this problem?”, “How satisfied do you feel with the support receive from your husband/wife for this problem?” and “With this problem, to what extent does your husband/wife say or do things that are unhelpful, whether or not he/she intends to be unhelpful?”). Ratings were given on a scale from 1 (not at all) to 5 (a large extent), and these items were averaged such that a higher score indicates higher levels of perceived support. This 3-item scale showed good internal consistency (Cronbach’s alpha = .82).

3.2.2.4  Demographic variables

The demographic variables assessed at baseline include: whether the couple was legally married or living in a common-law relationship, duration of marriage, duration of cohabitation, number and age of children, stepfamily type, and age, education, ethnicity, and income of husbands and wives.

3.2.3  Follow-up measures

3.2.3.1  Marital status

In the follow-up interview, participants were asked whether they were currently 1) married, 2) divorced, 3) separated, or 4) widowed from their partner from the start of the study. These categories were collapsed into a dichotomous variable to code for whether the couple was still together at the time of the follow-up interview (married = 0, divorced or separated = 1). Participants who were identified as widowed were excluded from the analysis. Among the couples that could not be reached by phone or mail, six additional couples were confirmed as divorced by retrieving public divorce records.
3.2.4 Statistical analysis

3.2.4.1 Hypothesis testing

This study involved variables measured at two levels of analysis: individual and couple. Stress appraisals were assessed at the level of the individual, whereas marital status is assessed at the level of the couple. The level at which the outcome variable is measured determines which modelling approach should be used. In this case, logistic regression with couples as the unit of analysis was used to model the probability of relationship dissolution over the follow-up period. Kenny’s (2014) approach to modelling a between-dyad outcome from individual-level predictors was used. It is described through a series of equations below.

Because all couples were heterosexual, dyad members could be distinguished based on gender, and thus there could be four separate predictor variables: appraisal of the wife’s most serious stressor from her perspective ($R_F$) and her husband’s perspective ($P_F$) and appraisal of the husband’s most serious stressor from his perspective ($R_M$) and his wife’s perspective ($P_M$). These variables are labelled based on whose perspective the item asked about – $R$ for the respondent’s own perspective and $P$ for the respondent’s partner’s perspective. Subscripts $F$ and $M$ denote whether the respondent is female (i.e., $F$ for wives) or male (i.e., $M$ for husbands).

The resulting regression equation with the four observed variables as predictors would be:

**Equation 3.1**

$$\log(Y) = b_0 + b_1R_M + b_2R_F + b_3P_M + b_4P_F + e$$

However, even when dyad members are distinguishable, it is important to test whether they should be modelled as distinguishable dyads (Kenny, Kashy, & Cook, 2006). If the effects for husbands and wives are not significantly different, we have more power to test the significance
of the main effects if the dyad members are treated as indistinguishable. Therefore, we tested whether the effect of the appraisal of stressor severity from the participant’s own perspective was significantly different for male and female participants. That is, we tested the null hypothesis, $H_0: b_1 - b_2 = 0$. Similarly, we tested whether the effect of the participant’s appraisal of stressor severity from his/her spouse’s perspective was significantly different for male and female respondents ($H_0: b_3 - b_4 = 0$). To do this we estimated Equation 3.2, where the significance of $b_6$ tests ($b_1 - b_2 = 0$), and the significance of $b_8$ tests ($b_3 - b_4 = 0$)

Equation 3.2

$$\log(Y) = b_0 + b_5(R_M + R_F) + b_6(R_M - R_F) + b_7(P_M + P_F) + b_8(P_M - P_F) + e$$

When $b_6 = 0$ and $b_8 = 0$ (i.e., there are no significant gender differences), Equation 3.2 simplifies to Equation 3.3.

Equation 3.3

$$\log(Y) = b_0 + b_5 R_M + b_5 R_F + b_7 P_M + b_7 P_F + e$$

When effects were not significantly different for male and female respondents, we estimated and reported coefficients for Equation 3.3, as this is a more powerful test of our main hypotheses.

3.2.4.2 Missing data

There are many different approaches available for handling missing data (see Graham, 2009 for a review). Ideally, the approach used would produce unbiased parameter estimates, offer a method of assessing the uncertainty of these parameters, and retain reasonable statistical power (Graham, 2009). Listwise deletion is a popular approach for handling missing data; however, when the amount of missing data is substantial, this approach results in a significant
loss of power. Restricting the analyses to complete cases only can mean losing a large amount of valuable information. In this study, we have some information from 170 couples, but complete information for only 101 couples (i.e., both partners completed the initial interview and the couple’s marital status at follow-up is known). In order to avoid potential bias and loss of power from restricting our analyses to only complete cases, instead missing data were estimated using multiple imputation. Using the mice package (Buuren & Groothuis-Oudshoorn, 2011), regression analyses were run on 40 imputed data sets and the estimates were pooled. Multiple imputation was chosen over other modern missing data approaches (e.g., full information maximum likelihood) for two main reasons. First, it can easily be adapted to dichotomous outcomes, like divorce (Zhang, 2016). Second, it can be applied to situations involving missing data at multiple levels of analysis (i.e., individual and couple; Lüdtke, Robitzsch, & Grund, 2017). If only one member of the couple completed the initial interview, then the information from those observed scores was retained. For example, to estimate Equation 3.2, missing values for \( R_M, R_F, P_M, \) and \( P_F \) were imputed first, and then sum and difference scores for each couple were created. This is essentially item-level imputation (Gottschall, West, & Enders, 2012). Alternatively, couple-level sum scores and difference scores could have been imputed directly for any couple with missing data at baseline. This would be equivalent to scale-level imputation (Gottschall et al., 2012). In this case, item level imputation was used because it has been found to result in much higher power than scale-level imputation (Gottschall et al., 2012).

### 3.3 Results

#### 3.3.1 Sample description

Socio-demographic and family characteristics of the participants at the beginning of the study are summarized in Table 3.1. The couples that completed both baseline and follow-up
assessments were not significantly different from those who did not in terms of any of these socio-demographic or family characteristics.

Examples of the family problems participants described as their most serious are given in Table 3.2. The types of problems reported included challenges involving parenting children and/or stepchildren, disagreements within the couple, relationships between stepparents and stepchildren, relationships with ex-partners or ex-spouses, and adjustment to living as a stepfamily. With one exception, the type of problem itself was unrelated to subsequent marital status. Wives who reported parenting problems as their most serious were more likely to stay married than wives who reported other types of problems as most serious ($\chi^2(1) = 4.18, p = .040$).

The means, standard deviations, and correlations between baseline family stress characteristics and marital status at follow-up are summarized in Table 3.3. On average, female respondents rated their most serious family problem as more serious from their own perspective than did male respondents ($M_{RF} = 4.01, M_{RM} = 3.78, t(149) = 2.89, p = .004$). Similarly, male respondents rated their most serious family problem as more serious from their partner’s perspective than did female respondents ($M_{PM} = 3.86, M_{PF} = 3.43, t(148) = 2.67, p = .007$). This is consistent with past research suggesting that women experience family stress more intensely than men (Zwicker & DeLongis, 2010). Despite differences in mean levels, the pattern of correlations between stress appraisals and subsequent marital status was similar for both husbands and wives. Marital dissolution over the follow-up period was positively correlated with participant’s appraisals of family stressor severity from their own perspective ($r = .24, p = .016$ for husbands; $r = .26, p = .006$ for wives) and negatively correlated with appraisals of support from the spouse ($r = -.20, p = .043$ for husbands; $r = -.24, p = .013$ for wives). At the bivariate level, there was no significant relationship between subsequent marital status and participant’s
appraisals of the severity of their most serious family problem from their spouse’s perspective ($r = -.06, p = .541$ for husbands; $r = .09, p = .369$ for wives).
Table 3.3  Means, standard deviations, and correlations between stress appraisals at baseline and marital status at follow-up.

