WE COPE TOGETHER: PREDICTORS AND CONSEQUENCES OF SOCIAL SUPPORT MOBILIZATION

by

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Abstract

Perceptions of support availability are important for well-being. However, little is known about support mobilization. Questions remain about when support is likely to be sought and provided and why support receipt is not always linked to improvements in well-being. This research examined support mobilization in three intensive longitudinal studies. Study 1 categorized appraisals of threat during stressful situations based on whether they were agentic (self-focused) or communal (other-focused). A model linking stressors, appraisals of agentic and communal threat, and support mobilization was examined. Consistent with expectations, increases in agentic threat were associated with increases in support seeking and decreases in support provision. In contrast, increases in communal threat were associated with increases in support seeking and provision. Study 2 extended results of Study 1 by examining whether the associations between threats and support are moderated by extraversion and agreeableness, personality dimensions previously implicated in the support process. At times when participants experienced increases in agentic threat, those higher in extraversion increased their support seeking and decreased their support provision to a greater extent than those lower in extraversion. At times when participants experienced increases in communal threat, those higher in agreeableness increased their support seeking and provision to a greater extent than those lower in agreeableness. Study 3 examined the associations between pain and several types of emotional support mobilization from partners to individuals diagnosed with rheumatoid arthritis (RA). Those with RA provided reports on pain mornings and evenings across one week. Both partners also reported three types of emotional support: esteem, solicitous, and negative from the partners to the person with RA. Pain tended to increase across the day following increases in negative support receipt and solicitous support provision. Pain tended to decrease across the day

when partners reported increased levels of esteem support provision. This research adds to the growing body of literature on the support mobilization process, building knowledge on factors that might lead people to seek and provide support during stress. This research also unpacks different types of emotional support and sheds light on the types that may be helpful in chronic pain contexts.

Lay Summary

This research had two overarching goals. The first was to examine the circumstances under which people seek and provide support. Results indicate that when people perceive their own needs to be at stake, they tend to increase their support seeking and decrease their support provision. When people perceive the needs of others or their relationships to be at stake, they tend to increase their support seeking and provision. Results also suggest that the extent to which people change their support seeking and provision in response to stakes differs depending on their levels of extraversion and agreeableness. The second goal was to gain a better understanding of what types of support are linked to changes in pain in individuals diagnosed with rheumatoid arthritis. Study 3 indicates that solicitous and negative support tend to be associated with increases in pain whereas esteem support tends to be associated with decreases in pain.

Preface

In collaboration with my advisor, Dr. Anita DeLongis, I was responsible for the identification and design of the Ph.D. research program. Formulation of all research questions and analyses of data reported herein were performed by me, with guidance from Dr. DeLongis. I am the primary contributor and author of the work presented in this dissertation. The results reported in Chapters 2, 3, and 4 have been adapted from three published articles to fit the format of this dissertation (full references are below). Chapter 1 acts as a general introduction for Chapters 2, 3, and 4. It includes information adapted and synthesized from the introduction sections of the three published articles as well as from two published review articles. Chapters 2, 3, and 4 present data from each of the three published articles. Data for Chapters 2, 3, and 4 were collected as part of Dr. Anita DeLongis' SSHRC funded research programme with the assistance of and in collaboration with her research team. Full references for the publications adapted for this dissertation are presented below:

Chapter 1 was adapted from the introduction sections from all three empirical articles (citation information below) as well as from the following two review articles: Pow, J. & DeLongis, A. (2018). The puzzle of social support transactions in marriage: What is helpful and under what conditions? In A. Bertoni, S. Donato, & S. Molgora (Eds.), *When "we" are stressed: A dyadic approach to coping with stressful events* (pp. 15-38). New York, NY: Nova Science Publishers. Pow, J. & DeLongis, A. (2018). Studying the role of personality in the support process using an intensive longitudinal design. *SAGE Research Methods Cases.* doi: 10.4135/9781526442208

Results presented in Chapter 2 were adapted from Pow, J., Lee-Baggley, D., & DeLongis, A. (2016). Threats to communion and agency mediate associations between stressor type and daily coping. *Anxiety, Stress, and Coping, 29,* 660-672. doi: 10.1080/10615806.2015.1126258. Results presented in Chapter 3 were adapted from Pow, J., Lee-Baggley, D., & DeLongis, A. (2017). Who is most likely to seek and give support in the face of agentic and communal threat? The roles of extraversion and agreeableness. *Journal of Research in Personality, 70,* 66-72. doi: 10.1016/j.jrp.2017.04.006. Results presented in Chapter 4 were adapted from Pow, J., Stephenson, E., Hagedoorn, M., & DeLongis, A. (2018). Spousal support for patients with Rheumatoid Arthritis: Getting the wrong kind is a pain. *Frontiers in Psychology, 9,* doi: 10.3389/fpsyg.2018.01760.

With guidance from Dr. DeLongis, I contributed to the theoretical development for results presented in all chapters. I was also responsible for data analysis and interpretation, manuscript writing, and correspondence with respective journals. For Chapter 1, my co-author, Dr. DeLongis assisted with theoretical development and manuscript revisions. For Chapters 2 and 3, my co-authors, Dr. Dayna Lee-Baggley and Dr. DeLongis, were responsible for study design and data collection. They also assisted with theoretical development, data analysis and interpretation, and manuscript revisions. For Chapter 4, Dr. DeLongis designed and directed the study, developed the theoretical framework, and provided guidance on data analysis and interpretation. Dr. Ellen Stephenson assisted with data analyses and contributed to revising the manuscript. Dr. Mariët Hagedoorn contributed to revising the manuscript.

All research contained in this dissertation was approved by the UBC Behavioural Research Ethics Board. Chapters 2 and 3 use data under ethics #B03-0098 (Project title: Daily

Assessment of Stress and Coping). Chapter 4 uses data under ethics #B04-0086 (Project title: UBC Rheumatoid Arthritis Project: Coping with Chronic Illness Among Couples).

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List of Abbreviations

A	Agreeableness
C	Conscientiousness
E	Extraversion
N	Neuroticism
O	Openness
OA	Osteoarthritis
RA	Rheumatoid arthritis
UBC	The University of British Columbia

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Dedication

To Adam: For turning bad days into good ones and for making already good days even better.

Chapter 1: Introduction

In life, problems inevitably arise. We have arguments. We experience setbacks and pain and sometimes it feels as if we lack the time or resources to accomplish our goals. When stressors arise, we often turn to those around us to manage stress together. The research presented in this dissertation focuses on the times when people seek, provide, and receive support, which together make up the process of support mobilization. Although previous research has documented that social support is important for stress management (Taylor, 2011), little is known about the circumstances under which people to turn to others during times of stress, or how people might best provide support to maximize benefits for recipients. Drawing primarily on theories of social support (House, 1981; Schwarzer, Dunkel-Schetter, & Kemeny, 1994; Schwarzer & Knoll, 2007; Schwarzer & Leppin, 1991), the Transactional Model of Stress (Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986a; Folkman, Lazarus, Gruen, & DeLongis, 1986b; Lazarus & DeLongis, 1983), Social Contextual Models of Stress and Coping (Bodenmann, 1995; 1997; 2005; DeLongis & Holtzman, 2005; Revenson & DeLongis, 2011) and the Agentic-Communal Framework (Bakan, 1966; Gurtman & Pincus, 2003; Trapnell & Paulhus, 2012), the research described in this dissertation aims to shed light on the antecedents and consequences of enacted support.

1.1 Conceptual Models of Social Support

Early models of support emphasized its importance in stress management. In his seminal book, House (1981) reviewed previous literature on support and provided an organizing framework that described the potential roles of support in stress-adaptation. First, he argued that support could lead to reductions in stress by potentially reducing the potential to be exposed to

stressors. Second, he argued for a "Buffering Model" whereby support might be able to protect people from the otherwise detrimental effects of stress on health. Third, he described how support may have direct effects on health because it may meet fundamental human needs for social connection. This third proposed effect of support has been referred to as the "Main Effects Model". His theoretical description of support's potential role in stress adaptation was foundational for future research.

Despite the conceptualization of support as having beneficial effects on well-being, empirical research testing these theories tended to be mixed (Cohen, 1988; House, Umberson, & Landis, 1988; Schwarzer & Leppin, 1989). The discrepancies in the literature led several researchers (Cohen, 1988; House et al., 1988; Schwarzer & Leppin, 1991) to argue for the need for clearer definitions of support. House and colleagues (1988) made distinctions between social network structure, social embeddedness, and relational content. Schwarzer and Leppin (1991) expanded on this conceptualization of support by distinguishing relational content in terms of whether it involved perceptions of support availability, satisfaction with support, or support mobilization. They also emphasized the importance of distinguishing between several functions of support, including instrumental, informational, and emotional. I provide more information about these conceptual distinctions below.

The first distinction that can be made is between perceived support availability, social network structure, social embeddedness, support satisfaction, and support mobilization (House et al., 1988; Schwarzer & Knoll, 2007; Schwarzer & Leppin, 1991; Taylor, 2011; Uchino, 2009). Perceived support availability refers to the perception that support would be available if one were to need it in the future. In contrast, social network structure is the "density, reciprocity, sex composition, durability or homogeneity of one's network" (Schwarzer & Leppin, 1991, p. 101).

Social embeddedness is often referred to as the number and strength of one's social connections, or with the number of roles with which one identifies (e.g., wife, mother, sister, friend, doctor; House et al., 1988; Thoits, 1983). Support satisfaction is the extent to which one subjectively evaluates his or her support positively (Schwarzer & Leppin, 1991). In contrast, support mobilization occurs when one individual has provided support to another and can be considered a coping response to stress (Schwarzer & Leppin, 1991). Support mobilization can also be referred to as enacted support or as support exchanges. To date, most of the research on support focuses on social embeddedness and perceived support availability. Relatively less is known about support mobilization, which is the focus of the work presented in this dissertation.

The second distinction that can be made is between functions of support including instrumental support, informational support, emotional support, and several others (Schwarzer & Leppin, 1991). *Instrumental support* involves the support provider attempting to help by doing something to help manage the situation or solve the problem. *Informational support* involves the support provider attempting to help the recipient decide what to do about the situation by providing advice or information. *Emotional support* involves attempts to help the recipient feel better about the situation by, for example, providing love and reassurance. These three types of support tend to be the most common types examined across studies (Barry, Bunde, Brock, & Lawrence, 2009; Cutrona & Russell, 1990; Cutrona & Suhr, 1992; Schaefer, Coyne, & Lazarus, 1981; Schulz & Schwarzer, 2004; Schwarzer et al., 1994; Schwarzer & Knoll, 2007; Schwarzer & Schulz, 2013). Different functions or types of perceived support availability as well as different types of support mobilization can be examined (Dunkel-Schetter, 1984; Dunkel-Schetter, Folkman, & Lazarus, 1987). For example, it is possible to perceive that others are available to help with difficult tasks if one were to need help (perceived instrumental support

availability); it is also possible to receive help with a difficult task (instrumental support mobilization).

Beyond making distinctions between different types of support, distinctions should also be made between different sources of support (Schwarzer et al., 1994). Support can occur between intimate partners, relatives, friends, coworkers, pets, and other community members (Allen, Blascovich, & Mendes, 2002). For adults, intimate partners are often considered the most important source of support (Schulz & Schwarzer, 2004; Schwarzer & Knoll, 2007; Selcuk, Gunaydin, Ong, & Almeida, 2016). Research indicates that different types of support may be differentially desired depending on the source (Lanza, Cameron, & Revenson, 1995).

Support mobilization is often assessed using self-report measures and can be assessed from the perspective of a person who received support or the person who provided support (Schwarzer & Knoll, 2007; Schwarzer & Schulz, 2013). It has also been assessed using observational methods (Collins & Feeney, 2000). When the support is assessed from the perspective of the person who provided the support, the term support provision is used. When the support is understood from the perspective of the person who received the support, the term support receipt is used. This distinction is important because the correlations between provider and recipient reports tend to be moderate and can show different associations with well-being outcomes (Bolger, Zuckerman, & Kessler, 2000; Donato et al., 2015; Maisel & Gable, 2009; Schwarzer & Knoll, 2007). Several researchers have argued that support recipients and providers might each provide unique and important information that is missed when only taking one perspective into consideration (Collins & Feeney, 2000; Revenson & DeLongis, 2011; Schwarzer & Knoll, 2007; Schwarzer & Leppin, 1991).

1.2 Support and Models of Stress

The Transactional Model is the contemporary leading model of stress adaptation and argues that coping responses unfold as a function of the person and his or her environment (Folkman et al., 1986a; 1986b; DeLongis & Holtzman, 2005; Lazarus & DeLongis, 1983). In contrast to previous conceptualizations of stress, which defined it as a negative stimulus or event (Holmes & Rahe, 1967) or as a biological outcome (Selye, 1955), the Transactional Model argues that stress occurs when a person appraises a situation or event as potentially harmful and exceeding the person's resources to cope. The model argues that when a potential stressor occurs, people engage in a process of cognitively appraising the situation. The cognitive appraisals that a person makes are thought to influence coping responses. The Transactional Model describes primary appraisal, which involves a variety of judgements about the situation including whether it is personally relevant, serious, and what is at stake in the situation. Stakes can include, for example, whether the person perceives that commitments, values or goals are threatened in the situation (Folkman et al., 1986a, p. 993). The model also describes secondary appraisal, which involves judgements about one's ability to manage the problem. Coping is defined as a response "to manage (reduce, minimize, master, or tolerate) the internal or external demands of the person-environment transaction" (Folkman et al., 1986b, p. 572). According to the Transactional Model, cognitive appraisals and coping responses have an impact on health and emotional well-being.

Original conceptualizations of the Transactional Model gave a limited consideration to social relationships. Dunkel-Schetter and colleagues (1987; p. 72) wrote that coping responses are "often manifested socially". Folkman and colleagues (1986b) included two coping responses that involve others in their *Ways of Coping Inventory*—namely, support seeking and

confrontation. Additionally, early research on the Transactional Model examined instrumental, informational, and emotional support receipt as consequences of the stress process (Dunkel-Schetter et al., 1987; Folkman & Lazarus, 1985). Folkman and Lazarus (1985) examined whether overall levels of support receipt differed across three stages of a midterm exam: before the exam, after the exam before the grades are announced, and after the grades are announced. They found that levels of informational support were higher before the exam compared to after the exam. Levels of emotional support receipt were higher after the exam compared to before the exam. Levels of instrumental support did not differ as a function of exam stage. In another study, Dunkel-Schetter and colleagues (1987) examined instrumental, informational, and emotional support receipt as a function of primary appraisal factors and coping responses. They found that instrumental support receipt was higher at times when participants reported higher threats to their own health, lower threats to the health of others, and lower threats to self-esteem. Additionally, all three types of support receipt were significantly associated with most of the coping responses they examined, including problem solving, positive reappraisal, support seeking, confrontive coping, and self-control. Together, these early studies indicate close links between support mobilization and the stress process.

Several researchers have extended the Transactional Model and provided more cohesive and comprehensive descriptions of the social context of stress (Berg & Upchurch, 2007; Bodenmann, 1995; 2005; Holtzman & DeLongis, 2005; Lyons, Mickelson, Sullivan, & Coyne, 1998; Revenson & DeLongis, 2011; Schultz & Schwarzer, 2004; Schwarzer & Leppin, 1991). In their Contextual Model of Stress, DeLongis and Holtzman (2005; Figure 1, p. 1635) describe a causal chain of the stress process with stressors leading to stress appraisals, which lead to coping responses, which lead to changes in adaptational outcomes. This model emphasizes how each

part of this causal chain may include social components. For example, their previous research differentiates between family stressors in terms of whether they involve marital conflict or conflict with children (Lee-Baggley, Preece, & DeLongis, 2005). Previous research also found important roles of coping responses that involve others in the stress process, including interpersonal withdrawal, support seeking, and responding empathically to others (DeLongis & Preece, 1992; O'Brien, 2000; Preece & DeLongis, 1995). Furthermore, they argue that the broader social context might play a role in influencing all stages of the stress process. For example, they argue that one person's stressors, appraisals, coping efforts, and personalities might impact all stages of another person's coping process. Overall, this model emphasizes the interconnectedness of the stress processes of people within a social network, describing stressors, stress appraisals, coping responses, and adjustment as having social components.

The Transactional Model describes two functions of coping—problem- and emotion-focused (Folkman et al., 1986a). Problem-focused coping involves attempting to make changes to the situation or attempting to solve the problem, whereas emotion-focused coping involves attempts to manage one's emotions. Later, proponents of the Contextual Model of Stress extended the Transactional Model by describing a third function of coping—relationship-focused coping (Coyne & Smith, 1991; DeLongis & O'Brien, 1990; O'Brien, 2000; O'Brien et al., 2009). Relationship-focused coping can be defined as "cognitive and behavioral efforts to manage and sustain social relationships during stressful episodes" (O'Brien et al., 2009, p. 18). O'Brien and colleagues (2009) argued that successful coping involves more than just solving the problem and managing emotions during stress and argued that successful coping also involves relationship-maintenance. In line with this, in their analyses of a study of couples with a child from a previous union, they found that increases in coping that involved empathizing and supporting others to

manage the most stressful family stressor of the day were associated with next-day decreases in marital tension.

As described in Section 1.1, Schwarzer and colleagues (Schultz & Schwarzer, 2004; Schwarzer & Knoll, 2007; Schwarzer & Leppin, 1991) have provided a clear conceptualization of support. They have also located support mobilization within the stress process, integrating their model with the Transactional Model of Stress. Schwarzer and Leppin (1991) argued that differentiating perceived support availability from support mobilization allows for clearer conceptualization of the role of support in the stress process. In this model (Schwarzer & Leppin, Figure 2, p. 109), support can be mobilized as a coping response to stressful events. Stress appraisals have an impact on support mobilization. In turn, support mobilization has an impact on physiological responses to stress and health outcomes.

In summary, theories of support and coping with stress have historically been intertwined. Recent conceptualizations of the stress process provided more emphasis on and detailed theorizing about the social context of stress compared to the Transactional Model. Researchers have argued that support mobilization is a way of coping (Schwarzer & Leppin, 1991). In line with this, support seeking has long been examined as an emotion- and problem-focused coping response (Folkman et al., 1986a). More recently, researchers have been arguing for the importance of examining coping responses that function to maintain relationships during stress (Coyne & Smith, 1991; DeLongis & O'Brien, 1990; O'Brien, 2000; O'Brien et al., 2009) and have been conceptualizing support provision as an important relationship-focused coping response (Bodenmann, 1995; 2005; O'Brien et al., 2009). As previously outlined by Schwarzer and Leppin (1991; Figure 2, p. 109) and by DeLongis and Holtzman (2005; Figure 1, p. 1635), support seeking and provision may unfold as coping responses following experiencing a stressor

and cognitively appraising that stressor. Support seeking and provision (and support receipt, if assessed from the perspective of the support recipient) may, in turn, lead to changes in adaptational outcomes, including health, emotional, and relationship outcomes. Support mobilization includes support seeking, support provision, and support receipt and can have several functions, including instrumental, informational, emotional, and others (Schulz & Schwarzer, 2004; Schwarzer & Knoll, 2007; Schwarzer & Leppin, 1991). Of all sources of support, the spouse is thought to be the most important (Bodenmann, 1995; 1997; 2005; Revenson & DeLongis, 2011; Schulz & Schwarzer, 2004; Schwarzer & Knoll, 2007). In my dissertation work, I built on these previous models by examining support mobilization as a coping response unfolding within the stress process.

1.3 Methodological Considerations in Studying Support Mobilization

Support has been studied using a variety of methods, but likely the most common is using cross-sectional questionnaires. This common approach relies on a single questionnaire in which participants are asked to recall a stressful event or problem they recently experienced and the extent to which they sought, received, or provided support in response to that event. This provides a "snapshot" based on only a single event (Suls & David, 1996). Another cross-sectional method is to ask individuals how much support they tend to seek, tend to receive, or tend to provide. However, support unfolds over time and people may experience support differently during different supportive episodes. Additionally, asking participants to retrospect on a stressful event or problem may be limited because of recall biases (Stone, Broderick, Kaell, Deles Paul, & Porter, 2000). Furthermore, support mobilization is theorized to be a process that unfolds over time. Cross-sectional methods do not allow for insight into strength of the lagged

associations among putative antecedents of support, consequences of support, and support variables. For these reasons, the conclusions that can be drawn about support mobilization may be limited when data are only collected at a single time-point. The present research uses an intensive longitudinal methodology, which involves asking participants to recall over short periods of time and allows for the examination of the process of support as it unfolds over time.

Another method to study support specifically in intimate relationships asks individuals to come to the laboratory as a couple. One partner is then asked to disclose a problem that does not involve conflict with the other partner, and the partners are asked to discuss the problem as they normally would (Carels & Beaucom, 1999; Collins & Feeney, 2000; Cutrona & Suhr, 1992; Pasch & Bradbury, 1998). Studies such as these tend to focus on examining researchers' observations of support. Although these studies are not limited by retrospective biases, the use of this method artificially constrains support exchanges and may not be representative of how support unfolds in daily life (Bolger & Laurenceau, 2013). Additionally, as in cross-sectional survey designs, these designs do not include multiple interactions over time. This limits the potential to understand the extent to which the observed support exchange is generalizable to other support exchanges over time for each couple, or how support changes across time. Instead, obtaining multiple reports of stress and coping across time may help to obtain higher reliability and greater insights into the fluctuating process of support within each person over time (Bolger & Laurenceau, 2013).

There has been growing recognition that intensive longitudinal designs are a powerful tool to understand rapidly changing processes (Bolger & Laurenceau, 2013; Tennen, Affleck, Armeli, & Carney, 2000). Intensive longitudinal designs involve asking participants to complete structured questionnaires daily or multiple times per day, usually over several days or weeks.

This method allows support to be studied in the real world, avoiding the artificiality of the laboratory. This method also allows for specificity in assessment of rapid change in support mobilization, putative antecedents, and putative consequences over time. By collecting multiple reports from each participant, intensive longitudinal study designs enable examination of within-person associations, something that is not possible with designs that only examine one support exchange. Critically, within-person analyses map onto theories about the process of support. These theories make within-person hypotheses that should be tested using methods that allow for within-person analyses. For example, the theories posit that *times when* people experience stress should be associated with increases in support, and that *times when* people receive support should be associated with changes in recipient well-being. Another benefit of examining within-person associations is that this can minimize the possibility for stable contextual or individual difference variables to act as third-variable confounds. Additionally, by asking participants to provide reports at frequent intervals they only need to recall events over a relatively short period of time, which diminishes the potential for recall biases (Lay, Gerstorf, Scott, Pauly, & Hoppmann, 2016; Ptacek, Smith, Espe, & Raffety, 1994; Stone et al., 2000). Furthermore, compared to traditional longitudinal designs, which involve assessments over larger time lags, intensive longitudinal designs capture repeated assessments over short time-periods, which may better reveal the course of change over time (Bolger & Laurenceau, 2013).

Because of the many benefits of this methodology, Chapters 2, 3, and 4 all utilize intensive longitudinal datasets (Bolger & Laurenceau, 2013). Specifically, Chapters 2 and 3 report results from a study including data from 350 undergraduate students, and Chapter 4 presents results from a dataset of 29 couples in which one partner was diagnosed with

rheumatoid arthritis (RA). In these studies, participants were followed twice daily over one week and examining within-person change over half-days played a central role in most analyses.

1.4 From Stress to Support

Chapters 2 and 3 focus on the putative antecedents of support mobilization in a sample of undergraduate students experiencing daily stressors. Specifically, these chapters attempt to increase understanding of the process of experiencing a stressor, appraising the stressor, and engaging in support seeking and provision. In Chapter 2, the focus is on threat appraisals and whether threat appraisals mediate associations between the type of stressor being experienced and support behaviors. In Chapter 3, the focus is on individual differences in the extent to which support behaviours are matched to threat appraisals. It is important to understand the process linking stressor types and threat appraisals to support behaviours because, paired with knowledge about when support behaviours are beneficial for well-being, this information may allow for interventions that help people learn to mobilize support when it could be helpful and foster more adaptive stress management.

1.4.1 Stressors, Appraisals, and Support Behaviours

As described in Section 1.2, the Transactional and Contextual Models argue that when people experience stressors, they engage in a process of cognitively appraising the situation, which impacts how they cope (DeLongis & Holtzman, 2005; Folkman et al., 1986a; 1986b; Schwarzer & Leppin, 1991). Consistent with these models, studies find significant associations between appraisals and coping responses (DeLongis & Holtzman, 2005; Folkman & Lazarus, 1980; Folkman et al., 1986a; McCrae, 1984), including support behaviours (Cutrona & Suhr, 1992; David & Suls, 1999; O'Brien et al., 2009; Schwarzer & Weiner, 1991; Stone, Kennedy-

Moore, & Neale, 1995). However, studies examining the role of appraisals in the support process have tended to focus on perceived controllability (David & Suls, 1999; Cutrona & Suhr, 1992) and seriousness (O'Brien et al., 2009; Stone et al., 1995). Only a few studies have examined threat appraisals in relation to coping responses and support mobilization. In one study, intimate partners were asked to have a conversation about a personal problem chosen by one dyad-member. In this study, higher levels of perceived threat were significantly associated with more direct support seeking (Collins & Feeney, 2000). However, in another study examining couples in which one partner was diagnosed with prostate cancer, higher levels of perceived threat of the illness in spouses was associated with *lower* self-reported dyadic communication about prostate cancer (Song, Rini, Ellis, & Northouse, 2016). It is possible that a more nuanced understanding of threat appraisal might clarify these conflicting findings.

Here, I argue that our understanding of threat appraisal can be improved by focusing on categories or types of threat appraisals in stressful situations. People may cope differently when different resources or goals are threatened. For example, Folkman and colleagues (1986a) examined several types of perceived threat, including threat to a loved one's well-being and threat to work goals. They found that greater perceived threat to a loved one's well-being was associated with different coping responses compared to threat to work goals, but they did not examine support mobilization. By going beyond overall levels of threat and examining the content of threat, we may be able to improve prediction of support mobilization. In the next section, I describe the Agentic-Communal Framework and how it can be used to differentiate appraisals of threat in stressful situations.

1.4.2 Agentic and Communal Threat Appraisals

First proposed in 1966 by David Bakan, the Agentic-Communal Framework describes agency and communion as "two fundamental modalities in the existence of living forms" (pp. 14-15). Agency involves a focus on self-interest, whereas communion involves a focus on affiliation and the well-being of others. These meta-constructs have been used to distinguish human motives, traits, values, goals, and behaviour, emphasizing the self-other distinction. The Agentic-Communal Framework has been used in a diverse array of research contexts, including in narrative interpretation (McAdams, Hoffman, Mansfield, & Day, 1996), self-enhancement (Paulhus & John, 1998), sex roles (Lippa, 2001), and cultural differences (Miller, Akiyama, & Kapadia, 2017).

The Agentic-Communal Framework has conceptual links to the Interpersonal Circumplex Model (Schwartz, 1992; Wiggins, 1991). The Interpersonal Circumplex organizes constructs related to interpersonal interactions in a circular structure, with constructs closer together being positively correlated, constructs 90 degrees apart being orthogonal, and constructs more than 90 degrees apart being negatively correlated. The Interpersonal Circumplex of Personality includes eight dispositions that can be arranged in a circular structure and that are related to how people tend to interact with others (e.g., Assured-Dominant, Arrogant-Calculating, Warm-Agreeable; McCrae & Costa, 1989; Wiggins, 1991). The Interpersonal Circumplex of Basic Values organizes ten guiding principles in people's lives in a circular structure (e.g., Power, Achievement, Benevolence, Universality; Schwartz, 1992; 2012).