<table>
<thead>
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<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Husband’s appraisal of stressor severity from his perspective</td>
<td>0.65***</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>2. Husband’s appraisal of stressor severity from his wife’s perspective</td>
<td></td>
<td>0.07</td>
<td>-0.05</td>
<td></td>
<td></td>
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<tr>
<td>3. Husband’s appraisal of support from his wife</td>
<td></td>
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<tr>
<td>4. Wife’s appraisal of stressor severity from her perspective</td>
<td></td>
<td></td>
<td></td>
<td>0.41***</td>
<td>0.38***</td>
<td>-0.14</td>
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<tr>
<td>5. Wife’s appraisal of stressor severity from her husband’s perspective</td>
<td></td>
<td></td>
<td></td>
<td>0.28***</td>
<td>0.21*</td>
<td>-0.11</td>
<td>0.57***</td>
<td></td>
</tr>
<tr>
<td>6. Wife’s appraisal of support from her husband</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.12</td>
<td>-0.02</td>
<td>0.28***</td>
<td>-0.18*</td>
</tr>
<tr>
<td>7. Couple’s agreement on most serious problem</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.24**</td>
<td>0.31***</td>
<td>0.02</td>
</tr>
<tr>
<td>8. Marital status at follow-up</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.24*</td>
<td>-0.06</td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td></td>
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<tr>
<td>SD</td>
<td>1.05</td>
<td>1.12</td>
<td>1.04</td>
<td>0.99</td>
<td>1.32</td>
<td>1.09</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Marital Status: 0 = married or common-law; 1 = separated or divorced. *p<.05; **p<.01; ***p<0.001.
3.3.2 Logistic regression analysis

3.3.2.1 Model 1: Appraisal of stressor severity and subsequent marital status

At the bivariate level, the severity of the participant’s most serious family problem from his/her own perspective at baseline was associated with an increased likelihood that the couple would be divorced or separated at follow-up \( (OR = 1.48, 95\% CI = [1.10, 2.00], t(67) = 2.64, p = .010) \). This relationship remained significant in regression models with controls for participant’s appraisals of stressor severity from their spouse’s perspective, agreement on the most serious family stressor within the couple, and perceived support from the spouse (Table 3.4).

To examine the additional impact of participants’ perceptions of how serious their spouse considered their most serious family problem, participants’ appraisals of stressor severity from their own perspective and from their spouse’s perspective were both entered into the regression model simultaneously (Model 1a in Table 3.4). Above and beyond the effects of seeing the problem as serious from their own perspective, participants who felt that their spouse saw this family problem as serious were less likely to get divorced \( (OR = 0.68, 95\% CI = [0.50, 0.92], t(106) = 2.52, p = .013) \). Figure 3.2 summarizes the combined effect of participant’s appraisals of stressor severity from both partner’s perspectives. The predicted probability of divorce is highest for participants who consider their most serious problem as very serious and who perceived that their spouse does not consider this problem serious at all. In comparison, participants who consider their most serious problem to be very serious, but also perceive that their spouse considers this problem to be very serious have a lower probability of divorce.

Model 1b in Table 3.4 shows that there were no significant gender differences in the effects of appraisals of stressor severity on subsequent marital status.
<table>
<thead>
<tr>
<th></th>
<th>Model 1a: No gender difference</th>
<th>Model 1b: Including tests for gender differences</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR</td>
<td>95% CI</td>
</tr>
<tr>
<td>Participant’s appraisal of stressor severity from his/her perspective</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Main effect ((R_M + R_F))</td>
<td>2.09</td>
<td>[1.35, 3.22]</td>
</tr>
<tr>
<td>Gender difference ((R_M - R_F))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participant’s appraisal of stressor severity from his/her spouse’s perspective</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Main effect ((P_M + P_F))</td>
<td>0.68</td>
<td>[0.50, 0.92]</td>
</tr>
<tr>
<td>Gender difference ((P_M - P_F))</td>
<td></td>
<td></td>
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</tbody>
</table>
Figure 3.2 Relationship between stress appraisals and probability of marital dissolution.

Predicted probability of marital dissolution is based on the results from Model 1a.
3.3.2.2 Model 2: Adjusting for agreement about the most serious problem

Comparing the descriptions of the most serious family stressor from each member of each couple revealed that both members described the same problem in 45% of couples. Agreement on the most serious problem may also reflect a joint view of the severity of family stressors. The models in Table 3.5 show that both agreement on the most serious family problem and appraisals of family stressor severity are uniquely predictive of subsequent marital status. Couples in which both spouses report the same problem as the most serious family problem were at a lower risk of marital dissolution ($OR = 0.36, p = .037$), controlling for how serious they both thought that problem was. However, the protective effect of participants’ perceptions of their spouses’ appraisals of stressor severity appears to be above and beyond agreement about the most serious problem.
Table 3.5 Logistic regression results predicting odds of marital dissolution from appraisals of stressor severity and couple agreement

<table>
<thead>
<tr>
<th>Model</th>
<th>Participant’s appraisal of stressor severity from his/her perspective</th>
<th>Coupled’s agreement on most serious problem</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Main effect ((R_M + R_F))</td>
<td>Gender difference ((R_M - R_F))</td>
</tr>
<tr>
<td>Model 2a: No gender difference</td>
<td>2.22 [1.40, 3.51] (&lt;.001)</td>
<td>0.98 [0.65, 1.50] (.936)</td>
</tr>
<tr>
<td>Model 2b: Including tests for gender differences</td>
<td>2.40 [1.50, 3.86] (&lt;.001)</td>
<td>0.98 [0.65, 1.50] (.936)</td>
</tr>
</tbody>
</table>
3.3.2.3 Model 3: Adjusting for appraisals of social support

Although appraisals of social support from the spouse were correlated with subsequent marital status (Table 3.3), this did not fully account for the association between participants’ perceptions of their spouses’ appraisals of stressor severity and a lower risk of marital dissolution (Table 3.6). The protective effect of participants’ perceptions of their spouses’ appraisals of stressor severity appears to be above and beyond participant’s perceptions of social support from their spouse. As in models 1b and 2b, model 3b (Table 3.6) showed no evidence of significant gender differences. There were no significant gender differences in the effects of appraisals of stressor severity or support from the spouse on subsequent marital status.
Table 3.6 Logistic regression results predicting odds of marital dissolution from appraisals stressor severity and support from spouse

<table>
<thead>
<tr>
<th></th>
<th>Model 3a: No gender difference</th>
<th></th>
<th>Model 3b: Including tests for gender differences</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR</td>
<td>95% CI</td>
<td>p</td>
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<tr>
<td>Participant’s appraisal of stressor severity from his/her perspective</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Main effect ((R_M + R_F))</td>
<td>1.98</td>
<td>[1.27, 3.08]</td>
<td>.003</td>
</tr>
<tr>
<td>Gender difference ((R_M - R_F))</td>
<td></td>
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<tr>
<td>Participant’s appraisal of stressor severity from his/her spouse’s perspective</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Main effect ((P_M + P_F))</td>
<td>0.70</td>
<td>[0.51, 0.95]</td>
<td>.024</td>
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<tr>
<td>Gender difference ((P_M - P_F))</td>
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<tr>
<td>Participant’s appraisal of support from his/her spouse</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Main effect ((S_M + S_F))</td>
<td>0.80</td>
<td>[0.62, 1.01]</td>
<td>.062</td>
</tr>
<tr>
<td>Gender difference ((S_M - S_F))</td>
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3.4 Discussion

The findings from the current investigation provide support for the importance of cognitive appraisals in theoretical models of stress. Participants who reported family problems that they appraised as more serious were found to be at greater risk of marital dissolution decades later. However, our findings also point to the limitations of Lazarus’s (1966; 1984) traditional cognitive model. They underscore the need for social contextual and dyadic coping models that take into account the importance of the perspectives of both members of the marital dyad and the potential benefits of shared appraisals of stress.

Consistent with social contextual and dyadic coping models (DeLongis et al., 2010; Revenson et al., 2005), we found that the risk of separation or divorce was lower when participants reported that their spouse also considered the problem as serious. In addition, comparing data from both spouses indicated that when both reported the same problem as their most serious, the risk of marital dissolution was also decreased. This suggests that getting spouses to agree on their most serious family problem and changing how the spouse is perceived may both help improve marital outcomes.

When spouses have discrepant appraisals of the severity of important family problems, this may result in worse marital outcomes because it hinders effective coping efforts. For example, collaborative coping (i.e., spouses pooling resources and problem solving jointly) often requires that both members of the couple recognize the problem or stressor as something that needs to be resolved (Berg et al., 2008; Hoppmann & Gerstorf, 2013).

The protective effect of perceived spouse appraisals on marital stability was found to be independent of whether spouses saw the same problem as most serious. That is, even when each
spouse reported a different problem as “most serious”, reporting that the other also thought the problem was serious was associated with better outcomes. This suggests that fostering a sense of shared perspective (i.e., “I think that my spouse and I both see this problem as serious”) may be effective even if both partners do not see the problem in the same way. Perceiving that one’s spouse does not take your stress seriously is one component of negative dyadic coping (Bodenmann, 2008) that may ultimately be detrimental for the longevity of the relationship. Past research has shown that perceptions of the spouse can significantly impact the relationship, above and beyond whether these perceptions are accurate. For example, perceived similarity has been shown to be a stronger predictor of marital well-being than actual similarity (Acitelli, Douvan, & Veroff, 1993). For any given individual, a perception that one’s spouse also takes an identified family problem seriously may reflect a broader set of shared views that strengthens their relationship and identity as a couple (Acitelli, 1993; Agnew, Rusbult, & Langston, 1998; P. L. Berger & Kellner, 1964). The process of forming a shared identity may be especially important in stepfamilies. Jacobson (1996) has argued that one of the reasons stepfamilies are less stable than traditional two-parent families stems from the challenges of integrating family members with distinct world views from different family cultures.