As argued previously (McCrae & Costa, 1989), it is possible to describe each point in the circumplex in terms of its two-dimensional coordinates. In a series of factor analyses of four datasets of individuals' importance ratings of a diverse set of life goals (Richards, 1966; Roberts

& Robins, 2000) and values as assessed by Schwartz's (1992) values survey, Trapnell & Paulhus (2012) found consistent evidence for the agentic-communal distinction. Their analyses for the values measures indicated that the agentic values dimension included power, achievement, hedonism, and self-direction. The communal values dimension included universalism, benevolence, security, conformity, and tradition. Their analyses for the goal measures indicated that the agentic dimension included goals related to hedonism, leadership, power, expertise, success, and economic interests. In contrast, the communal dimension included goals related to fulfilling religious and relationship obligations, conformity, universalism, seeking purpose in life, and sacrificing for others. Since events are stressful when important values or goals are at stake (Folkman et al., 1986a; Folkman & Moskowitz, 2004), and value and goal content can be understood using the agentic-communal framework, then I argue that appraisals of what is at stake in stressful situations may also be understood using this framework.

In this dissertation, I examined perceptions of the extent to which there is potential harm or threat to agency and communion. When a stressful event occurs, people may perceive agentic and communal threat, which may provoke coping responses meant to prioritize maintaining what is under threat. Times when agency is threatened are expected to be associated with efforts to maintain agency, and times when communion is threatened are expected to be associated with efforts to maintain communion. Furthermore, there is some research indicating that agency and communion may sometimes be in competition, potentially because circumstances may require that people prioritize one or the other (Trapnell & Paulhus, 2012). For example, in one experimental study, people who were primed to think about achievement values tended to be better at completing puzzle tasks and were less helpful to an experimenter compared to those in the control group (Maio, Pakizeh, Cheung, & Rees, 2009). People who were primed to think

about communion tended to be more helpful to the experimenter but did worse completing a puzzle task. Because communion and agency may be in competition, times when individuals experience communal threat are expected to lead to the prioritization of communion and be associated with lower effort to maintain agency. Additionally, times when individuals experience agentic threat are expected to lead to the prioritization of agency and be associated with lower effort to maintain communion.

Theoretical descriptions of support provision and support seeking point to the potential for agentic and communal threat to play key roles in the support mobilization process. Since support provision is theorized to involve putting others' needs ahead of one's own needs (O'Brien et al., 2009), individuals may be more likely to provide support when they perceive higher levels of communal threat and lower levels of agentic threat. In contrast, support seeking has been theorized to have a dual purpose—that is, it has been theorized to be used to maintain and contribute to relationships (Taylor, 2006). It has also been theorized to be a problem- and emotion-focused coping response (Folkman et al., 1986a) that is used to fulfill personal needs (O'Brien et al., 2009). Therefore, individuals may be more likely to seek support when they perceive higher levels of communal or agentic threat. Examining the roles that agentic and communal threat play in the support process may be a key step in synthesizing theories of stress and support mobilization with the agentic-communal framework and may provide a more nuanced understanding of the circumstances under which support mobilization occurs.

Previously, O'Brien and DeLongis (1996) used the agentic-communal framework to understand the connections between stressors and support seeking and provision. In this study, they categorized participants' open-ended reports of the worst stressor of the week depending upon whether it was related to achievement/agency or relationships/communion. Individuals who

experienced stressors in the previous week that were categorized as communal by the researchers tended to report greater use of support provision and support seeking compared to individuals who reported stressors that were categorized as agentic. There are three important limitations of this study. First, this study used a cross-sectional design, which did not allow the researchers to examine within-person associations. Second, stressors were categorized as either agentic or communal. However, stressors could be threatening to both agency and to communion simultaneously. Third, individuals' appraisals of agentic and communal threat were not examined. Although I expect that people tend to appraise achievement stressors as being more threatening to agency and less threatening to communion compared to interpersonal stressors, stressors that individuals experience may have distinct meanings to them that may not be fully captured by researchers' categorizations.

This dissertation aimed to examine both the type of stressor being experienced by categorizing recent stressors similarly to O'Brien and DeLongis (1996) as well as the extent to which participants perceived threats to communion and agency in the stressful situation. This allowed me to examine whether appraisals of threat mediate associations between stressor categorizations and support behaviours. In the following section, I provide an illustrative example of how experiencing achievement/agentic and social/communal stressors might influence appraisals of threat to agency and to communion, and how these threat appraisals might be expected to lead to changes in support seeking and provision.

1.4.3 An Illustrative Example: Daily Stress Experiences of Undergraduates

Imagine a day in the life of Wen, a third-year psychology undergraduate student who wants to go to medical school. She must balance her part-time job with her social life and her desire to get good grades. Wen's roommate is Laura, a third-year English student. Like Wen,

Laura must deal with academic demands while balancing a part-time job, but a more stressful issue she must cope with is that her parents are currently going through a difficult divorce. Daily, Wen and Laura must cope with having too much to do, the demands of school, the demands of their part-time jobs, and financial demands, not to mention keeping up with regular household chores and managing the roommate relationship. Laura must also cope with family stress.

Wen has an upcoming exam, which may be classified as an achievement or agentic stressor. Wen may appraise this stressor in a variety of ways. Wen may appraise this stressor as threatening to agency—she is not sure that she will be able to achieve as high of a grade as she desires, and she may feel that, between studying for the exam and showing up for her part-time job, she has too much to accomplish before the exam day. Wen may appraise this exam stressor as threatening to communion. With all her studying, she is having trouble keeping up with her share of the household chores, which is getting frustrating to an already stressed out Laura. She has also promised that she would study with a friend also taking the class, James, even though she does not feel that she would personally benefit from a study session with James because he has not been doing so well in the class. She may feel that the time it takes to study for this exam might take away from the time she needs to maintain her relationships, fulfill her social obligations, and help her friends, Laura and James.

To the extent that Wen perceives this upcoming exam as threatening to agency, she may be inclined to ask others for help, and be less likely to provide help to others. For example, Wen might ask Laura for more help reviewing her notes and ask Laura to take on more household chores as Wen prepares for the exam to the extent that she perceives greater agentic threat. Wen may also opt to cancel her plans with James and refrain from helping him study for the exam. To the extent that Wen perceives this upcoming exam as threatening to communion, she may be

more inclined to ask others for help and provide help. For example, Wen might opt to spend some time completing her chores so that she can maintain her relationship with Laura. She may also opt to attend the study session with James to help him get a better grade. Increases in communal threat might also lead her to seek emotional support from her parents about how stressful university is for her.

On the surface, an exam stressor may seem like it is purely threatening to agency. Indeed, we may expect that times when people are confronted with an achievement stressor like an upcoming exam, they may tend to experience higher levels of threat to agency compared to times when people experience social stressors, like finding out one's parents are getting a divorce. However, achievement stressors may also have communally threatening components. Likewise, on the surface, social stressors may tend to lead to higher communal threat; however, they may also be threatening to agency (e.g., "supporting my parents is taking away from my ability to concentrate on schoolwork"). Examining appraisals of threat to agency and communion alongside open-ended descriptions of the stressor that has been experienced may improve understanding of the circumstances under which people are likely to seek and provide support.

1.4.4 Chapter 2 Study Overview and Hypotheses

In Chapter 2 of this dissertation, my goal was to examine associations between stressor type (achievement and interpersonal), threat appraisals (agentic and communal), and support behaviors (seeking and provision). To examine these associations, I analyzed data from an intensive longitudinal study of 350 undergraduate students who reported on a stressor at midday and evening over seven consecutive days. I hypothesized that achievement stressors, compared to interpersonal and other stressors, would be associated with increases in agentic threat

appraisal, which would, in turn be associated with increases in support seeking and decreases in support provision. Additionally, I hypothesized that interpersonal stressors, compared to achievement and other stressors, would be associated with increases in communal threat appraisal, which would, in turn be associated with increases in support seeking and provision.

1.4.5 The Role of Personality

One of the central tenets of the Transactional Model of Stress is that coping unfolds as an interplay of the person and the situation (Folkman et al., 1986a; DeLongis & Holtzman, 2005). Additionally, previous research indicates that there are key individual differences in the support mobilization process (Collins & Feeney, 2000). In Chapter 3 of this dissertation, my aim was to understand how individual differences in personality are associated with the strength of the associations between agentic and communal threats and support behaviours.

The Big Five Model provides a taxonomy that has been argued to represent the smallest number of dimensions required to describe personality (David & Suls, 1999; McCrae & Costa, 1985; McCrae & John, 1992; Watson & Hubbard, 1996). These personality dimensions include Extraversion (E), Agreeableness (A), Conscientiousness (C), Neuroticism (N), and Openness (O). Previous research indicates that the Big Five personality dimensions are associated with the process of coping with stress (Bolger & Zuckerman, 1995; Lee-Baggley et al., 2005; O'Brien & DeLongis, 1996; Suls, David, & Harvey, 1996; Watson & Hubbard, 1996). However, there is more to be learned about how dispositional factors are differentially associated with coping responses in different situational contexts.

Researchers have argued that, of the Big Five personality dimensions, A and E are the most conceptually linked to the Agentic-Communal Framework (Barrick, Stewart, & Piotrowski, 2002). A is the most clearly conceptually linked to communion. Those higher in A tend to be

more compassionate, respectful, and more trusting compared to those lower in A (Soto & John, 2016). E is the most clearly conceptually linked to agency. Those higher in E tend to be more assertive, energetic, and sociable compared to those lower in E (Soto & John, 2016). A growing body of research has linked A with communion and constructs related to communion and has also linked E with agency and constructs related to agency. These associations have been found using a variety of assessments and statistical analytic methodologies. This literature is reviewed below.

A has been found to be associated with several constructs closely related to communion and E has been found to be associated with several constructs related to agency. Those higher in A may be more motivated to maintain positive interpersonal relationships compared to those lower in A (Graziano, Jensen-Campbell & Hair, 1996; Jensen-Campbell & Graziano, 2001). Those higher in A also tend to be more kind, unselfish, generous, and fair compared to those lower in A (Goldberg, 1992). A meta-analysis found a consistent positive correlation between A and performance during team-oriented tasks (Mount, Barrick, & Stewart, 1998). Another study found a positive association between A and self-sacrifice during stress (Costa, Zonderman, & McCrae, 1991). In another study, A showed a small positive association with communal goal striving and E showed moderate positive associations with status and accomplishment striving (Barrick et al., 2002). In one study, Ghaed and Gallo (2006) examined associations among all Big Five dimensions and agentic and communal traits as assessed by the Extended Personal Attributes Questionnaire (Spence, Helmreich, & Holahan, 1979). They found that A showed the strongest association with communion and E showed the strongest association with agency. In this study, C and N were also weakly associated with agency and C and O were weakly associated with communion.

As described previously (Section 1.3.2), the Agentic-Communal Framework is conceptually linked to the Interpersonal Circumplex, with agency and communion representing orthogonal dimensions of the circumplex (Trapnell & Paulhus, 2012). Previously, McCrae and Costa (1989) argued that the Interpersonal Circumplex should correspond to only the Big Five dimensions that are inherently interpersonal—E and A. The Interpersonal Circumplex theoretically originated in interpersonal psychiatry and was intended to be used to understand interpersonal interactions (Wiggins, 1979). In contrast, the Five-Factor model emerged from attempts to provide a summary of all aspects of personality (McCrae & Costa, 1985). Although all five personality dimensions might have social implications, N, C, and O are not inherently interpersonal: "One can feel unhappy, respond to art, or accomplish a task regardless of the presence of absence of other people. The case is different with the two dimensions of Extraversion and Agreeableness" (p. 586). To examine the correspondence of E and A with the Interpersonal Circumplex, McCrae and Costa (1989) conducted a joint factor analysis of self- and peer-reports on the NEO-PI subscales (an assessment of the Big Five; Costa & McCrae, 1985) and of the IAS-R subscales (an assessment of personality on the Interpersonal Circumplex; Wiggins, Trapnell, & Phillips, 1988). They extracted five factors. As they had expected, each factor was defined by one of the NEO-PI subscales, and the eight IAS-R subscales showed the strongest loadings with either the E or A factors. This pattern also emerged when using spouse ratings of the Big Five rather than peer-ratings. Several other studies using factor analytic techniques have found further evidence for strong congruence between A and communion and for strong congruence between E and agency (Lippa, 1995, 2001; Wiggins & Broughton, 1985, 1991).

Additional evidence of E and A's particular relevance to the Agentic-Communal Framework comes from a meta-analysis that examined associations of all Big Five personality dimensions and Schwartz's (1992) ten value dimensions. As I described in Section 1.3.2, Trapnell and Paulhus (2012) have demonstrated that Schwartz's (1992) ten values can be categorized as agentic or communal. In their meta-analysis, Fischer and Boer (2015) examined associations between Schwartz's (1992) ten value dimensions and the Big Five personality dimensions. Of the Big Five dimensions, E was the only personality dimension that was consistently associated with all five agentic values. It showed correlations between 0.18 and 0.30 with power, achievement, hedonism, stimulation, and self-direction. The other four personality dimensions did not show consistent associations with agentic values (for A: *range* = -0.28, 0.03; O: *range* = -0.10, 0.37; N: *range* = -0.02, -0.09; for C: *range* = -0.06, 0.10). Of the five personality dimensions, A tended to show the most consistent positive associations with the five communal values. More specifically, A showed correlations ranging from 0.13 to 0.40 with universalism, benevolence, tradition, and conformity. A showed a small positive (0.04) but nonsignificant correlation with security. O and E had both positive and negative associations with communal values; N and C tended to show positive associations with communal values, but the strength of the associations were weaker and often nonsignificant (for E: range = -0.13, 0.10; O: range = -0.17, 0.26; N: range = 0.03, 0.05; for C: range = 0.06, 0.22).

Research indicates that E and A are both associated with individual differences in coping responses. Those higher in E tend to engage in higher levels of approach-oriented coping, including support seeking, as well as lower levels of passive forms of coping compared to those lower in E (Amirkhan, Risinger, & Swickert, 1995; David & Suls, 1999; Hooker, Frazier, & Monahan, 1994; McCrae & Costa, 1986; Watson & Hubbard, 1996). Previous research indicates

that those higher in A tend to cope in ways that protect relationships to a greater extent than those lower in A, such as by engaging in support seeking, providing support to others, and avoiding confrontation (Hooker et al., 1994; O'Brien & DeLongis, 1996). Importantly, some research indicates that the associations of E and A with coping may differ in different situational contexts, such as the type of stressor being experienced (Lee-Baggley et al., 2005). No previous studies of which I am aware have examined the joint or interactive effects of these personality dimensions and threats to agency and communion in predicting support behaviours.

1.4.6 Chapter 3 Study Overview and Hypotheses

In Chapter 3 of this dissertation, I extended the analyses presented in Chapter 2 by examining whether E and A are associated with individual variability in the extent to which people seek and provide support in response to agentic and communal threats. First, I aimed to examine the role of E in the strength of the association between agentic threat and support behaviours. Since individuals who are higher in E tend to place higher value on agency compared to those lower in E (Fischer & Boer, 2015), I expected these individuals to show a stronger match between threats to agency and responses meant to maintain agency compared to those lower in E. Thus, I hypothesized that for those higher in E, increases in agentic threat would be associated with greater increases in support seeking compared to those lower in E. I also expected that for those higher in E, increases in agentic threat would be associated with greater decreases in support provision compared to those lower in E.

In Chapter 3, I also aimed to examine the role of A in the strength of the associations between communal threat and support behaviours. Individuals who are more agreeable tend to place higher value on communion compared to those lower in agreeableness (Fischer & Boer, 2015). Therefore, I expected those higher in A to show a stronger association between communal

threat and responses aimed at maintaining communion compared to those lower in agreeableness. More specifically, I hypothesized that for those higher in A, increases in communal threat would be associated with greater increases in support seeking and support provision compared to those lower in A.

1.5 From Support to Well-being

In the above sections, I emphasized the importance of taking a perspective that considers support mobilization as a process that unfolds over time. I argued that support unfolds as a function of the type of stressor being experienced, agentic and communal threat appraisals, as well as two personality dimensions, E, and A. Furthermore, I described several hypotheses related to these putative antecedents of support, which were tested in Chapters 2 and 3.

In Chapter 4, I refocused my attention in four key ways. First, I turned my attention away from the putative antecedents of support and instead examined the putative consequences of support mobilization—that is, I wanted to examine associations between support mobilization and recipient well-being. Second, I refocused my attention on a context involving couples coping with chronic pain. Those coping with chronic pain may be likely to experience heightened stress compared to other populations (Stenstrom, Lindell, Swanberg, Nordemar, & Harms-Ringdahl, 1992). Because support tends to be more important at times when people are experiencing higher stress compared to times when they are experiencing lower stress (consistent with the Buffering Model; Cohen & Wills, 1985; House, 1981; Taylor, 2011), coping with chronic pain may be a context in which adaptive support exchanges are particularly important. Third, I wanted to focus on support from the intimate partners and take a methodological approach that reflects the process of support by considering the dyadic nature of support exchanges. In Chapter 4, I

examined support mobilized to individuals with RA from their own perspectives and their partners' perspectives. Fourth, I aimed to go beyond most previous research, which has taken a broad approach and either examined global support or tangible, informational, and emotional support in relation to recipient well-being. I built on previous research by taking a more focused approach to sharpen understanding of the role of emotional support in recipient well-being. Specifically, I examined three types of emotional support—esteem, solicitous, and negative.

1.5.1 Coping with Chronic Pain: The Role of Support Mobilization

In Chapter 4, I examined reports of support mobilization in couples in which one partner was diagnosed with rheumatoid arthritis (RA). RA is an autoimmune disease with no known cure that affects about 1% of the western population (Evers, Kraaimaat, Geenen, & Bijlsma, 1998). Those with RA typically experience a range of stressors including difficulties engaging in leisure or social activities, interpersonal tensions, difficulties performing household chores, and impaired ability to work (Stenstrom et al., 1992). RA treatment focuses on alleviating symptoms and attempts to maintain function (Evers et al., 1998). RA is associated with several symptoms including chronic pain, joint stiffness and inflammation, fatigue, and frequent shifts in mood (Smith & Wallston, 1992). Of all the symptoms they experience, pain tends to be most concerning to individuals with RA (Young, 1992).

Pain has been defined as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage" (Merskey & Bogduk, 1994, p. 209). Although chronic pain was once viewed as a solely physical problem to be treated only with medical solutions, it is increasingly being conceptualized as a biopsychosocial issue (Hadjistavropoulos et al., 2011; Perry, Nicholas, & Middleton, 2010). This is important because psychological factors have been found to play a role in managing pain

(Turk & Melzack, 2001). A better understanding of psychological factors that exacerbate or ameliorate pain may lead to insights on targets for interventions in this population.

In summary, couples coping with chronic pain may provide an important context to study support mobilization. Those with RA tend to experience a range of illness-related stressors (Stenstrom et al., 1992). Support tends to be more important at times when people are experiencing high levels of stress (Pow et al., 2017). Additionally, chronic pain may be an important adaptational outcome to examine in relation to support because it is expected to be related to psychological factors (Turk & Melzack, 2001). Furthermore, insights about what specific partner behaviours are associated with changes in RA pain might lead to effective psychosocial pain-management interventions. In Chapter 4, my goal was to examine support mobilized to those diagnosed with RA in relation to subsequent changes in pain.

1.5.2 **Dyadic Coping with Chronic Pain**

When one partner experiences an ongoing, complex stressor like having a chronic illness, the other partner is also affected (Bodenmann, 1995; 2005; Revenson & DeLongis, 2011). Because of the closeness and interdependence of intimate partners, they often face stressors together and both use their personal stress management resources to respond to stress as a unit rather than independently (Bodenmann, 1995; Lyons et al., 1998). Dyadic coping refers to the variety of ways that couples manage stress together. Taking a dyadic coping approach involving consideration of how each partner influences the other in terms of their cognitions, emotions, and actions might be key to improving our understanding of adjustment to chronic illness.

A growing body of research has examined the role of dyadic coping in adjustment to chronic illness (Berg & Upchurch, 2007; Schwarzer & Knoll, 2007). A variety of chronic illness conditions have been examined, including chronic pain, myocardial infarction, cancer, and

diabetes. Many outcomes of dyadic coping have been examined, including psychosocial, relationship, and health outcomes. This research has found evidence that the intimate partner plays an important role in assisting the person with chronic illness. Being married and having better marital functioning are both predictors of better well-being in those with RA (Reese, Somers, Keefe, Mosley-Williams, & Lumley, 2010; Waltz, Kriegel, & Bosch, 1998; Ward & Leigh, 1993). In a cross-sectional study, higher negative mood in one partner was associated with higher low back pain in the other partner (Schwartz, Slater, Birchler, & Atkinson, 1991). In a prospective study of persons with RA and their spouses, spouse reports of their own depressive symptoms predicted increased functional limitations and RA-related symptoms over a one-year period, controlling for earlier depression and functional limitations (Lam, Lehman, Puterman, & DeLongis, 2009). In subsequent examination of these data, the association between spouse depression and prospective changes in pain was weaker to the extent that spouses tended to respond empathically toward those with RA (Stephenson, DeLongis, Esdaile, & Lehman, 2014).

Dyadic coping includes the ways that intimate partners interact when they deal with stressors (Berg & Upchurch, 2007; Bodenmann, 1997; Schwarzer & Knoll, 2007). There are many ways that spouses can work together to cope with stress. For example, they can engage in collaborative problem solving, protective buffering, or confrontation (Berg & Upchurch, 2007; Bodenmann, 1995; DeLongis & Holtzman, 2005). Although there are other ways that spouses work together to cope with stress, exchanging support plays a central role in models of dyadic coping (Berg & Upchurch, 2007; Bodenmann, 1997; Manne & Badr, 2008; Revenson & DeLongis, 2011; Schwarzer & Knoll, 2007).

1.5.3 **The Roles of Perceived Support Availability and Social Integration in Promoting Recipient Well-being**

Consistent with the Main Effects and Buffering Models (House, 1981; Cohen & Wills, 1985), perceived support availability, support satisfaction, and social embeddedness have consistently been found to be positively associated with a wide range of recipient well-being outcomes across a variety of contexts (Schwarzer & Leppin, 1991; Schwarzer & Knoll, 2007; Taylor, 2011). For example, in one study, paramedics who perceived higher levels of support availability tended to report higher-quality sleep on workdays and on weekends compared to paramedics who perceived lower levels of support availability (Pow, King, Stephenson, & DeLongis, 2017). In this study, associations between support availability and sleep quality were significantly stronger on days when paramedics reported experiencing a greater number of work stressors compared to days when paramedics reported fewer work stressors. A recent meta-analysis indicated that a lack of support availability and social embeddedness (social isolation and loneliness) are significant predictors of mortality, with comparable effects to well-established risk factors for mortality, including smoking and sedentary lifestyle (Holt-Lunstad, Smith, Baker, Harris, & Stephenson, 2015).

In individuals with RA, support availability has been found to be associated with higher self-esteem (Fitzpatrick, Newman, Lamb, & Shipley, 1988), life satisfaction (Smith, Dobbins, & Wallston, 1991), and lower depression (Fitzpatrick et al., 1988; Revenson, Schiaffino, Majerovitz, & Gibofsky, 1991). Support satisfaction has been found to be associated with higher psychological adjustment in those with RA, with stronger associations for those with more severe functional disability (Affleck, Pfeiffer, Tennen, & Fifield, 1988). In another study (Holtzman, Newth, & DeLongis, 2004), days when those with RA were more satisfied with the

support they received were associated with within-person increases in several forms of coping with chronic pain, including cognitive reframing, emotional expression, and problem solving. In turn, these ways of coping were associated with decreases in pain. Daily satisfaction with support has also been found to be associated with decreases in pain catastrophizing and decreases in pain severity (Holtzman & DeLongis, 2007).

1.5.4 Support Mobilization and Recipient Well-being

Although perceived support availability, support satisfaction, and social embeddedness are consistently associated with better well-being, associations between support mobilization and recipient well-being have been less consistent. In one study, global support including items assessing emotional and instrumental support receipt from spouses was associated with higher cognitive restructuring in women with RA, which in turn, predicted better psychological adjustment (Manne & Zautra, 1989). In another study, Feldman, Downey, and Schaffer-Neitz (1999) examined mood, pain, and global support receipt over 28 consecutive days in individuals diagnosed with reflex sympathetic dystrophy syndrome, a complex neurological disorder associated with chronic pain. Support receipt was assessed as a combination of emotional and instrumental support and was aggregated across all sources (e.g., spouse, friend). In this study, increases in support receipt were associated with decreases in negative mood on the following day. Support receipt was also associated with decreases in pain, even when controlling for negative mood. Other research has indicated the receiving support is associated with higher levels of several types of adaptive coping four months later (Schulz & Schwarzer, 2004; Schwarzer & Knoll, 2007). Other research has found higher levels of received support to be associated with subsequently lower levels of depressive symptoms (Schwarzer & Gutiérrez-Doña, 2005). In contrast, in two studies of older adults, higher frequency of global received

support was associated with lower functional ability (Jang, Haley, Mortimer, & Small, 2003) and higher depression (Liang, Krause, & Bennett, 2001). In one study of college students, global support received in the last month was positively associated with anxiety and strengthened the association between stressors and anxiety (Sandler & Barrera, 1984).

1.5.5 Types of Support Mobilization and Recipient Well-being

Researchers have long been calling for the need to consider the multidimensionality of support and consider multiple functions of support (Barrera & Ainlay, 1983; Sandler & Barrera, 1984; Schaefer et al., 1981; Schwarzer et al., 1994). Theoretical models outline several types of support, which are expected to have different implications for well-being. The three main functions or types of support that are most often examined include instrumental support, informational support, and emotional support (Barry et al., 2009; Cutrona & Russell, 1990; Cutrona & Suhr, 1992; Schaefer et al., 1981; Schulz & Schwarzer, 2004; Schwarzer & Knoll, 2007; Schwarzer & Schulz, 2013).

Previous research indicates that the type of support needs to be considered in conjunction with the source of support. For example, in a study of people with cancer, Dunkel-Schetter (1984) found that informational, instrumental, and emotional support were perceived as helpful when coming from health care professionals, and instrumental and emotional support from family and friends was perceived to be helpful. Several other studies have found emotional support to be perceived as the most helpful type of support that spouses can provide (e.g., Dakof & Taylor, 1990; Lanza et al., 1995; Rose, 1990). In one study, women with breast cancer named their spouses or intimate partners as the most important providers of emotional support (Pistrang & Barker, 1992).

1.5.6 **Support from the Spouse and Recipient Well-being**

Although emotional support from the intimate partner is perceived to be particularly helpful by recipients (Dakof & Taylor, 1990; Dunkel-Schetter, 1984; Lanza et al., 1995; Rose, 1990; Pistrang & Barker, 1992), research indicates that emotional support from the intimate partner can also be perceived as unhelpful by recipients. Lanza and colleagues (1995) asked married people to report the most helpful thing anyone had done to help the cope with a new RA diagnosis and the most unhelpful thing that anyone had done to help them cope. Participants' open-ended responses of helpful and unhelpful support were coded as to whether the support was emotional, informational, tangible support, or criticism as well as who provided it. The most common type of helpful support was emotional support from the spouse. However, emotional support was also the most common type of unhelpful support from the spouse as described by those with RA. Additionally, in a study on women with a history of cancer and women undergoing genetic testing for cancer, participants tended to report both emotionally supportive and emotionally unsupportive behaviours of the spouse (Coyne & Anderson, 1999). Unsupportive emotional behaviours included minimizing participants' worries and concerns or seeming overly concerned and were related to more distress. Emotionally supportive behaviours were not significantly related to distress in this study.

In line with participants' perceptions that emotional support from the spouse can sometimes be helpful and sometimes be unhelpful, studies have found mixed associations between emotional support in intimate relationships and recipient well-being. For example, in a study of persons coping with cancer surgery and their partners, Schulz and Schwarzer (2004) examined both partners' reports of emotional, instrumental, and informational support mobilized from partners to those who had undergone cancer surgery. Partner reports of emotional,

instrumental, and informational support provision were all associated with higher levels of adaptive coping responses, including accommodation, downward comparison, fighting spirit, and search for meaning. The authors did not report associations between reports of support receipt in those who had undergone the cancer surgery and coping. In a study on couples in which the female partner was diagnosed with OA, receiving higher levels of emotional support from husbands was non-significantly associated with lower pain severity (r = -.07; Stephens, Martire, Cremeans-Smith, Druley, & Wojno, 2006). In a sample of couples in which one partner was an undergraduate student, receiving higher emotional support from the partner after describing an ongoing problem in the laboratory was associated with higher satisfaction with support in recipients (Collins & Feeney, 2000). In a daily diary study of couples with a child from a previous union, days when participants received higher emotional support from their partner were significantly associated with within-person improvements in mood (DeLongis et al., 2004). In contrast, studies have found evidence for negative effects of receiving emotional support from the intimate partner on well-being. On days when recipients reported receiving emotional support, they tended to show increases in negative affect (Bolger et al., 2000; Gleason, Iida, Shrout, & Bolger, 2008).