Support in times of stress has been consistently associated with better individual and dyadic outcomes (Cutrona, 1996; House et al., 1988; Uchino, 2009). Indeed, we found that social support from the spouse was correlated with a lower likelihood of marital dissolution over the follow-up period. However, our findings also add to a growing literature that suggests social support measures do not fully capture key aspects of dyadic interactions during periods of stress (Bertoni, Donato, & Molgora, 2018; Coyne & DeLongis, 1986; Revenson et al., 2005). The effects of appraisals of stress on marital stability were above and beyond the effects of perceived
support from the spouse. The protective effects of married couples’ shared appraisals of stressors is not fully explained by spouse support, but rather adds to our ability to predict marital stability over the long-term. Nevertheless, the brief measure of social support used in the current study was limited to support interactions in the context of the most serious family problem and does not reflect other forms of support from the spouse that may also be important for marital outcomes (Rafaeli & Gleason, 2009).

This study used reports from one member of the dyad to capture appraisals of stressor severity from both partner’s perspectives. An alternative approach would be to ask each dyad member to rate the severity of the same problem from his/her own perspective and his/her partner’s perspective. This second approach would allow researchers to assess the effects of accurately perceiving the other’s perspective. Studies of the effects of accurately perceiving others using this kind of approach have yielded some interesting insights that our design does not capture (Fletcher & Kerr, 2010). However, this alternative approach is not without its own limitations. Applied to our study, it would have required us to disclose the most serious problem reported by one member of the couple to their spouse so that both partners could rate the severity of the same problem. Instead, we maintained each participant’s confidentiality and did not share any of their responses with their spouse. In doing so, participants may have been more willing to disclose very serious problems, even ones they are not comfortable discussing with their spouse.

The current investigation focused on stepfamilies, who typically experience higher levels of family stress than do more traditional family forms (Bray & Berger, 1993; Sweeney, 2010). Whether the findings generalize to less stressed couples, or couples in other family forms, is unclear and requires additional research. However, despite the increasing prevalence of stepfamilies, they remain an understudied family structure and therefore an important one on
which to focus. The current longitudinal study adds to the limited literature on stepfamilies by providing unique insights into the role that stress plays in predicting divorce. Nevertheless, the sample is relatively small, predominantly White, and higher than average SES. The findings may not generalize to other socioeconomic, racial, or ethnic contexts, in which the stressors couples face and the coping resources they have available may vary. However, the current sample included stepfamilies with a range of structures and compositions (e.g., ages of children, stepfamily type). Capturing families at a variety of life stages may have contributed to the diversity of stressors they reported.

There are very few clinical interventions for prevention and treatment of couple relationship problems in the context of stepfamily living (Browning & Bray, 2010; Bullard et al., 2010; Whitton, Nicholson, & Markman, 2008). Reducing the stress that couples face is an important goal of many interventions designed to improve marital satisfaction and stability (Lavner & Bradbury, 2017). Our findings support the importance of early preventive interventions that target reducing family stress. Additional research is necessary to determine if interventions that target early appraisals of family stress can reduce the long-term risk of divorce, and to increase understanding of the mechanisms involved. For couples who are facing serious problems or challenges, feeling that they both view these stressors as serious and are facing the stress together may help prevent a sense of alienation that has been related to declines in relationship satisfaction and eventual break-up (Bodenmann et al., 2007). Instead, shared appraisals of stress may help reinforce a sense of shared experience and commitment that bolsters the longevity of the relationship (Agnew et al., 1998). Marital therapists have long acknowledged that a shared appraisal of the presenting problem between spouses is an important prognostic indicator (Lebow, Chambers, Christensen, & Johnson, 2012). Our findings suggest
that getting couples to agree on their sources of family stress may be helpful, but that clinicians may also need to foster an understanding that the spouse is taking family problems seriously.
Chapter 4: Growth in the Face of Adversity in Families of Children with a Complex Chronic Health Condition

4.1 Introduction

The stress associated with having a severe or chronic illness is not limited to the person with the diagnosis. Family members also experience significant stress from caring and living with someone who has a chronic illness. Most of the research studying family member dyads in the context of coping with health problems has focused on either married couples or parent-child dyads (e.g., Berg et al., 2009; Stephenson et al., 2014). When one member of a married couple is diagnosed with an illness such as arthritis, diabetes, cancer, or cardiac disease, it is clear that the other spouse is also affected (Hagedoorn, Sanderman, Bolks, Tuinstra, & Coyne, 2008; Revenson & DeLongis, 2010; Vilchinsky, 2017; Wiebe, Helgeson, & Berg, 2016). Researchers have documented a variety of mutually influential coping processes in couples with chronic illness, including joint appraisals of illness ownership (Kayser et al., 2007), use of dyadic coping strategies (Badr, Carmack, Kashy, Cristofanilli, & Revenson, 2010; Berg et al., 2008), and shared adjustment trajectories in which the wellbeing of both partners is affected (Meyler, Stimpson, & Peek, 2007; Polenick, Martire, Hemphill, & Stephens, 2015; Soriano et al., 2018). As such, the coping and adjustment of one spouse is related to the coping and adjustment of the other. Similar patterns of mutual influence and joint adjustment have been observed in parent-child dyads, including parents with chronically ill children (Berg et al., 2017; Kazak & Baxt,

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2007) and children of chronically ill parents (Lavelle, Wittenberg, Lamarand, & Prosser, 2014; Sieh, Meijer, Oort, Visser-Meily, & van der Leij, 2010). Increasingly, medical professionals are recognizing the need to consider the family system in their interventions (Carman et al., 2013; Hartmann, Bätzner, Wild, Eisler, & Herzog, 2010; Kazak, Simms, & Rourke, 2002; Martire, Lustig, Schulz, Miller, & Helgeson, 2004). However, a more complete understanding of how the family system is affected by chronic illness requires that researchers consider other types of relationships as well. In families with a chronically ill child, less attention has been paid to parent-child dyads that do not include the afflicted child. That is, the siblings of the child with the target health condition and their parents. In this study, we address this gap in the literature by investigating how siblings of children with severe, complex, chronic health conditions are functioning over time and the relationship this has with their mothers’ adjustment to caregiving stress.

4.1.1 Siblings of children with chronic health problems

Having a sibling with a chronic health condition represents a risk to children’s psychological health and wellbeing. These children are at increased risk of anxiety, depression, posttraumatic stress symptoms, poorer quality of life, behavioral difficulties, and/or peer problems (Alderfer et al., 2010; O’Brien, Duffy, & Nicholl, 2009; Sharpe & Rossiter, 2002; Vermaes, van Susante, & van Bakel, 2012). The findings of a recent meta-analysis suggest that the risk for poor psychological functioning among siblings of children with chronic health conditions is especially pronounced if the condition is highly intrusive or life-threatening (Vermaes et al., 2012). Given this, siblings of children with complex chronic conditions (CCC) involving progressive and life-threatening symptoms are expected to be at high risk for behavioural problems. However, relatively little research has investigated the experience of
siblings of children with life-threatening, non-curable genetic, metabolic, or neurological conditions. These families typically anticipate an unknown trajectory and must live with great uncertainty (Siden et al., 2010; Steele et al., 2014). They also devote considerable time and resources to caring for the ill child (Siden & Steele, 2015).

The studies of siblings of children with chronic health conditions have been largely cross-sectional and there is a need for more longitudinal research to identify factors that protect these siblings from potential adverse outcomes (Vermaes et al., 2012). The present study addresses this limitation by following families over a period of up to 4 years to investigate potential protective factors associated with changes in sibling functioning over time.

### 4.1.2 Posttraumatic growth as a form of resilience in times of stress

Posttraumatic growth refers to positive changes experienced in the face of adversity (Tedeschi & Calhoun, 1996). Tedeschi and Calhoun, among others (e.g., (Affleck & Tennen, 1996; McMillen, 1999), have described various aspects of growth in the face of adversity, including the experience of new possibilities, enhanced relationships, enhanced strength, increased appreciation of life, and spiritual change. Experiences of posttraumatic growth have been reported among caregivers of children with life-limiting illness (Cadell et al., 2014), as well as other pediatric medical conditions including cancer (Picoraro, Womer, & Kazak, 2014). Although the impact of parents’ mental health problems on their children has been widely studied (Amrock & Weitzman, 2014; Downey & Coyne, 1990; Goodman & Gotlib, 1999), fewer studies have examined the effect of parental resilience factors on child outcomes (Cabaj, McDonald, & Tough, 2014; Patterson, 2002). The focus of research on posttraumatic growth has been on individual factors associated with growth rather than on how the effects of growth experiences might spill over to other network members. Berger and Weiss (2008) have proposed
a model of posttraumatic growth that extends to the entire family system. Despite this proposal, only a few studies have examined the impact of one family member’s posttraumatic growth on other family members (Thornton & Perez, 2006; Weiss, 2004; Zwahlen, Hagenbuch, Carley, Jenewein, & Buchi, 2010).

4.1.3 Objectives of the current study

The goal of the present study was to examine the potential protective effects of mothers’ experiences of posttraumatic growth on adjustment among their children over time, particularly changes in behavior problems among the siblings of the chronically ill child. This may be one way in which mother’s adjustment in the face of adversity affects the adjustment of her children. Psychological adjustment among children is frequently assessed in terms of behavior problems (Carter, Briggs-Gowan, & Davis, 2004). For children and adolescents, stressful life experiences can manifest as both internalizing and externalizing behaviors (Compas, Connor-Smith, Saltzman, Thomsen, & Wadsworth, 2001; Kim, Conger, Elder, & Lorenz, 2003); therefore, we examined both types of behavior problems. A mother’s experience of growth was expected to be associated with improvements in behavioral functioning of the siblings of the children with CCC over time.

4.2 Methods

The methods described here are part of a larger study that was implemented to determine and document the experiences of families of children with progressive, non-curable genetic, metabolic, or neurological conditions over time (Siden et al., 2010). Children and their families were followed for up to 4 years. Participants were enrolled from 9 clinical sites (7 in Canada, 2
in USA). In addition to obtaining ethical approval from each of clinical study settings, ethical approval was also obtained from 4 universities at which the researchers were affiliated.

4.2.1 Recruitment

Families were recruited from July 2009 until October 2012, primarily through referrals from hospital clinics (49%) and hospice/palliative teams/services (43%). Initial eligibility was determined by a palliative care specialist and was based on the chronically ill child’s condition. To be eligible, a family had to have a child with a health condition that met all of the following criteria. The health condition 1) was diagnosed by a physician as progressive and incurable, 2) is believed to have a genetic or metabolic cause, 3) manifests in neurological (CNS) impairment, 4) has no effective treatment available or treatment is failing for this particular patient, and 5) will likely result in the death of the child before the child reaches 20 years of age.

Figure 4.1 illustrates the enrollment process. Of 385 families evaluated for eligibility in the larger study, 34 did not meet inclusion criteria, 59 declined further contact, and 34 could not be contacted, leaving 258 families who were enrolled. A total of 365 potentially eligible siblings were identified in 192 of the 258 families, but information was provided for only 304 siblings who were then evaluated based on sibling eligibility criteria. To be eligible to participate, the sibling had to be cognitively capable of participating, understand English or French, and be aged 7-18 years. One hundred and twenty-one siblings met these eligibility criteria, 65 of whom were

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7 No significant mean differences in child behavior outcomes or maternal posttraumatic growth were detected across the 9 recruitment sites or between the 2 countries.

8 All children were screened for health conditions. Parents were asked to report if any of their other children had medical conditions. Health conditions of participating siblings included asthma, allergies, hearing loss, mild visual impairment, and metabolic disorders that did not qualify for participation as a target child with complex chronic conditions. Siblings with cognitive impairments such as severe autism were excluded from the study.
enrolled in the study at baseline. An additional 5 siblings became eligible during the follow-up period, resulting in a total of 70 siblings from 58 families who were recruited into the study.
Figure 4.1 Participant recruitment for Study 3

385 families recruited to be evaluated for eligibility based on the child’s illness

34 families did not meet inclusion criteria
59 families declined to participate
34 families could not be contacted

258 families enrolled in the larger study

61 families with only one child (no siblings)
Five 2-child families in which both children had eligible complex chronic conditions

192 families with 365 siblings

61 siblings could not be contacted to obtain information needed to evaluate their eligibility

304 siblings evaluated for eligibility

At baseline:
92 siblings were too young (<7 years old)
58 were too old (>18 years old)
18 were cognitively impaired
15 had a severe health condition

121 eligible siblings

65 siblings from 53 families enrolled at baseline

5 additional siblings who become eligible (age 7) to participate after baseline family enrollment

Final sample:
70 siblings from 58 families
4.2.2 Data collection

Siblings and parents completed the baseline questionnaires in-person ($n = 24$) or by mail ($n = 34$), and subsequently every six months by mail. Each member of a family was asked to complete the questionnaires individually. In an effort to protect confidentiality, each participant was given an envelope for his or her own personal use. Then all the sealed smaller personal envelopes went into the larger 'family' envelope that was returned to the research team. If the ill child died during the course of the study ($n = 8$), the research team sent a sympathy card to the family and then did not make contact for a period of six months following the death to allow the family to grieve undisturbed. After the six-month period, families were invited to resume follow-up assessments.

4.2.3 Measures

4.2.3.1 Child behavior problems

Parents$^9$ completed the Child Behavior Checklist (CBCL) for each participating sibling in the family (Achenbach, 2001). The 120-item behavior problems section of the CBCL generated scores on Internalizing Problems, Externalizing Problems, and Total Problems. Higher scores indicate greater behavioral problems. Youth (ages 11-18) are considered developmentally to be at a stage at which they are able to validly complete the youth self-report (YSR) form of the measure (Achenbach, 2001) for themselves. In these cases, we obtained youth completed reports, in addition to the parent completed CBCL. The internalizing problems (CBCL $\alpha = .88$; YSR $\alpha = .92$), externalizing problems (CBCL $\alpha = .93$; YSR $\alpha = .87$), and total problems (CBCL

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$^9$ In each family one parent designated him/herself to complete a set of questionnaires pertaining to sibling functioning. In 54 families the mother was the designated parent. In 4 families the father was the designated parent.
α = .96; YSR α = .96) scales of both measures showed good internal consistency across all observations in the current sample. Both raw scores and T-scores are presented for descriptive purposes, but following recommendations for use in statistical analyses, raw scores were used in all subsequent analyses (Achenbach, 2001).

4.2.3.2 Posttraumatic growth

The Post Traumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996) was used to assess growth among mothers. The 21 items of the PTGI are rated on a 6-point Likert scale that indicates the degree to which a change in the person’s life has come about (Total scale, Cronbach’s α = .91). Consistent with other applications in pediatric palliative care research (e.g., Cadell et al., 2014), mothers were asked to rate the degree to which change had occurred in their lives as a result of the illness of their child. Although we limited our hypothesis to expectations regarding the protective role of overall PTGI scores in the development of sibling behavior problems over time, we examined the relationship between all PTGI subscales and changes in child behavior outcomes. There are five subscales in the PTGI that represent different forms of growth and showed good internal consistency in the current sample: Relating to Others (e.g., “I have a greater sense of closeness with others”; Cronbach’s α = .87), New Possibilities (e.g., “I established a new path for my life”; Cronbach’s α = .78), Personal Strength (e.g., “I know better that I can handle difficulties”; Cronbach’s α = .79), Spiritual Change (e.g., “I have a better understanding of spiritual matters”; Cronbach’s α = .81), and Appreciation of Life (e.g., “I have a greater appreciation for the value of my own life”, Cronbach’s α = .65).

4.2.3.3 Demographic information

When they enrolled in the study, parents completed a demographics questionnaire that asked questions about their child’s illness (e.g., child’s diagnosis) and other family
characteristics (e.g., total number of children, family income).

4.2.4 Data analysis

To estimate the effect of maternal posttraumatic growth on changes in child behavior problems from one time point to the next, a series of lagged multilevel regression analyses were run in R using the lme4 and lmerTest packages (Bates et al., 2015; Kuznetsova et al., 2017). Multilevel regression analyses were employed to account for the dependence of observations within families and within siblings over time.

A series of models were run to test the effects of different facets of maternal posttraumatic growth on subsequent changes in parent-reported and self-reported child behaviour problems. Each model had the same basic form as Equation 4.1.

Equation 4.1

\[ CBP_{ij(t+1)} = b_0 + b_1 CBP_{ijt} + b_2 PTG_{jt} + u_i + u_j + e_{ijt} \]

Child behavior problems (CBP) for child \( i \) in family \( j \) at time point \((t+1)\) were predicted from child behavior problems and maternal posttraumatic growth (PTG) at the previous time point, \( t \). Lags were based on the next available time point for that child in order to maximize inclusion of available data in analyses. The average length of time between consecutive time points was 6.15 months (\( SD = 2.30 \)). Given the relatively small sample size, only random intercepts for child (\( u_i \)) and family (\( u_j \)) were included as random effects to account for non-independence of the observations. All slopes were modeled as fixed effects. This means that the size of the effect of maternal posttraumatic growth on child behaviour problems is assumed to be constant across children and families.

First, we examined the relationship between maternal posttraumatic growth (total score) and changes in parent-reported and youth self-reported total behaviour problems scores on the
CBCL and YSR, respectively. Next, we explored whether the relationship between total posttraumatic growth and changes in behavior problems was specific to internalizing or externalizing problems, or whether maternal posttraumatic growth was associated with changes in both types of behavior problems. Then, we explored whether the specific facets of maternal posttraumatic growth (New Possibilities, Relating to Others, Personal Strength, Appreciation of Life, and Spiritual Change) were associated with changes in internalizing, externalizing, and total problems. Finally, all models were reported with and without the child’s age included as a covariate.