There are several reasons why receiving emotional support might sometimes have detrimental effects on recipient well-being. Researchers have long been describing how social exchanges can be aversive (Rook, 1984; 1998; Shrout, Herman, & Bolger, 2006). Research indicates that emotional support might involve both beneficial and detrimental components (Butler, Koopman, Classen, & Spiegel, 1999; Coyne & Anderson, 1999). Several studies and theories indicate that, although different types of emotional support are often lumped together, there may be different types of emotional support that might have different implications for

recipients (Barrera & Ainlay, 1983; Finch et al., 1997; Hemphill, Martire, Polenick, & Stephens, 2016). In Chapter 4, my aim was to build on previous work by examining several types of emotional support provided by the intimate partner as they were related to pain in those diagnosed with RA.

1.5.7 **The Berlin Social Support Scales and Unpacking Emotional Support**

The Berlin Social Support Scales were developed to assess support mobilized to those undergoing cancer surgery (BSSS; Schulz & Schwarzer, 2004; Schwarzer & Schulz, 2013). This scale met a need in the literature to assess several types of support receipt and provision, including emotional, instrumental, and informational, specifically in close relationships. This scale has commonly been used to assess support exchanges in the intimate partner relationship (Luszczynska, Boehmer, Knoll, Schulz, & Schwarzer, 2007; Schulz & Schwarzer, 2004; Schwarzer & Knoll, 2007).

The BSSS includes nine items to assess received emotional support and nine items reworded to assess provided emotional support. These items tap into a diversity of content areas of emotional support and capture the breadth of the construct. For example, items assess behaviours that communicate that the provider is worried about the recipient (e.g., "this person expressed concern about my condition"). The emotional support scale also includes items that tap into negative emotional support (e.g., "this person criticized me"). These negative emotional support items are reverse-scored before being included in the emotional support scale score. Finally, the scale also includes emotionally supportive behaviours that communicate that the recipient is loved and valued (e.g., "this person showed me that he/she loves and accepts me").

The three content areas of emotional support captured by the BSSS correspond with previous conceptualizations of three subtypes of emotional support that may be particularly

important in the context of chronic pain. The first subtype of emotional support that the BSSS taps into is solicitous support, which involves conveying concern for the support recipient (Flor, Turk, & Rudy, 1989; Newton-John, 2002). The second subtype of emotional support that the BSSS taps into is *negative support*, which includes being critical of the support recipient or avoiding the support recipient (Bodenmann, 2005; Sullivan, Pasch, Johnson, & Bradbury, 2010). The third type of support that the BSSS taps into is *esteem support*, which refers to expressions that the provider has confidence in the recipient and that the recipient is loved, valued, and accepted. Studies indicate that these forms of support are distinct constructs and that they may be key for couples coping with chronic pain (Cano, Barterian, & Heller, 2008; Hemphill et al., 2016). In Chapter 4, I used items drawn from the BSSS to tap into each subtype of emotional support.

Beyond providing a broad assessment of emotional support that might be used to assess esteem, solicitous, and negative emotional support, another benefit of the BSSS is that it includes items that can be used to assess recipients' perceptions of the support they received as well as partner perceptions of support they provided (Schulz & Schwarzer, 2004). This is important because when support is mobilized from one partner for the other, each person within the support exchange may have their own, complementary perspective. Associations between provider reports and recipient reports tend to be moderate (Bolger et al., 2000; Donato et al., 2015; Schulz & Schwarzer, 2004), suggesting the potential to gain unique insights by studying both perspectives. Additionally, some studies find that providers' and recipients' reports often have quite different associations with well-being outcomes (Bolger et al., 2000; Donato et al., 2015; Maisel & Gable, 2009). Examining only one dyad-member's perspective might lead to missing important information that would be gained if both partners' perspectives were considered.

Despite theoretical arguments and empirical research indicating the importance of understanding multiple perspectives, only a few studies have emerged documenting associations between well-being in the person diagnosed with a chronic illness and both partners' perceptions of support (Badr & Taylor, 2009; Rosen et al., 2014; Rosen, Bergeron, Sadikaj, & Delisle, 2015).

1.5.8 Models of Support and Pain: The Operant Model and the Interpersonal Model

There are two leading models that make different predictions regarding which types of support should be most effective at promoting well-being for those experiencing chronic pain (Cano & Williams, 2010; Hemphill et al., 2016). Pain research has traditionally relied on operant models, which indicate that pain behaviours communicate pain to others, and others' supportive responses to pain behaviours may inadvertently reinforce those behaviours, leading to an increase in pain (Fordyce, 1976). This model predicts that spousal solicitous support could reinforce pain behaviour and lead to worse outcomes over time. The interpersonal model predicts that spouse responses aimed at understanding and validating the recipients' emotions and pain experiences are intimacy-building, help individuals regulate emotions, and lead to better outcomes over time (Cano & Williams, 2010; Cano et al., 2008; Hemphill et al, 2016; Holtzman & DeLongis, 2007). Interpersonal models classify negative spouse responses as unsupportive and suggest that they undermine intimacy, disrupt emotion regulation, and lead to poorer outcomes (Cano et al., 2008; Cano & Williams, 2010; Hemphill et al., 2016; McCracken, 2005).

1.5.9 Testing the Operant and Interpersonal Models: Previous Research on Support and Well-being in Chronic Pain Populations

Findings regarding solicitous support tend to be consistent with the traditional operant model. Several cross-sectional studies of couples coping with chronic pain indicate that individuals who receive higher levels of solicitous support from their partners tend to have worse

well-being than those who receive lower levels of solicitous support (Boothby, Thorn, Overduin, & Ward, 2004; Fillingim, Doleys, Edwards, & Lowery, 2003; McCracken, 2005; Romano et al., 1995; Romano, Jensen, Turner, Good, & Hops, 2000). Additionally, findings for negative support tend to support the interpersonal model. Negative responses have been linked to poorer recipient outcomes, including greater emotional distress, pain, and pain catastrophizing, as well as less activity engagement and lower acceptance of pain (Boothby et al., 2004; Cano, 2004; Keefe et al., 2003; Kerns, Haythornthwaite, Southwick, & Giller, 1990; McCracken, 2005). Fewer studies have examined associations between esteem support and well-being in individuals with chronic illness. However, the studies that have examined esteem support tend to find positive associations with recipient well-being (Hemphill et al., 2016).

Despite several cross-sectional studies examining associations between spouse support and recipient well-being in couples coping with chronic illness, few studies have examined within-couple or prospective associations. One study of persons with OA examined change in physical limitations and physical activity over 6 and 12 months as a function of spouse reports of esteem support provision, solicitous support provision, and negative support provision (Hemphill et al., 2016). Esteem support provision as reported by spouses was a significant predictor of subsequent decreases in functional limitations and increases in physical activity over 6 months in those with OA; solicitous responses were significantly associated with increases in functional limitations and decreases in physical activity over 12 months. Negative support was not significantly associated with changes in outcomes over time. Although this study provides evidence for a beneficial effect of esteem support and a detrimental effect of solicitous support over time, the study did not examine reports from both partners, nor did the authors examine pain as an outcome. Given this, questions remain about whether spouse reports provide

complementary information beyond recipient reports, and whether each type of support similarly influences different outcomes.

As I described in an earlier section, intensive longitudinal studies are a powerful methodology to study support mobilization and include many benefits, including that they allow for within-person examination of time-ordered associations. However, this methodology has been used infrequently to study support and well-being in chronic pain populations. There have been only a few intensive longitudinal studies examining daily associations between recipient well-being and esteem, solicitous, and negative partner responses. These studies tend to find benefits of esteem support and detrimental effects of solicitous and negative support on recipient well-being (Song, Graham-Engeland, Mogle, & Martire, 2015; Rosen et al., 2014; Badr, Pasipanodya, & Laurenceau, 2013). For example, in an intensive longitudinal study examining persons in intimate relationships experiencing vulvodynia pain, receiving higher levels of esteem, lower solicitous, and lower negative support from their partners was associated with improvements in sexual functioning (Rosen et al., 2014).

A handful of studies have used intensive longitudinal methods to examine associations between spouse support and pain in those with a chronic illness diagnosis (Burns et al., 2013; Rosen et al., 2015). In one study, Burns and colleagues (2013), found that times when persons with chronic low back pain received higher spouse hostility and criticism tended to be associated with higher concurrent pain when controlling for prior pain intensity. Additionally, recipient perceptions of higher spouse hostility were associated with residualized increases in pain over the subsequent three hours. However, no association was found between recipient perceptions of spouse criticism and subsequent changes in pain. Although this study provides some evidence that negative spouse responses are prospectively associated with changes in pain, esteem and

solicitous spouse responses were not examined. Additionally, only recipient reports of spouse responses were examined.

One intensive longitudinal study examined associations between women's self-reports of vulvodynia pain and both partners' reports of spouse esteem, solicitous, and negative support (Rosen et al., 2015). In this study, pain decreased on days when women reported receiving lower levels of solicitous and negative support, or when their partners reported providing higher levels of esteem and lower levels of solicitous support. Although this study provides preliminary evidence that there may be beneficial effects of esteem and detrimental effects of solicitous and negative support on daily pain, prospective associations were not examined. Examining lagged associations may provide additional information about the process of support mobilization over time.

1.5.10 Chapter 4 Study Overview and Hypotheses

Results reported in Chapter 4 are from an intensive longitudinal study in which persons with RA and their partners were asked to provide reports about 6 and 12 hours after waking. The goal was to examine the associations of specific types of spousal emotional support mobilized to those with RA in the morning and subsequent changes in recipient reports of RA pain from morning to evening. Additionally, I took a dyadic approach and assessed support mobilization to those with RA from the perspectives from both partners. I hypothesized that mornings when higher levels of esteem support were mobilized than typical for that couple would be associated with subsequent decreases in pain. I also hypothesized that times when higher levels of solicitous and negative support were mobilized than typical for that couple would be associated with subsequent increases in pain. I expected that these associations would be maintained when

morning levels of potential confounding variables were controlled, including the amount of time spent with the partner and mood in persons with RA.

I was also interested in examining, on an exploratory basis, whether spouses change their supportive behaviours following increases in RA pain. Thus, I conducted reverse-time-lagged analyses. In these analyses, I examined whether mornings when those with RA experienced higher levels of pain than typical for them were associated with subsequent shifts in esteem, solicitous, and negative support from the spouse.

1.6 Dissertation Overview: Summary

The broad goal of this line of research was to sharpen understanding of the putative antecedents and consequences of support exchanges. Chapters 2 and 3 focus on potential antecedents of support and involve analyses of an intensive longitudinal dataset from 350 undergraduate students. Chapter 2 aims to establish links between the types of daily stressors experienced, appraisals of threat to agency and to communion, and support seeking and provision. Chapter 3 aims to investigate the roles of E and A in the associations between threat appraisals and support seeking and provision. Chapter 4 focuses on the potential consequences of support and involves analyses of intensive longitudinal data from 29 couples in which one partner was diagnosed with RA. This chapter examined RA-related pain in relation to esteem, solicitous and negative support as reported by both recipients and providers. Taken together, the results of the proposed thesis contribute to a better understanding of the support mobilization process through a rigorous analysis of both the theorized antecedents and consequences of social support.

Chapter 2: Threats to Communion and Agency Mediate Associations Between Stressor Types and Support Behaviours

2.1 Introduction

The current study sought to examine whether appraisals of threat to communion and agency mediate associations between stressor type (achievement, social, other) and support seeking and provision. To meet this goal, participants provided reports of the most serious stressor of each half-day, their appraisals of those stressors, and their support behaviours twice daily across one week. Previous research indicates that appraisals of stressor seriousness and controllability are important components of the stress process and are linked to coping responses (e.g., Walker, Smith, Garber, & Claar 2005). Thus, I examined whether communal and agentic threat appraisals mediated the associations between stressor type and support behaviors even when including these variables as control variables.

I hypothesized that situations in which social stressors were reported would be associated with higher levels of support provision and support seeking compared to situations in which other stressors were reported (Hypothesis 2-1A). I also expected that communal threat would mediate the association between social stressors and support behaviours. More specifically, I expected that social stressors would be related to higher levels of communal threat than would other stressors. In turn, communal threat was expected to be associated with higher levels of support provision and support seeking (Hypothesis 2-1B).

In contrast to associations of social stressors and support behaviours, I expected that situations in which individuals reported achievement stressors would be associated with lower levels of support provision and support seeking as compared to situations in which they reported

other stressors (Hypothesis 2-2A). My final hypothesis was that agentic threat would mediate the relations between achievement stressors and support behaviours. Achievement stressors were expected to be related to higher levels of agentic threat compared to all other stressors. In turn, agentic threat was expected to be related to higher levels of support seeking as well as lower levels of support provision (Hypothesis 2-2B).

2.2 Materials and Methods

2.2.1 Participants and Procedure

Data come from the Personality, Stress, and Coping Study, a large intensive longitudinal study that involved twice-daily reports as well as a questionnaire battery (Lee-Baggley, 2006). Surveys assessed a variety of constructs including mood, stressors, physical symptoms, coping responses, and other variables. Only variables relevant to the current analyses are described here. Participants were recruited from the undergraduate subject pool of the Department of Psychology at the University of British Columbia. Participants provided written informed consent as well as demographic information in the laboratory. Participants received course credit for participation, which was voluntary and confidential. Then participants completed daily surveys through a web-based questionnaire twice per day (midday and evening) for seven consecutive days. This study was approved by the Behavioural Research Ethics Board at The University of British Columbia.