4.3 Results
4.3.1 Sample description

Of the 58 families with a participating sibling, reports on either the CBCL or the YSR were available for 70 siblings for at least one time point. The demographic characteristics of these families and siblings are summarized in Table 4.1. Means and standard deviations for child behavior outcomes and maternal posttraumatic growth are presented in Table 4.2. On average, the level of child behavior problems in this sample was within the normal range; however, 5-15% of scores were within the clinical range (T-score > 63; Table 4.2). This is consistent with established norms for these measures (Achenbach, 2001). Although there are no established clinical cut-offs for the PTGI, the mean levels reported in this sample are consistent with the level of posttraumatic growth reported in similar samples of parent caregivers (Cadell et al., 2014). Child behavior problems and maternal posttraumatic growth scores were unrelated to the number of time points at which questionnaires were completed.
<table>
<thead>
<tr>
<th><strong>Table 4.1 Sample characteristics for Study 3</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age of sibling at enrollment</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Primary complex chronic health condition</strong></td>
</tr>
<tr>
<td>Severe neurological impairment—not yet diagnosed</td>
</tr>
<tr>
<td>Epileptic encephalopathy/neurodegenerative disease</td>
</tr>
<tr>
<td>Mitochondrial encephalomyopathy</td>
</tr>
<tr>
<td>Lysosomal/peroxisomal leukodystrophy</td>
</tr>
<tr>
<td>Multi organ congenital abnormalities</td>
</tr>
<tr>
<td>Structural CNS abnormalities</td>
</tr>
<tr>
<td>Neuromuscular diseases</td>
</tr>
<tr>
<td>Small molecules diseases</td>
</tr>
<tr>
<td>Other conditions not otherwise specified</td>
</tr>
<tr>
<td><strong>Total number of children per family</strong></td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>7</td>
</tr>
<tr>
<td><strong>Number of participating siblings in the family</strong></td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td><strong>Gender of participating siblings</strong></td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td><strong>Birth order</strong></td>
</tr>
<tr>
<td>Sibling is older than ill child</td>
</tr>
<tr>
<td>Sibling is younger than ill child</td>
</tr>
<tr>
<td><strong>Family income</strong></td>
</tr>
<tr>
<td>Less than $40K</td>
</tr>
<tr>
<td>$40K-$80K</td>
</tr>
<tr>
<td>$80K-$120K</td>
</tr>
<tr>
<td>$120K or more</td>
</tr>
<tr>
<td><strong>Mother’s ethnicity</strong></td>
</tr>
<tr>
<td>Aboriginal</td>
</tr>
<tr>
<td>Arab/West Asian</td>
</tr>
<tr>
<td>Black</td>
</tr>
<tr>
<td>Chinese</td>
</tr>
<tr>
<td>European</td>
</tr>
<tr>
<td>South Asian</td>
</tr>
<tr>
<td>Other</td>
</tr>
<tr>
<td>Mixed</td>
</tr>
<tr>
<td>Not specified</td>
</tr>
</tbody>
</table>
### Table 4.2 Means and standard deviations

<table>
<thead>
<tr>
<th></th>
<th>Raw score</th>
<th>T-score</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td>% in clinical range</td>
</tr>
<tr>
<td>CBCL Internalizing</td>
<td>6.45</td>
<td>6.34</td>
<td>50.69</td>
<td>10.33</td>
<td>13.3</td>
</tr>
<tr>
<td>CBCL Externalizing</td>
<td>6.10</td>
<td>7.53</td>
<td>48.56</td>
<td>10.66</td>
<td>8.4</td>
</tr>
<tr>
<td>CBCL Total Problems</td>
<td>22.34</td>
<td>20.43</td>
<td>49.11</td>
<td>10.80</td>
<td>8.0</td>
</tr>
<tr>
<td>YSR Internalizing</td>
<td>10.53</td>
<td>9.31</td>
<td>49.66</td>
<td>11.51</td>
<td>14.9</td>
</tr>
<tr>
<td>YSR Externalizing</td>
<td>8.12</td>
<td>6.39</td>
<td>47.70</td>
<td>9.25</td>
<td>5.2</td>
</tr>
<tr>
<td>YSR Total Problems</td>
<td>34.18</td>
<td>23.90</td>
<td>48.99</td>
<td>10.28</td>
<td>11.9</td>
</tr>
<tr>
<td>Maternal PTG - Total</td>
<td>65.01</td>
<td>19.05</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal PTG – Relating to others</td>
<td>21.19</td>
<td>7.43</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal PTG – New Possibilities</td>
<td>14.34</td>
<td>5.77</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal PTG – Personal Strength</td>
<td>13.68</td>
<td>4.37</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal PTG – Spiritual Change</td>
<td>5.07</td>
<td>3.42</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal PTG – Appreciation of Life</td>
<td>10.72</td>
<td>3.07</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CBCL = parent-reported child behaviour problems. YSR = youth self-reported behaviour problems. PTG = posttraumatic growth.
4.3.2 Predicting changes parent-reported behavior problems over time

Regression analyses predicting changes in parent-reported child behavior problems were based on cases where the CBCL was completed at 2 consecutive time points (n = 179 pairs of observations, n = 52 siblings, n = 43 families). To examine the effect of maternal posttraumatic growth the mother also had to have completed the PTGI at the earlier of the 2 time points; therefore, the final regression analyses were based on 173 observations from 50 siblings from 41 families. The relationships between maternal posttraumatic growth and changes in parent-reported CBCL scores are show in Table 4.3. Higher levels of total posttraumatic growth were associated with decreased sibling internalizing (b = -0.04, CI_{95} = [-0.08, -0.01], t(170) = 2.51, p = .013), externalizing (b = -0.04, CI_{95} = [-0.07, -0.01], t(170) = 2.34, p = .020), and total behavior problems (b = -0.11, CI_{95} = [-0.19, -0.02], t(170) = 2.49, p = .014) at the subsequent time point. Growth in terms of relationships with others was also associated with reduced parent-reported internalizing (b = -0.11, CI_{95} = [-0.20, -0.03], t(170) = 2.69, p = .008), externalizing (b = -0.09, CI_{95} = [-0.17, -0.02], t(170) = 2.39, p = .018), and total behavior problems (b = -0.27, CI_{95} = [-0.48, -0.06], t(170) = 2.57, p = .011) at the next time point. The New Possibilities facet of posttraumatic growth was associated with reduced parent-reported externalizing (b = -0.14, CI_{95} = [-0.24, -0.04], t(170) = 2.71, p = .007) and total behavior problems (b = -0.30, CI_{95} = [-0.57, -0.03], t(170) = 2.20, p = .028) at the subsequent time point, but was not significantly associated with changes in internalizing problems (b = -0.09, CI_{95} = [-0.20, 0.02], t(170) = 1.61, p = .108). The Personal Strength, Spiritual Change, and Appreciation of Life subscales of posttraumatic growth were not significantly associated with changes in parent-reported internalizing, externalizing, or total behavior problems (all ps > .05).
A similar pattern of results was observed when the models were adjusted for sibling age\textsuperscript{10} (Table 4.3).

\textsuperscript{10} Sibling age was the only demographic variable associated with changes in child behavior problems. Older age was associated with higher internalizing problems on the CBCL.
Table 4.3 Lagged unstandardized relationships between maternal posttraumatic growth and parent-reported sibling behavior problems

<table>
<thead>
<tr>
<th></th>
<th>Internalizing Problems</th>
<th></th>
<th>Externalizing Problems</th>
<th></th>
<th>Total Problems</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unadjusted for sibling age</td>
<td>Adjusted for sibling age</td>
<td>Unadjusted for sibling age</td>
<td>Adjusted for sibling age</td>
<td>Unadjusted for sibling age</td>
<td>Adjusted for sibling age</td>
</tr>
<tr>
<td>Overall Analysis of Posttraumatic Growth</td>
<td>$b$</td>
<td>($SE$)</td>
<td>$b$</td>
<td>($SE$)</td>
<td>$b$</td>
<td>($SE$)</td>
</tr>
<tr>
<td>Total Posttraumatic Growth</td>
<td>-.043</td>
<td>(.017) *</td>
<td>-.043</td>
<td>(.018) *</td>
<td>-.037</td>
<td>(.016) *</td>
</tr>
<tr>
<td>Analysis of Posttraumatic Growth Sub-Scales</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relating to Others</td>
<td>-.114</td>
<td>(.042) **</td>
<td>-.107</td>
<td>(.044) *</td>
<td>-.094</td>
<td>(.040) *</td>
</tr>
<tr>
<td>New Possibilities</td>
<td>-.089</td>
<td>(.055)</td>
<td>-.086</td>
<td>(.056)</td>
<td>-.137</td>
<td>(.051) **</td>
</tr>
<tr>
<td>Personal Strength</td>
<td>-.133</td>
<td>(.074) +</td>
<td>-.136</td>
<td>(.077) +</td>
<td>-.092</td>
<td>(.069)</td>
</tr>
<tr>
<td>Spiritual Change</td>
<td>-.198</td>
<td>(.098) +</td>
<td>-.257</td>
<td>(.103) *</td>
<td>-.094</td>
<td>(.088)</td>
</tr>
<tr>
<td>Appreciation of Life</td>
<td>-.098</td>
<td>(.108)</td>
<td>-.092</td>
<td>(.112)</td>
<td>-.015</td>
<td>(.100)</td>
</tr>
</tbody>
</table>