Of the initial sample of 412 individuals, 62 were excluded in these analyses because they did not complete at least one full day of diary entries (n = 55) or because they submitted more than two days' worth of entries at the same time (n = 7). The final sample consisted of 350 participants (70% female). Mean age was 20.54 years (*SD* = 5.12) and mean years in university were 2.14 (*SD* = 1.11). Participants identified as being of Asian heritage (n = 177; 51%),

European heritage (n = 113; 32%), other heritage (n = 36; 10%), mixed heritage (n = 13; 4%), and some did not report their heritage (n = 11; 3%), reflecting the demographic profile of students at the University of British Columbia. Those included and excluded in this study were not significantly different in gender, age, years in university, or ethnicity. Adherence was confirmed by a time and date stamp of all diary entries. Only time logs entered at midday and evening were included in the final analysis. Of the possible 4900 diary entries across all participants, there were 3867 entries completed on time, which is a completion rate of 79%.

2.2.2 Measures

Stressor type was assessed with an open-ended question that read, "Please describe briefly the most bothersome event or problem you had since your last entry. It may have been about an exam or a conflict with a friend. Whatever your most serious issue was since your last entry (no matter how minor or trivial it may seem to you), please describe it here." Categories were developed based on responses and were consistent with past studies (Bolger, DeLongis, Kessler, & Schilling, 1989; Lee-Baggley et al., 2005). Categories included: achievement stressors (43%) social stressors (25%), health/fatigue (11%), work-life balance (2%), multiple stressors (1%), and miscellaneous hassles (18%; e.g., finances, commuting). Two coders independently rated each event and achieved a high interrater reliability (kappa = .86). Discrepancies were resolved by a graduate student research assistant. The two most frequent categories (social and achievement stressors) were kept as separate categories and other stressor types were combined to create a third category ("other stressor"). Social and achievement stressors were further coded for descriptive purposes. Social stressors included being wronged by another person (e.g., "my boyfriend cheated on me"; n = 150; 39%), interpersonal conflict (e.g., "had a fight with my mom"; n = 116; 30%), a stressor impacting someone else ("my friend has

family problems"; n = 85; 22%), or doing wrong to another person (e.g., "I lied to my good friend"; n = 31; 8%). Achievement stressors were related to academics (e.g., "I did poorly on an assignment"; n = 485; 87%), work (e.g., "want a better job for the summer"; n = 19; 3%), extracurricular activities and hobbies, (e.g., "I was annoyed with my performance at the driving range"; n = 19; 3%), or other (n = 36; 6%).

Participants were asked to report agentic threat, communal threat, stressor seriousness, and stressor controllability on a 5-point Likert scale (1 = "none/not at all", 2 = "a little", 3 = "somewhat", 4 = "moderately", and 5 = "a lot"). Stressor seriousness and controllability were each assessed with single items (Folkman et al., 1986a). Stressor seriousness was assessed with the item, "How serious was this for you?" and controllability was assessed with that the item, "With this event, how much control or influence did you feel you had over it or its handling?"

Agentic and communal threat appraisals were assessed in reference to the question, "to what extent would you say each of the following was of concern to you in this situation?" (Folkman et al., 1986a). Three items assessed agentic threat ("losing your self-respect", "things not running as smoothly as you would like", "not achieving an important goal at your job or in your schoolwork") and four items assessed communal threat ("harm to a loved one's well-being", "a loved one having difficulty getting along in the world", "losing someone's respect or love", and "not getting the support and understanding you want"). The scale of agentic and communal threat appraisals used in this study is a modified version of a previously developed measure of appraisal (Folkman et al., 1986a). The original scale includes thirteen items that Folkman and colleagues (1986a; 1986b) selected based on a review of the literature and on subjects' responses to open-ended questions from a prior study of stress and coping (Folkman & Lazarus, 1980). Four of the original items, two slightly modified items, and two newly written

items were included in this study. These eight items were selected to minimize participant burden while maximizing breadth of measurement. For example, the original scale included five items related to losing face (i.e., "losing your self-respect," "appearing to be an uncaring person," "appearing unethical," "appearing incompetent," and "losing the approval or respect of someone important to you"; Folkman et al., 1986a). Additionally, there was conceptual overlap between two items on the original scale tapping into losing the love or respect from another person (i.e., "losing the affection of someone important to you", and "losing the approval or respect of someone important to you"; Folkman et al., 1986a). To minimize conceptual redundancy and participant burden in this study, the items, "losing your self-respect," and "losing someone's respect or love" were included as broad, face valid assessments meant to tap into losing respect and affection. The other six item in this study were also chosen to maximize breadth of assessment and include, "things not running as smoothly as you would like," "harm to a loved ones' well-being", "not getting the support and understanding you want," "harm to your own health, safety, or physical well-being," "not achieving an important goal at your job or in your schoolwork," "a loved one having difficulty getting along in the world". The eight items included in this study were subjected to a principal components analysis in a previous analysis of the data used in this study (Lee-Baggley, 2006). These analyses indicated a two-factor solution reflecting the agentic-communal distinction. One of the items, "harm to your own health, safety, or physical well-being" did not load on either of the factors. The three items that I used to assess agentic threat in the current analyses loaded on the first factor and the four items that I used to assess communal threat in the current analyses loaded on the second factor.

Support seeking and provision were assessed using subscales from a revised version of the Brief Ways of Coping Questionnaire, which was specifically developed to measure coping

with daily stressors (BWOC; Lee-Baggley et al., 2005; Folkman et al., 1986b). The stem read, "We would like to find out what you did in response to this significant issue or difficulty you just described. Please circle the number that best describes how much you used each strategy below. Some of these many not apply to your situation". Consistent with other subscales from the BWOC, participants were asked to report their support seeking and provision with any other individual and did not ask participants to report the individual or individuals with whom support was being exchanged. Participants reported the degree to which they used a variety of coping strategies in response to the problem they described on a 3-point Likert scale ("does not apply OR not at all" = 1 to "a lot" = 3). Support seeking was assessed with six items ("talked with someone not involved about the problem", "talked to someone about how I was feeling", "tried to get comfort and understanding from someone", "tried to get advice or help from other people about what to do", "tried to get emotional support from others", "I asked someone I respected for advice"). Support provision was assessed with eight items ("Tried to help the other person involved by listening to him/her", "Tried to comfort the other person involved by showing this person my positive feelings for him/her", "Imagined myself in the other person's shoes", "Tried to help the other person involved by doing something for him/her", "Tried to understand how the other person felt", "Tried to see things from the other person's perspective", "Tried to find a solution that was fair to all involved", and "Tried to meet the other person half-way").

2.2.3 Analytic Strategy

Data had dependency stemming from including multiple timepoints for each individual. I began analyses by testing a series of unconditional means multilevel models with timepoints nested within individuals for all repeatedly assessed variables. This allowed me to examine whether the intercept variances for support seeking and provision were significantly different

from zero and to calculate intra-class correlations (ICCs) for all repeatedly assessed variables (See Table 2-1; Woltman, Feldstain, MacKay, & Rocchi, 2012). These models showed that intercept variances for support seeking and provision were both significantly different from zero. The ICC for support provision was 0.265, indicating that approximately 27% of the variability in support provision can be accounted for by differences between individuals. The ICC for support seeking was 0.353, indicating that approximately 35% of the variability in support seeking can be accounted for by differences between individuals. Overall, these results suggest that a multilevel approach is appropriate.

To examine the relations between stressor type, threat appraisals, and coping responses, I conducted multilevel regression analysis using Hierarchical Linear Modeling 6.0 (HLM; Raudenbush, Bryk, Cheong, & Congdon, 2004). Two-level mediational analyses were conducted using the analytic strategy proposed by Bauer, Preacher, and Gil (2006), with daily experiences (Level 1) nested within individuals (Level 2). The first set of analyses were conducted with the aim to examine whether the association between social stressors and support behaviours were mediated by within-person variability in communal threats. To examine this question, I wanted to compare half-days when participants experienced a social stressor to half-days when participants experienced any other stressor. Therefore, two models were run that included a dummy-coded variable for social stressors (social stressors = 1; other stressors = 0), and person-mean centered communal and agentic threat appraisals as predictors of each support behaviour. One of these models included support seeking as the outcome variable and the other included support provision as the outcome variable. Communal threat was the mediator variable; the model also included agentic threat as a predictor of the support behaviour outcome to adjust for overall levels of perceived threat. Omitting random effects can lead to biased estimates for fixed

effects (Schmidt-Catran & Fairbrother, 2016). Therefore, all intercepts and slopes were modelled as random. Because the focus was on within-person associations, the between-person averages for the Level 1 variables were not included in the models. The general equation for the models examining communal threat as a mediator of the association between social stressor type and each support behaviour is included below:

Level 1 (diary entries): $CT_{ij} = \beta_{0j} + \beta_{1j}StressorType_{ij} + r_{CTij}$,

$Y_{ij} = \beta_{2j} + \beta_{3j}StressorType_{ij} + \beta_{4j}CT_{ij} + \beta_{5j}AT_{ij} + r_{Yij}$,

Level 2 (persons): $\beta_{0j} = \gamma_{00} + u_{0j}$, $\beta_{1j} = \gamma_{10} + u_{1j}$, $\beta_{2j} = \gamma_{20} + u_{2j}$, $\beta_{3j} = \gamma_{30} + u_{3j}$, $\beta_{4j} = \gamma_{40} + u_{4j}$, $\beta_{5j} = \gamma_{50} + u_{5j}$

where *i* denotes Level-1 units (i.e., diary entries), *j* denotes Level-2 units (i.e., persons), and we assume that $r_{CTij} \sim N(0, \sigma_{CT}^2)$, $r_{Yij} \sim N(0, \sigma_Y^2)$, $\begin{pmatrix} u0j \\ ... \\ u5j \end{pmatrix} \sim N \begin{pmatrix} 0 & \tau 00 & ... & \tau 05 \\ ..., & ... & ... & ... \\ 0 & \tau 50 & ... & \tau 55 \end{pmatrix}$, and $cov(r_{CTij}, r_{Yij}) = cov(u_{0j}, r_{ij}) = cov(u_{1j}, r_{ij}) = cov(u_{2j}, r_{ij}) = 0$. Here, CT_{ij} corresponds to the mediator, communal threat; the outcome support behaviour variable (i.e., support seeking or support provision) is represented by Y_{ij}; the intercept for the mediator is β_{0j}; the effect of stressor type (i.e., social stressor vs. other stressor) on communal threat for the *j*th individual is β_{1j}; the intercept for the outcome is β_{2j}; the effect of stressor type (i.e., social stressor vs. other stressor) on the support behaviour for the *j*th individual when threat to agency and threat to communion are at zero is β_{3j}; the effect of threat to communion on the support behaviour for the *j*th individual when stressor type and threat to agency are at zero is β_{4j}; the effect of threat to agency on the support behaviour for the *j*th individual when stressor type and threat to communion are at zero is β_{5j}; the conditional grand mean for the mediator is γ_{00}, which is the average amount individuals perceived communal threat when aggregating across all individuals when stressor type is at zero;

the average effect of stressor type on communal threat when aggregating across persons is γ_{10}; the conditional grand mean for the outcome, which is the average amount individuals reported engaging in support seeking or provision when aggregating across all individuals and when stressor type, agentic threat, and communal threat are at zero is γ_{20}; the average effects of each predictor (stressor type, threat to agency, threat to communion) on the support behaviour outcome when aggregating across individuals are represented by γ_{30} - γ_{50}. The Level 1 residual for communal threat is r_{CTij} , which is the difference between the average amount that the *j*th person perceived communal threat across the week and the amount that the *j*th person perceived communal threat for the *i*th diary entry when stressor type is equal to zero; the Level 1 residual for the support behaviour outcome is r_{Yij}, which is the difference between the average amount that the *j*th person engaged in the support behaviour across the week and the amount that the *j*th person engaged in the support behaviour for the *i*th diary entry when stressor type, agentic threat, and communal threat are equal to zero. The difference between the average amount that the *j*th person reported threat and the grand mean for that threat appraisal when stressor type is equal to zero is u_{0j}; the difference between the association between stressor type and the mediator for the *j*th person and the grand mean association between stressor type and the mediator is u_{1j}; the difference between the average amount that the *j*th person engaged in the support behaviour and the grand mean for that support behaviour when predictor variables in the model are equal to zero is u_{2j}; the differences between the slopes for the predictor variables in relation to the support behaviour outcomes for the *j*th person and the grand mean slopes for the predictor variables in relation to the support behaviour outcomes are represented by u_{3j}- u_{5j}; the within-person variance in the mediator when stressor type is at zero is σ_{CT}^2; the within-person variance in the outcome when stressor type, agentic threat, and communal threat are at zero is σ_Y^2. The variance of the

conditional grand mean for the mediator or the between-person variation in how much individuals appraised threat to agency or communion on average when stressor type is at zero is τ_{00}; the variance of the conditional grand mean for the outcome or the between person variation in how much individuals engaged in the support behaviour on average when stressor type, agentic threat, and communal threat are at zero is τ_{22}; the variation in the effect of stressor type on communal threat across persons is τ_{11}; the variations in the effects of the predictor variables (stressor type, agentic threat, communal threat) on the support behaviour across persons when the other predictor variables in the model are average are represented by τ_{33}- τ_{55}.

Two similar models were run to examine whether the associations between achievement stressors and support behaviours were mediated by within-person variability in agentic threats. Here, instead of the mediator being communal threat, agentic threat was modelled as the mediator. Therefore, instead of CT_{ij} as the outcome in the first Level 1 equation, AT_{ij} was the outcome in the first Level 1 equation. I wanted to compare half-days when participants experienced an achievement stressor to half-days when participants experienced any other stressor. Therefore, the two models that were run each included a dummy-coded variable for achievement stressors (achievement stressors = 1; other stressors = 0), and person-mean centered communal and agentic threat appraisals as predictors of each support behaviour. One of these models included support seeking as the outcome variable and the other included support provision as the outcome variable. The model included communal threat as a predictor of the support behaviour outcome to adjust for overall levels of perceived threat. To avoid biases in fixed effect estimates (Schmidt-Catran & Fairbrother, 2016), all intercepts and slopes were modelled as random. Because the focus was on within-person associations, the between-person averages for the Level 1 variables were not included in the models.