Note: **$p<.01$, *$p<.05$, *$p<.10$. All models predict child behaviour problems at the subsequent time point ($CBP_{ij(t+1)}$) and control for the outcome score at the previous time point ($CBP_{ijt}$). Models were based on 173 observations from 50 siblings from 41 families. Age adjusted models control for sibling age at time point the outcome is measured ($Age_{ij(t+1)}$).
4.3.3 Predicting changes in youth self-reported behavior problems over time

Of the 70 participating siblings, 42 were over the age of 11 and eligible to complete the YSR for at least one time point. There was a total of 149 time points when families completed a questionnaire package and a sibling aged 11 years or older was eligible to complete the YSR. Of these 134 YSR reports were completed. Regression analyses predicting changes in sibling-reported behavior problems were based on cases where the YSR was completed at 2 time points \((n = 88\) pairs of observations, \(n = 29\) siblings, \(n = 23\) families). To examine the effect of maternal posttraumatic growth the mother also had to have completed the PTGI at the earlier of the 2 time points; therefore, the final regression analyses were based on 82 observations from 27 siblings from 21 families. The relationships between maternal posttraumatic growth and changes in youth self-reported (YSR) behavior problems are shown in Table 4.4. Total scores on maternal posttraumatic growth were not significantly associated with changes in youth self-reports of internalizing \((b = -0.04, CI_{95} = [-0.10, 0.02], t(12.49) = 1.18, p = .257)\), externalizing \((b = -0.04, CI_{95} = [-0.09, 0.02], t(79) = 1.34, p = .185)\), or total behavior problems \((b = -0.14, CI_{95} = [-0.30, 0.03], t(79) = 1.65, p = .102)\). However, consistent with findings reported above for parent reports on the CBCL, maternal posttraumatic growth specifically in terms of relationships with others was associated with decreases in self-reported internalizing \((b = -0.16, CI_{95} = [-0.30, -0.03], t(79) = 2.38, p = .020)\), externalizing \((b = -0.13, CI_{95} = [-0.26, -0.01], t(79) = 2.02, p = .047)\), and total behavior problems \((b = -0.45, CI_{95} = [-0.80, -0.09], t(79) = 2.46, p = .016)\) at the subsequent time point. Maternal spiritual change was also associated with decreases in youth-reported internalizing problems at the next time point \((b = -0.38, CI_{95} = [-0.71, -0.05], t(79) = 2.26, p = .027)\), but not changes in externalizing \((b = -0.18, CI_{95} = [-0.50, 0.13], t(79) = 1.15, p = .252)\) or total problems \((b = -0.76, CI_{95} = [-1.65, 0.13], t(79) = 1.68, p = .097)\). The New
Possibilities, Personal Strength, and Appreciation of Life subscales of posttraumatic growth were not significantly associated with changes in self-reported internalizing, externalizing, or total behavior problems (all \( p > .05 \)). A similar pattern of results was observed when the models were adjusted for sibling age (Table 4.4).
Table 4.4 Lagged unstandardized relationships between maternal posttraumatic growth and sibling self-reported behavior problems

<table>
<thead>
<tr>
<th></th>
<th>Internalizing Problems</th>
<th></th>
<th>Externalizing Problems</th>
<th></th>
<th>Total Problems</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unadjusted for sibling age</td>
<td>Adjusted for sibling age</td>
<td>Unadjusted for sibling age</td>
<td>Adjusted for sibling age</td>
<td>Unadjusted for sibling age</td>
<td>Adjusted for sibling age</td>
</tr>
<tr>
<td>Overall Analysis of Posttraumatic Growth</td>
<td>$b$</td>
<td>$(SE)$</td>
<td>$b$</td>
<td>$(SE)$</td>
<td>$b$</td>
<td>$(SE)$</td>
</tr>
<tr>
<td>Total Posttraumatic Growth</td>
<td>-.037</td>
<td>(.031)</td>
<td>-.027</td>
<td>(.034)</td>
<td>-.038</td>
<td>(.029)</td>
</tr>
<tr>
<td>Analysis of Posttraumatic Growth Sub-Scales</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relating to Others</td>
<td>-.164</td>
<td>(.069) *</td>
<td>-.161</td>
<td>(.069) *</td>
<td>-.131</td>
<td>(.065) *</td>
</tr>
<tr>
<td>New Possibilities</td>
<td>-.029</td>
<td>(.110)</td>
<td>-.006</td>
<td>(.114)</td>
<td>-.127</td>
<td>(.088)</td>
</tr>
<tr>
<td>Personal Strength</td>
<td>.296</td>
<td>(.150) +</td>
<td>.315</td>
<td>(.149) *</td>
<td>.052</td>
<td>(.131)</td>
</tr>
<tr>
<td>Spiritual Change</td>
<td>-1.382</td>
<td>(.169) *</td>
<td>-1.358</td>
<td>(.174) *</td>
<td>-1.185</td>
<td>(.160)</td>
</tr>
<tr>
<td>Appreciation of Life</td>
<td>.167</td>
<td>(.221)</td>
<td>.179</td>
<td>(.226)</td>
<td>.153</td>
<td>(.186)</td>
</tr>
</tbody>
</table>

Note: **$p < .01$. *$p < .05$. *$p < .10$. All models predict child behaviour problems at the subsequent time point ($CBP_{ij(t+1)}$) and control for the outcome score at the previous time point ($CBP_{ijt}$). Models were based on 82 observations from 27 siblings from 21 families. Age adjusted models control for sibling age at time point the outcome is measured ($Age_{ij(t+1)}$).
4.4 Discussion

Our findings suggest that, among families with a child diagnosed with a complex chronic health condition, mothers’ experiences of posttraumatic growth are associated with the functioning of their healthy children. Mothers who reported greater total posttraumatic growth had children with decreased parent-reported behavior problems over time. This effect was not limited to either externalizing or internalizing problems. Rather, overall maternal posttraumatic growth was associated with reductions in internalizing problems, externalizing problems, and behavior problems in general.

In most of the families in our study, mothers completed both the measures of posttraumatic growth and child behavior problems; therefore, common method variance should be considered as a plausible alternative interpretation for these findings. It is possible that this association is a result of a mother’s perceptions of changes in her child, without any real changes in child behavior. Previous research has found that a mother’s mental health has a substantial effect on her reports of behavior problems among her children (Najman et al., 2000). Fortunately, data not subject to this shared method variance was available to address this potential confound. We examined the relationship between maternal posttraumatic growth and children’s self-reported behavior problems among a subsample of youth old enough to reliably self-report: those aged 11 years and older. Although we did not find a significant relationship between total maternal posttraumatic growth scores and self-reported child behavior problems, specific dimensions of posttraumatic growth were associated with changes in self-reported behavior problems. Mothers’ reports of growth in terms of relationships with others were associated with reduced child behavior problems assessed using both parent reports and youth self-reports.
Growth in terms of relationships with others may be a key dimension that is likely to have crossover effects on other family members. Relationship-focused coping has been identified as an important part of coping with stress, such that successful coping involves maintaining relationships during stressful periods and coping in ways that consider the responses of involved others (Revenson & DeLongis, 2010; Stephenson et al., 2016). By focusing on their important social relationships, mothers may protect their healthy children from the potential negative effects of living with a child with a complex chronic condition. Although the measure of posttraumatic growth asked about growth in terms of relationships in general, it is possible that it captures a mother’s experiences of growth in her relationships with her healthy children. Previous research on siblings of children with a chronic illness or disability has found better behavioral functioning in siblings who felt supported by their parents (Incledon et al., 2015; Williams et al., 2002, 2010). Another possibility is that mother’s perceptions of growth in terms of relationships with others captured some information about her perceptions of practical and emotional support from other sources, which in turn may have benefited the siblings in these families. Further research is needed to assess the role of posttraumatic growth in the context of other factors (e.g., supportive parenting, perceived social support) that have been associated with child outcomes (Giallo & Gavidia-Payne, 2006; Incledon et al., 2015; Lovejoy, Graczyk, O’Hare, & Neuman, 2000; Repetti, Taylor, & Seeman, 2002).