For all models, confidence intervals and inferences for indirect and total effects were made using the normal approximation method, which accounts for the random effects at Level 1 (Bauer, Preacher, & Gil, 2006). The percent of within-person variance in support behaviours that was accounted for by stressor type and threat appraisals and the percent of within-person variance in threat appraisals that was accounted for by stressor type were obtained using procedures outlined by Raudenbush and Bryk (2002, p. 79). A full description of these calculations is presented in Appendix I. Maximum likelihood estimation was used in order to allow for two Level 1 residual variances to be modelled (i.e., one for the mediator and one for the outcome variable; Bauer, Preacher, & Gil, 2006). Robust standard errors were used in estimation for all models.

All hypotheses were tested when controlling for appraised seriousness, appraised controllability, gender, and ethnicity (European, Asian, or other heritage) as predictors of support behaviours in turn in a series of additional models. Appraised seriousness and controllability were centered on the mean for each person prior to inclusion in the models and I included random slopes in the models for these variables. For gender and ethnicity, I also tested cross-level interactions with stressor types and threat appraisals. Given that including appraised seriousness, appraised controllability, gender, or ethnicity did not substantively change results and ethnicity and gender did not moderate any of the associations, they were not included in the final models presented here.

2.3 Results

2.3.1 Preliminary Analyses

Protocol compliance was examined in preliminary analyses. On average, participants completed eleven diary entries. Eighty-six percent of participants completed at least 50% of the diary entries and 28% of participants completed all diary entries. Individuals who identified as being of Asian heritage tended to complete a higher number of diary entries (M = 11.39, SD = 2.79) compared to those who were of European heritage (M = 10.59, SD = 3.04), t (228) = 2.29, p = .023, 95% CI = [0.11, 1.48].

Table 2-1 presents means, standard deviations, ICCs, and internal consistencies for study variables. Based on mean ratings across all person-days of data, participants tended to rate their stressors as being "somewhat"– "moderately" serious and "somewhat" controllable. On average, participants rated their stressors as being "not at all"– "a little" threatening to communion and to agency. Additionally, participants tended to report engaging in support provision and seeking "not at all"– "a little". Reliability of change ("within-person internal consistency"; R_c) and reliability of average of all items and time ("between-person internal consistency"; R_{KF}) were calculated for all repeatedly-assessed variables according to recommendations by Cranford and colleagues (2006) and Shrout and Lane (2012). These calculations were completed using the multilevel.reliability function in the lme4 package in R (Bates, Maechler, Bolker, & Walker, 2015; R Core Team, 2017). Across all study variables, ICCs ranged from .11 to .35. Reliability of change (R_c) ranged from .49 to .90, and reliability of average of all ratings across all items and times (R_{KF}) ranged from .94 to .98.

Table 2-2 presents sample-size weighted between-person correlations and pooled within-person correlations among study variables. These correlations were calculated using the statsBy

function in the *psych* package in R (Revelle, 2017), which calculates the pooled within-person correlations and the sample size weighted between-person correlations. Although my focus was on within-person associations, between-person correlations are also reported for transparency and future meta-analyses. Between-person correlations of study variables with gender and ethnicity are also included. Relevant for the research questions of interest here, social stressors, compared to all other stressors, were significantly associated with within-person decreases in threat to agency (r = -.20, p < .001) and within-person increases in threat to communion (r = .41, p < .001). Social stressors, compared to all other stressors, were also significantly associated with within-person increases in support seeking (r = .15, p <.001) and support provision (r = .48, p < .001). In contrast, achievement stressors, compared to all other stressors, were significantly associated with within-person increases in threat to agency (r = .42, p < .001) and within-person decreases in threat to communion (r = -.25, p < .001). Achievement stressors, compared to all other stressors, were also significantly associated with within-person decreases in support seeking (r = -.04, p = .015) and within-person decreases in support provision (r = -.30, p < .001). Within-person increases in threat to agency were associated with within-person increases in support seeking (r = .15, p < .001) and decreases in support provision (r = -.12, p < .001). Furthermore, within-person increases in threat to communion were associated with within-person increases in support seeking (r = .29, p < .001) and support provision (r = .56, p < .001).

2.3.2 Hypothesis Testing

Results of Model 2-1, a mediation model testing the statistical effect of social stressor type on support provision through communal threat, are displayed in Table 2-3 and in Panel A of Figure 2-1. Results of Model 2-2, a mediation model of the statistical effect of social stressor

type on support seeking through communal threat, are displayed in Table 2-4 and in Panel B of Figure 2-1. The total statistical effects of social stressors on support behaviours were in full support of Hypothesis 2-1A. Compared to other stressors, social stressors were related to higher levels of support provision, Total effect = 0.48, *SE* = 0.03, *z* = 18.68, $p < .001$, and support seeking, Total effect = 0.18, *SE* = 0.03, *z* = 7.27, $p < .001$. I found support for Hypothesis 2-1B. Social stressors were significantly related to higher levels of threat to communion, $\gamma_{10} = 0.66$, *SE* = 0.03, $t\ (349) = 19.64$, $p < .001$, compared to other stressors. In turn, higher levels of threat to communion were associated with higher levels of support provision, $\gamma_{40} = 0.21$, *SE* = 0.01, $t\ (349) = 16.25$, $p < .001$, and support seeking $\gamma_{40} = 0.14$, *SE* = 0.01, $t\ (349) = 9.29$, $p < .001$.

Formal tests revealed significant indirect associations of social stressor type and support provision through communal threat, Indirect effect = 0.13, *SE* = 0.02, *z* = 8.05, $p < .001$, and of social stressor type and support seeking through communal threat, Indirect effect = 0.08, *SE* = 0.02, *z* = 5.00, $p < .001$. When including communal threat in models predicting support behaviours, social stressors were significantly linked to higher levels of support provision, $\gamma_{30} = 0.35$, *SE* = 0.02, $t\ (349) = 15.34$, $p < .001$, and support seeking, $\gamma_{30} = 0.10$, *SE* = 0.02, $t\ (349) = 4.49$, $p < .001$.

Within-person explained variance, R^2_{Level1}*(approx.)*, was calculated for communal threat and the support behaviour outcome for each model by comparing the exact models described here with one modification to improve estimate accuracy (Raudenbush & Bryk, 1992; Lahuis et al., 2014; see Appendix I for a full description of these calculations). Specifically, the models were rerun as random intercept models and did not include random slopes. In each model, R^2_{Level1} for communal threat was 0.18, indicating that about 18% of the within-person variance in communal threat was accounted for by the social stressor type (vs. all other stressor types).

R^2_{Level1} for support provision was 0.43, indicating that 43% of the within-person variance in support provision was accounted for by social stressor type and threat appraisals. R^2_{Level1} for support seeking was .11, indicating that about 11% of the within-person variance in support seeking was explained by social stressor type and threat appraisals.

Results of Model 2-3, the mediation model testing the statistical effect of achievement stressor type on support provision through communal threat, are displayed in Table 2-5 and in Panel C of Figure 2-1. Results of Model 2-4, the mediation model of the statistical effect of achievement stressor type on support seeking through communal threat, are displayed in Table 2-6 and in Panel D of Figure 2-1. The total statistical effects of achievement stressors on coping responses were in partial support of Hypothesis 2-2A. As expected, achievement stressors were related to lower levels of support provision, Total effect = -0.11, *SE* = 0.03, *z* = -9.29, $p < .001$. However, achievement stressor type had a nonsignificant total statistical effect on support seeking, Total effect = 0.02, *SE* = 0.02, *z* = 0.76, $p = .449$. Mediation models provided support for Hypothesis 2-2B. Achievement stressors were significantly related to higher levels of threat to agency compared to other stressors (γ_{10} = 0.63, *SE* = 0.03, *t* (349) = 19.07, $p < .001$. In turn, higher levels of threat to agency were associated with lower levels of support provision γ_{50} = -0.05, *SE* = 0.01, *t* (349) = -6.72, $p < .001$, as well as with higher levels of support seeking, γ_{50} = 0.07, *SE* = 0.01, *t* (349) = 0.01, $p < .001$.

Formal tests revealed a statistically significant and negative indirect association between achievement stressor type and support provision through agentic threat, Indirect effect = -0.03, *SE* = 0.01, *z* = -5.27, $p < .001$. Additionally, although achievement stressor type did not have a significant total statistical effect on support seeking, it did have a significant positive indirect association with support seeking through threat to agency, Indirect effect = 0.05, *SE* = 0.02, *z* =

2.18, p = .029. When including threat to agency in the model, there was a significant direct association between achievement stressor type and support provision, γ_{30} = -0.09, SE = 0.01, t (349) = -6.45, p < .001. With the addition of threat to agency in the model, there was a nonsignificant association of achievement stressor type and support seeking, γ_{30} = -0.03, SE = 0.02, t (349) = -1.70, p = .089.

Within-person explained variance, R^2_{Level1}*(approx.)*, was calculated for agentic threat and the support behaviour outcome for each model using the same procedures as for the models testing communal threat as the mediator. In each model, R^2_{Level1} for agentic threat was 0.14, indicating that about 14% of the within-person variance in agentic threat was accounted for by achievement stressor type vs other stressors. R^2_{Level1} for support provision was 0.36, indicating that 36% of the variance in support provision was accounted for by achievement stressor type and threat appraisals. R^2_{Level1} for support seeking was .10, indicating that about 10% of the within-person variance in support seeking was explained by achievement stressor type and threat appraisals.

2.4 Discussion

2.4.1 Research Summary

This study found support for the Communal-Agentic Framework in understanding how threat appraisals are related to stressors and support mobilization. This study replicated past research indicating that stressor types play a role in specific patterns of coping (O'Brien & DeLongis, 1996). Findings here also went beyond previous research by supporting a model in which threats to agency and communion mediate the associations between the types of stressors experienced and the extent to which people respond with support seeking and provision.

The associations between stressor type, threat appraisals, and support provision were consistent with expectations. Social stressors were associated with higher levels of communal threat compared to other stressors, and achievement stressors were associated with higher levels of agentic threat compared to other stressors. In turn, communal threats were associated with higher levels of support provision, whereas agentic threats were associated with lower levels of support provision. Findings for support provision lend support to previous arguments that communion and agency are at competition at the behavioural level (Maio et al., 2009). Findings are consistent with theorizing that threat to communion provokes and threat to agency inhibits support provision, a stress response primarily meant to affiliate with and help others.

Within-person variability in communal and agentic threat also mediated associations between stressor type and support seeking. The results are consistent with the theory that individuals increase their use of support seeking above their own typical levels in the face of either communal or agentic threat. This suggests that support seeking may be used to affiliate with others (Taylor, 2006) and to fulfill personal needs with the help of others (O'Brien et al., 2009). Importantly, these results indicate that agentic threat may have the opposite effect on support seeking compared to achievement stressor type. In a model examining whether agentic threat mediates associations between achievement stressor and support seeking, the total association between achievement stressors and support seeking was negative and nonsignificant. However, achievement stressor type had a significant and positive indirect association with support seeking through agentic threat. These data provide support for the notion that stressor type and threat appraisals represent separate aspects of the stress process (Folkman et al., 1986a; Walker et al., 2005).

Previous studies of the role of appraisal in the support process have tended to focus on the roles of perceived stressor seriousness and controllability (David & Suls, 1999; Cutrona & Suhr, 1992; O'Brien et al., 2009; Stone et al., 1995). However, the sizes of associations between support behaviours, appraisals, and stressor types indicate that stressor type and threat appraisals may play non-ignorable roles in the support process. In the current study, stressor seriousness showed a moderate positive within-person correlation with support seeking and a small positive within-person correlation with support provision (Table 2-2). Stressor controllability showed small negative within-person correlations with support seeking and provision. In contrast, stressor type showed moderate to large within-person correlations with support provision and small within-person correlations with support seeking. Threat to communion showed a moderate within-person correlations with support seeking and a large within-person correlation with support provision. Threat to agency showed small within-person correlations with support seeking and provision. Furthermore, mediation analyses indicated that stressor type and threat appraisals together accounted for a substantial proportion of the within-person variance in support behaviours (10-43%). The sizes of the associations indicate that stressor type and threat appraisals are as important as perceived controllability and seriousness in the support process and should be incorporated in studies aiming to understand the circumstances under which support is mobilized.

2.4.2 Strengths, Limitations, and Future Directions

Testing within-person associations limits the possibility that stable characteristics acted as third variable confounds. However, this study was correlational, and there are other potential explanations for the associations observed among the variables in this study. Although results were not changed when controlling for perceived stressor seriousness and controllability, other

situation-specific variables may have had an impact on the results. For example, more support tends to be exchanged within higher quality relationships (Lopes, Salovey, Côté, Beers, & Petty, 2005). Additionally, research suggests that more support is provided when providers are experiencing higher levels of positive mood compared to when providers experience lower positive mood (Iida, Seidman, Shrout, Fujita, & Bolger, 2008). It is possible that relationship quality and positive mood might also be associated with threat appraisals. Examining relationship quality, mood, and threat appraisals as they together relate to support seeking and provision may improve understanding of the circumstances under which support is exchanged.

Beyond relationship quality and provider positive mood, another situation-specific factor that may influence the results is the extent to which the other individual or individuals involved in the situation share the responsibility of coping with the stressor (Lyons et al., 1998). Specifically, Lyons and colleagues (1998) theorized that there may be differences in responses to stress depending on whether the individual believes that another person will be impacted by the stressor, which is conceptually related to communal threat. They also theorized that responses depend on whether the individual believes that the other person shares responsibility to cope. It is possible that times when another person may be impacted by the stressor may be accompanied by perceptions that the other person shares higher levels of responsibility to cope with the stressor compared to times when that person is not impacted by the stressor. Additionally, times when a person perceives that another person shares greater responsibility to cope with the stressor may be associated with increases in support seeking compared to times when a person perceives that another person shares less responsibility to cope. Future research should examine the associations of threat appraisals and support behaviours when also taking perceptions of stressor responsibility into consideration.