The current study focused on mothers’ experiences of growth, but the siblings themselves may have also experienced growth from having a child with a complex chronic condition in the family. Indeed, the experience of posttraumatic stress and growth may involve the entire family system (Barakat, Alderfer, & Kazak, 2006; R. Berger & Weiss, 2008; Dekel & Monson, 2010; Goff & Smith, 2005; Tedeschi et al., 2018). There is evidence that siblings of children with
chronic health conditions also experience increased empathy and maturity, resilience in the face of adversity, and personal growth (Alderfer et al., 2010; Brennan, Hugh-Jones, & Aldridge, 2013; Wilkins & Woodgate, 2005; Williams et al., 2010). Future research is needed to better understand the relationship between experiences of posttraumatic growth within parent-child dyads and to identify what factors might facilitate this growth. Recent research with parents of children with life-limiting illnesses, which included children with complex chronic conditions, found that meaning in caregiving was central to the experience of growth in the parents (Cadell et al., 2014). It is possible that the factors that contribute to the creation of meaning in mothers also contribute to the creation of meaning for their healthy children. The extent to which qualities of close relationships with others might facilitate posttraumatic growth processes in families is an area of potential future exploration.

4.4.1 Strengths and limitations

Recruitment across multiple clinical sites and collection of reports from multiple informants across several years strengthened the current investigation. Given that the eligible health conditions were very rare, sampling families from a larger geographic region and repeatedly overtime increased the total number of observations on which to base our conclusions. It also allowed us to examine temporal relationships between maternal posttraumatic growth and subsequent changes in child behaviour problems. This design is more powerful than a cross-sectional design in which each family is only sampled once; nevertheless, the total number of participating siblings was still relatively small. This means that power to detect smaller effect sizes was limited. The analyses involving specific facets of posttraumatic growth were exploratory and should be interpreted with caution. Future research with larger samples is needed to demonstrate the robustness of these findings.
Efforts were made to recruit as many siblings as possible, but the extent to which the families who agreed to participate are representative of the entire clinical population is unknown. We focused on mothers’ experiences of posttraumatic growth, but the experiences of fathers or other caregivers may also have been important and may not be equivalent. Although our analysis focused on the association between maternal posttraumatic growth and changes in child behavior problems, the association is likely bidirectional. Future research could investigate the role of child behavior problems in contributing to changes in maternal posttraumatic growth.\textsuperscript{11}

4.4.2 Clinical implications

Our findings support the value of intervention research and policy recommendations that emphasize the importance of close relationships and urge clinicians to consider outcomes for all members of the family system (American Academy of Pediatrics, 2003; Kazak, 2006; Martire et al., 2004). Our findings suggest that enhanced relationships with close others may be an important part of a mother’s adjustment to having a child with a complex chronic condition. Further research is needed to demonstrate the extent to which interventions that foster posttraumatic growth among parents may benefit the broader family system. Research on existing treatments for child behavior problems in families coping with severe or traumatic stress may be enhanced if mothers’ experiences of posttraumatic stress and growth are taken into consideration.

\textsuperscript{11} The relationship between child behaviour problems and subsequent maternal posttraumatic growth was considered to be outside the scope of the current paper for a couple of reasons. A different analytic approach would be required because some families have more than one sibling. The approach used here to model siblings nested within mothers cannot be used to model mothers nested within siblings. We also felt that the predictors of mother’s posttraumatic growth could be better assessed in a paper that incorporates observations from all participating families, not just those with a participating sibling.
Chapter 5: Conclusion

5.1 Summary of findings

Chapter 1 opened with the idea that research is shifting from asking whether social relationships matter for health and wellbeing, to understanding the mechanisms involved. Taken together the findings from my research provide some insights into the mechanisms linking social relationships to better health and wellbeing. Each study addressed a different pathway in a different population, and together they all provide support for a social contextual model in which close relationships shape and are shaped by experiences of chronic stress. In Study 1, I found that perceptions of support availability played a role in the pain experience of people living with a spinal cord injury. Not only were perceptions of tangible support associated with less pain catastrophizing, but they also had a stress buffering effect on the relationship between catastrophizing and subsequent pain. Given the functional limitations of some people living with SCI, the specific benefits associated with tangible support may reflect the need to match support with the demands at hand (Cutrona & Russell, 1990). Moving beyond perceptions of support, Study 2 showed that taking a dyadic approach to assessing stressor severity provides unique information beyond what is captured by more traditional individualistic approaches. I found that how couples appraise their most serious problems was related to the longevity of their relationships. I found that a shared view of serious family problems was related to improved marital stability. This was examined both in terms of independently reporting the same issue as a serious stressor, and the perception of one’s spouse’s perspective of how serious the identified stressor was. Although this shows that perceptions of others play a role, actually agreeing about serious problems also seems to matter. Finally, Study 3 continued to build on our social contextual model, which argues that the wellbeing of close others and our relationships with
them are shaped by experiences of chronic stress. I found that some mothers experience growth in their relationships with others as result of caring for a chronically ill child, and that this, among other forms of posttraumatic growth, was associated with improved behavioural functioning in their other (healthy) children in the family over time. This supports a social contextual model in which adjustment to stressful circumstances is related within families. When mothers have more positive experiences in the context of caregiving, their children do better as well. Although health care services are often centered on the patient’s needs, this research underlines the need to also support the larger family system. Together the findings from these studies highlight the complexity of the mechanisms linking social relationships to health and wellbeing, spanning individual, interpersonal, and systemic levels of analysis. The role of social relationships in stressful contexts encompasses an individual’s perceptions of their social environment (individual level), transmission or exchange from one individual to another (interpersonal level), and the novel dyadic phenomena that emerge when the perspectives of both people are consider in combination (systemic level).

5.2 Strengths and limitations of this program of research

Chapters 2-4 included discussions of the strengths and limitations of each study. Here, I provide a broader discussion of some of the strengths and limitations of the work as a whole.

5.2.1 Longitudinal research designs

Each study in this dissertation involved repeated assessment of a predefined period of time. The length of time studied varied from a few hours (Study 1), to a few months (Study 3), to a couple of decades (Study 2). This meant that temporal precedence could be established between the predictor and outcome variables of interest in each study. Compared to cross-sectional or retrospective designs, longitudinal research that establishes temporal associations
provides more compelling evidence for a causal relationship. Another important reason that we chose this type of design is that it allowed us to capture people’s experiences as they are lived rather than in tightly controlled or contrived settings. However, this improved ecological validity comes at a cost to internal validity. There may be other factors involved that contribute to the associations observed in these studies. More controlled experimental or treatment studies involving random assignment may be useful for understanding the causal process involved and ruling out some of the possible alternative explanations.

5.2.2 Targeting understudied populations

Researchers often focus on studying problems that affect large segments of the general population. For example, health psychologists often focus on preventing and treating the most common causes of morbidity and mortality (e.g., cancer, diabetes, cardiovascular diseases). However, there is also a need to study less prevalent conditions that are associated with a high risk of poor outcomes. All of the studies in this dissertation involved people from smaller, at times extremely rare, populations that are understudied and experience frequent, intense, and/or ongoing forms of stress. This work provides much needed insights into the experiences of highly stressed individuals that would not be obtained if larger, more convenient samples were used. Members of these communities expressed the need for scientific research about their experiences and tended to be highly motivated to be involved throughout the research process. The specific research questions addressed in each study were selected with the needs of the population in mind. For example, pain is a highly prevalent and debilitating symptom for people with spinal cord injuries (Jensen et al., 2005). Stepfamilies are at high risk of divorce and the negative consequences that accompany it (Ambert, 2009). Very little is known about the experiences of the siblings of children with life-threatening, non-curable genetic, metabolic, or neurological
conditions, despite the fact that these families anticipate an unknown trajectory and must live with a great deal of uncertainty (Siden et al., 2010; Steele et al., 2014). To inform the current research on these understudied groups, I drew on past research and conceptual models that have been employed in other stressful contexts. However, the extent to which the current findings are specific to the population studied or will generalize to other similar populations remains to be seen. For example, the benefits of tangible support for pain catastrophizing found in Study 1 might be specific to people living with SCI or might extend to other populations with physical disabilities or chronic pain symptoms. The findings in Study 2 might be specific to stepfamilies or might generalize to a wider range of family structures. There could also be cohort effects as the characteristics of stepfamilies and societal attitudes towards stepfamilies change over time (Ganong & Coleman, 2018). For health psychologists, there is a need to contextualize our theories across settings, behaviours, and populations to enhance their translation into real-world applications (Mermelstein & Revenson, 2013).

5.2.3 Methodological considerations when studying social relationships

Once researchers recognize the need to assess interpersonal factors in addition to intrapersonal factors, there are additional methodological choices that must be weighed. In the following section I discuss the rationale for some of the methodological choices made in this series of studies. I also describe other approaches for studying social relationships and how they might be used to further our understanding of stress in its social context.

The simplest and most widely used approach is to ask participants directly about their perceptions of their interpersonal environment. This approach was used to some degree in all three studies in this dissertation. In Study 1 participants were asked about their perceptions of support in their social network. In Study 2 participants were asked about perceptions of their
spouse. In Study 3 mothers were asked about their perceptions of growth in their relationships and behaviour problems in their children. Although this type of measure is subject to self-report biases, the fact that it captures the respondent’s unique perspective is also an important strength. Cognitive appraisals of relationships can arguably best be assessed by asking participants directly, and these appraisals are fundamentally important to contemporaneous models of human stress and coping.

In understanding relationship phenomena that involve two or more people, there are however limitations to relying on the perspective of only one person. A second approach to assessing social relationships involves including both members of the relationship dyad in the research study. This type of approach is exemplified in Study 2 and Study 3. In Study 2, both members of each couple were invited to participate in the study. This allowed us to capture information that was not present in one participant’s self-reports alone. Both members of each couple independently reported their most serious problem, and these descriptions were compared to identify whether the spouses reported the same problem or two different problems. In a design that involved only self-reports from one member of the dyad, it is possible to ask what they think their partner would report, but this may or may not be an accurate perception. Therefore, there can be added value to incorporating reports from both dyad members. Study 3 invited parents and children in each family to participate. In this case the inclusion of multiple informants helped address concerns about shared method variance. Replicating findings using parent-reported and self-reported behaviour problems in children speaks to the robustness of the findings and helps rule out the possibility of a third variable that influences both the mothers’ perceptions of posttraumatic growth and behavioural problems in her children. In research involving parent-child dyads it is important to keep in mind what each member can reliably be asked to report. For
example, self-reported behaviour problems were only assessed among youth who were 11 years or older given that past research supports the reliability and validity of such assessments (Achenbach, 2001). In terms of posttraumatic growth, spouses may be able to report on each other’s symptoms (Canevello, Michels, & Hilaire, 2016), but children may be less reliable informants of their parents’ symptoms. Therefore, the variables assessed in dyadic designs should be tailored to the specific research objectives in that context.

Incorporating reports from multiple family members is a key strength of Study 2 and Study 3. However, a limitation of all three studies is that we do not know to what extent the participants cognitive appraisals of their relationships are based on observable behaviours or intrapersonal cognitive processes. For example, if we want to increase perceptions of support availability, do we need to increase the amount or timing of support exchanges between participants and their care providers? Are shared appraisals of serious family problems formed through specific types of communication or emotional disclosure? Observational methods incorporating video or audio recordings of dyadic exchanges may help researchers address these types of questions. As with all methods involving coding observed behaviours, researchers must consider how the act of observing changes or constrains the phenomena they are interested in studying. For example, to better understand how couples cope with serious family problems or establish shared appraisals of these problems, we might want to observe their discussion in a controlled laboratory setting (Margolin, 1998). Although the factors contributing to this discussion are more tightly controlled, it becomes less clear whether this same pattern of behaviour would happen in naturally occurring contexts (Gardner, 2000). For example, knowing how to provide support when prompted in a controlled setting does not necessarily translate to appropriately identifying when to engage in this behaviour in everyday life.
Recent technological advances have enabled some observational research to be moved outside the laboratory setting into more naturalistic settings. For example, Electronically Activated Recording (EAR) protocols typically involve sampling small fragments of the acoustic environment repeatedly across several days (e.g., 30 sec once every 12 min for 2-4 days; Mehl, Pennebaker, Crow, Dabbs, & Price, 2001), and can be implemented using most smartphones (Mehl, 2017). EAR sampling protocols can be much more intensive than those requiring self-reports but may not capture meaningful conversations that occur less frequently or last longer than the period sampled. For example, researchers interested in how couples cope with cancer may be especially interested in capturing cancer-related conversations, but these conversations may not be very frequent and thus more difficult to capture using EAR (Robbins, López, Weihs, & Mehl, 2014). Information needed to contextualize the behaviours observed may also be absent. Repetti and colleagues (2015) have used video cameras in families’ homes to capture a wider range of behaviour patterns than those captured with audio alone. A limitation to most observational methods used in naturalistic settings is that they are highly resource intensive. However, technological advances mean that they are tools available today, that might not have been imaginable even a decade ago (e.g., smart home technology; Nelson & Allen, 2018). In any case, researchers must weigh the strengths and limitations of each methods against their specific research goals. Behavioural observations can capture information outside the participants’ awareness, but do not necessarily replace self-reports of internal cognitive or affective states.

So far, I have discussed three types of approaches used to study social relationships: self-reports from one person, reports from both members of a relationship dyad, and behavioural observation. The types of relationships these methods can be used to sample is also an important
consideration. When both dyad members are involved in the study, questions are often limited to that relationship. For example, Study 2 asked participants about the support they received from their spouse. In contrast, measures of support availability in Study 1 and growth in relationships with others in Study 3 were not limited to one source of support or type of relationship. Observational methods can also be limited to interactions that occur in the setting being observed (e.g., at home). Although it would be interesting to know if the effects observed are driven by specific types of relationships, using a global measure means we were not limited to one type of relationship (e.g., spouses) or type of participant (e.g., married people). Research using dyadic coping models to study adjustment to illness in adults often focuses on recruiting married couples (Badr et al., 2010; Burns et al., 2015; F. Müller et al., 2018; Pow, Stephenson, Hagedoorn, & DeLongis, 2018; Vilchinsky et al., 2011). There are some good reasons for this. A spouse is the most central relationship in the lives of most adults and recruiting couples allows for designs that incorporate reports from both dyad members. Internal validity is improved by making comparisons across the same type of relationship. However, this can come at a cost. For example, only about half the participants in Study 1 were married or in a marriage-like relationship. Focusing exclusively on these participants would have substantially reduced the pool of eligible participants and excluded some of those most at risk for poor outcomes. Married people generally enjoy better health and wellbeing than their unmarried counterparts (Holt-Lunstad, Birmingham, & Jones, 2008; Liu & Umberson, 2008; Wood, Goesling, & Avellar, 2007). This pattern has also been shown among people with SCI (Crewe & Krause, 1992). People with SCI may receive support from a variety of sources including, spouses, parents, children, friends and paid support staff. Focusing on only one type of relationship, leaves out the others. A subset of participants in Study 1 nominated a caregiver who was also invited to
participate. Therefore, we have dyadic data for support exchanges in these participants. However, the frequency, quality, and meaning of these exchanges is difficult to compare across relationship types. Rather than focusing on support exchanges that occurred exclusively within these participant dyads, we opted for a global measure of support availability. Specificity in terms of relationship type was sacrificed in favour of assessing a construct that applies to all participants.

5.3 Implications and future directions

Additional research clarifying the antecedents of these phenomena and ways in which they can be modified is needed to appropriately design interventions. Study 1 found perceived support availability played a role in minimizing the extent and consequences of pain catastrophizing. However, this does not tell us how perceptions of support availability are formed. It is possible that perceived support availability is based on past experience receiving support when it was needed, or that perceptions of support availability are more closely tied to cognitive processes and psychological health (Mankowski & Wyer, 1997). Study 2 found that couples in which partners have a joint view of their most serious problems (or perceive that they do) are less likely to get divorced. However, this study does not explain how this shared perspective arises or whether it is stable over the course of the marriage. One possibility is that joint views of serious family problems reflect more open and honest patterns of communications such that both partners know how the other feels and recognize the importance of problems they are facing. This in turn may be associated with more effective ways of coping with and resolving the problem. Similarly, Study 3 found that maternal posttraumatic growth was associated with fewer behaviour problems in children over time, but it did not identify factors that contribute to or promote posttraumatic growth for these mothers. More work is needed to clarify the
conditions under which caring for a child with a severe, progressive, chronic illness is characterized by positive experiences of growth in various life domains.

All three studies point to potential intervention targets related to social relationships (i.e., perceived support availability, shared stress appraisal, growth in close relationships). The findings suggest targeted interventions involving support networks under stress to treat and prevent potential negative outcomes. Posttraumatic stress and poor psychological wellbeing more generally, poor relationship outcomes, and poor health outcomes are all negative consequences of stress that can be meaningfully prevented with early intervention. My work helps to identify those who are at risk for these poor trajectories, as well as key points of intervention. Existing evidence-based cognitive-behavioural interventions are increasingly often modular by design (Chorpita, Daleiden, & Weisz, 2005). This facilitates adding components to target key factors identified by the research described here such as shared appraisals, perceptions of support, and posttraumatic growth.
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Appendices

Appendix A  List of peer-reviewed journal articles from the UBC Stepfamilies Project
(Study 2)

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Appendix B  List of peer-reviewed journal articles from the Charting the Territory Project (Study 3)

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