The Transactional Model of Stress theorizes that stressors lead to stress appraisals which lead to efforts to manage the stressors (Folkman et al., 1986a; 1986b). In line with this theorizing, I examined within-person associations between stressor types, threat appraisals, and support behaviours. However, another potential explanation for the observed associations among the variables in this study is that cognitive appraisals or support behaviours determined the choice of which stressor to report as most stressful. Alternatively, support behaviours could have changed appraisals of threat. For example, the use of support provision to cope may have improved or worsened the stressful situation or changed even which stressors were experienced. Future research could assess threat appraisals and support behaviours in the context of the same stressor multiple times over the course of a day. This may allow for a better understanding of the time-ordering of fluctuations in threat appraisals and support behaviours. However, the burden on participants would have to be balanced with such a method.

The current study measured stressor type by coding participants' open-ended reports of the most serious stressor of the day. Stressors that were expected to be pertinent to interpersonal relationships or the well-being of others were coded as "social stressors"; stressors that were considered to be pertinent to personal achievement were coded as "achievement stressors", and all other stressors were combined to create an "other stressors" category. These general categories are consistent with previous research (e.g., Lee-Baggley et al., 2005) and were moderately correlated with threat appraisals and support behaviours in the current study. However, there could be other ways to categorize stressor types, potentially by examining more specific subcategories of social or achievement stressors.

Reliability estimates for communal and agentic threat appraisals were high at the between-person level but were lower at the within-person level (R_c was .74 for communal threat

and .49 for agentic threat). Importantly, communion and agency are mega-constructs (Trapnell & Paulhus, 2012). Because threat to agency was only assessed with three items and threat to communion was only assessed with four items, it is not surprising that the internal consistencies of such broad constructs were low. The low reliability at the within-person level could also indicate multidimensionality of the constructs at the situation level. Indeed, it seems reasonable that not all aspects of communion or agency may be threatened by the same stressor. For example, situations that threaten the well-being of a loved one may not necessarily threaten the person's relationship with him or her. However, individuals would be expected to cope using support provision in both situations. Future studies should increase the number of items measuring threat appraisals or aim to assess more specific types of communal and agentic threat in order to increase the within-person reliability of the measures.

Consistent with scales assessing other ways of coping (Folkman et al., 1986b), support seeking and provision were assessed by asking participants to report on how they interacted with any other individuals. The individuals from whom individuals were seeking support and to whom individuals were providing support were not assessed. This methodology does not provide information about how support is being exchanged across the members of people's social networks. It is not clear whether support is being exchanged with one other person or with multiple other people; it is not clear which individuals with whom support was most often exchanged. Additionally, because participants were asked to report the most serious problem of the half-day, they reported a wide range of stressors, and some may have been experienced independently. Although it is likely possible to involve others in most stressful situations (e.g., even when getting a flat tire when driving alone in one's vehicle, it is possible to call others to ask for help in dealing with the stressor), situations may not always call for support seeking or

provision. These types of stressors would likely be coded as achievement or other stressors (i.e., not as social stressors), be low in communal threat (though even seemingly independent stressors might have ripple effects and impact social interactions; e.g., a flat tire may make one late for a meeting) and be low in support provision and seeking. This may have inflated the associations between social stressor type, communal threat, and support behaviours in this study. Other studies have asked participants to provide reports on family stressors (e.g., King & DeLongis, 2013). Future research could examine the roles of communal and agentic threat in support behaviours during different types of family stressors.

This study included the perspective of only one individual within the support exchange, which does not allow for a complete understanding of the support process. Support mobilization is an interpersonal process involving more than one person and each individual within the support exchange likely has a unique perspective. Future research should examine the associations between stressor type, threat appraisals, and support behaviours within specific relationships and take more than one person's perspective into consideration.

This study focused on the within-person relations between stressor type, threat appraisals, and coping responses using a homogeneous sample reporting minor stressors. Given that the study included a sample of students from UBC, it is not surprising that many participants identified as Asian and female. Because of the homogeneity of the sample, it is not clear whether the associations among the variables observed in this study would generalize to other samples. For example, it is possible that the associations between stressor type, threat appraisals, and support behaviours would be different in other cultures or in older samples. For example, people may less readily seek support in collectivistic cultures compared to more individualistic cultures, and women tend to seek higher levels of support compared to men (Kim, Sherman, Ko, &

Taylor, 2006). In the current study, females tended to report more social stressors and agentic threat compared to men (see Table 2-2). Consistent with previous research (Kim et al., 2006), females also tended to report significantly higher levels of support seeking compared to men. Additionally, people identifying as having an Asian heritage tended to report fewer social stressors and more achievement stressors compared to people identifying as other ethnicities; people identifying as having a European heritage tended to report more social stressors and more achievement stressors compared to people identifying as other ethnicities. This study did not replicate previous findings (Kim et al., 2006) that people identifying as having an Asian heritage sought less support compared to people identifying as having another heritage. Importantly, neither gender nor ethnicity moderated associations between stressor types, threat appraisals, and support behaviours in the current study. It is possible that with a sample that includes more balanced numbers of different ethnicities, a more fine-grained examination might lead to more insights on the role of ethnicity in the support process. For example, there may be differences across different Asian cultures in terms of the extent to which support seeking is perceived to be an appropriate response to stress. Future research examining the roles of stressor type and threat appraisals in the support process should assess these variables in other populations in order to understand the extent to which the associations observed here are generalizable to other cultures and contexts.

Beyond providing a better understanding of the links between stressors with support behaviours, the communal-agentic framework may be useful in furthering our understanding of biological processes of stress. Measures of perceived stress tend to be only loosely correlated with salivary cortisol responses to laboratory stressors (Dickerson & Kemeny, 2004). However, there are reliable differences in the types of stressors that elicit elevated cortisol responses. In

particular, stressors higher in social-evaluative threat tend to elicit the highest cortisol responses compared to stressors lower in social-evaluative threat (Dickerson & Kemeny, 2004). It is possible that these stressors tend to elicit the highest cortisol responses because they pose threats to communion and agency simultaneously. Future research could examine whether perceptions of threat to communion and agency play a role in biological stress responses.

Beyond ethnicity and gender, this study did not examine other stable factors that might impact the stress process. This is important because despite the homogeneity of the sample, most of the relations examined were accompanied by statistically significant variance components. This indicates that there might be substantive differences between individuals in the strength of the associations between stressor type, threat appraisals, and support behaviours. Finding factors that are systematically associated with individual differences in the strengths of associations observed here would be consistent with theorizing that responses to stress arise as a function of both the individual and the situation (Folkman et al., 1986a; 1986b). For example, the variability in how threat appraisals and support behaviours were related across individuals could be explained by individual differences in communal and agentic orientations (Fischer & Boer, 2015; Markus & Kitayama, 1991; Trapnell & Paulhus, 2012). Those who have a more communal orientation may be expected to be more in tune with communal threat and put more effort into maintaining communion when communion is threatened compared to those with less of a communal orientation. In contrast, those who have a more agentic orientation may be expected to be more in tune with agentic threat and put more effort into responding when agency is threatened. Future research should examine whether individual differences in agentic and communal orientations moderate associations among threat appraisals and support behaviours. A better understanding of who tends to show threat appraisal-support behaviour matching could

lead to interventions that take into consideration both the person's appraisals and their communal and agentic orientations.

2.4.3 Conclusions

Previous research indicates that social support is important for health and well-being. However, little is known about putative antecedents of support. Here, I applied the Transactional Model of Stress and the Agentic-Communal Framework to understand the roles of stressor type and threat appraisals in the support mobilization process. Results indicate different patterns of support mobilization linked to whether the stressor being experienced is interpersonal or achievement-related. Results also indicate different patterns of support mobilization linked to appraisals of threat to agency and communion, with increases in support provision being associated with increases in communal threat and decreases in agentic threat and increases in support seeking being associated with increases in communal and agentic threat. Furthermore, results indicate that associations between stressor type and support behaviours may be partially mediated by threat appraisals. Key directions for future research include examining these processes in different populations to examine generalizability, examining these processes within specific relationships and when taking multiple individuals' perspectives into consideration, and establishing causal links between stressor type, threat appraisals, and support behaviours. An additional key next step is to examine individual differences in the extent to which support seeking and provision are matched to the agentic and communal demands of stressful situations, a question I turn to in the next Chapter.

Table 2-1. Descriptive statistics of study variables.

	Mean	*SD*	Possible Range	Observed Range	ICC	R_c^2	R_{KF}^2
Social stressor	0.25[1]	0.41	0-1	0-1	.11		
Achievement stressor	0.42[1]	0.49	0-1	0-1	.14		
Seriousness	3.21	1.27	1.00-5.00	1.00-5.00	.32		
Controllability	2.95	1.32	1.00-5.00	1.00-5.00	.17		
Agentic threat	2.65	1.08	1.00-5.00	1.00-5.00	.35	.49	.94
Communal threat	1.55	0.86	1.00-5.00	1.00-5.00	.33	.74	.96
Support provision	1.27	0.43	1.00-3.00	1.00-3.00	.27	.90	.98
Support seeking	1.36	0.51	1.00-3.00	1.00-3.00	.35	.86	.98

Note. N = 350 at the between-person level and N = 3827-3847 at the within-person level. Social stressor = Social stressor (1), other stressor (0); Achievement stressor = achievement stressor (1), other stressor (0). Means, standard deviations, and ranges were calculated for data over all person-days.

[1]These values represent the proportion of entries classified as being social stressors or achievement stressors.

[2]Reliability of change ("within-person internal consistency"; R_c) and reliability of average of all items and time ("between-person internal consistency"; R_{KF}) were calculated for all repeatedly-assessed variables according to recommendations by Cranford and colleagues (2006) and Shrout and Lane (2012). These calculations were calculated using the multilevel.reliability function in the lme4 package in R (Bates, Maechler, Bolker, & Walker, 2015; R Core Team, 2017).

Table 2-2. Correlations among study variables.

	1	2	3	4	5	6	7	8	9	10	11
1. Social stressor	--	-.50***	-.04	-.22***	-.07	.30***	.34***	.19***	.14**	-.18**	.16**
2. Achievement stressor	-.44***	--	.28***	.37***	.31***	-.08	-.18*	.02	.01	.14*	-.16*
3. Seriousness	-.05**	.23***	--	.24***	.61***	.39***	.24***	.36***	.09	.09	-.10
4. Controllability	-.14***	.29***	.09***	--	.29***	.05	.10	.05	.04	.08	-.14*
5. Agentic threat	-.20***	.42***	.47***	.22***	--	.50***	.30***	.36***	.13*	-.01	-.01
6. Communal threat	.41***	-.25***	.21***	-.07***	.12***	--	.73***	.56***	.01	.07	-.07
7. Support provision	.48***	-.30***	.06***	-.09***	-.12***	.56***	--	.61***	.03	.04	-.04
8. Support seeking	.15***	-.04*	.27***	-.06***	.15***	.29***	.26***	--	.18*	.06	-.00
9. Gender									--	.11*	-.06
10. Asian heritage										--	-.70***
11. European heritage											--

Note. N = 350 at the between-person level and N = 3827-3847 at the within-person level. Missing data were handled using pairwise deletion. Sample-size weighted between-person correlations are presented above the diagonal and pooled within-person correlations are presented below the diagonal. These were computed using the statsBy function in the *psych* package in R (Revelle, 2017; R Core Team, 2017). Social stressor = Social stressor (1), other stressor (0); Achievement stressor = achievement stressor (1), other stressor (0). Gender = Female (1), Male (0). Asian heritage (1), other heritage (0), European heritage (1), other heritage (0).

*** $p < .001$, ** $p < .010$, * $p < .050$

Table 2-3. Model 2-1: Effects of social stressor type on support provision through communal threat.

	Communal threat					Support provision				
Fixed effects	***b***	***SE***	***t***	***p***	***95% CI***	***b***	***SE***	***t***	***p***	***95% CI***
Intercept, γ_{00} (for communal threat) or γ_{20} (for support provision)	-0.17	0.01	-14.91	< .001	[-0.19, -0.15]	1.19	0.01	91.35	< .001	[1.17, 1.22]
Social stressor, γ_{10} (for communal threat) or γ_{30} (for support provision)	0.66	0.03	19.67	< .001	[0.59, 0.72]	0.35	0.02	15.34	< .001	[0.30. 0.39]
Communal threat, γ_{40}						0.21	0.01	16.25	< .001	[0.18, 0.23]
Agentic threat, γ_{50}						-0.03	0.01	-4.85	< .001	[-0.04, -0.02]
						Estimate	***SE***	***z***	***p***	***95% CI***
Indirect effect						0.13	0.02	8.05	< .001	[0.10, 0.16]
Total effect						0.48	0.03	18.68	< .001	[0.43, 0.53]
R^2_{Level1}*(approx.)*	18%					43%				
Random effects	***Variance***	***X²***		***p***		***Variance***		***X²***	***p***	
Intercept, τ_{00} (for communal threat) or τ_{22} (for support provision)	0.01	369.22		< .001		0.05		1686.23	< .001	
Social stressor, τ_{11} (for communal threat) or τ_{33} (for support provision)	0.19	775.55		< .001		0.10		655.80	< .001	
Communal threat, τ_{44}						0.02		575.72	< .001	
Agentic threat, τ_{55}						0.002		384.31	< .001	
Level 1 residual, σ_{CT}^2 (for communal threat) or σ_Y^2 (for support provision)	0.04					0.03				
Indirect effect						0.02				
Total effect						0.10				

Note. *Df* for t-values was 349 and *df* for X^2 values was 264.

Table 2-4. Model 2-2: Effects of social stressor type on support seeking through communal threat.

	Communal threat					Support seeking				
Fixed effects	***B***	***SE***	***t***	***p***	***95% CI***	***B***	***SE***	***t***	***p***	***95% CI***
Intercept, γ_{00} (for communal threat) or γ_{20} (for support seeking)	-0.16	0.01	-14.94	< .001	[-0.19, -0.14]	1.33	0.02	76.46	< .001	[1.30, 1.37]
Social stressor, γ_{10} (for communal threat) or γ_{30} (for support seeking)	0.66	0.03	19.64	< .001	[0.59, 0.72]	0.10	0.02	4.49	< .001	[0.06, 0.14]
Communal threat, γ_{40}						0.14	0.01	9.29	< .001	[0.11, 0.17]
Agentic threat, γ_{50}						0.07	0.01	7.67	< .001	[0.05, 0.09]
						Estimate	***SE***	***z***	***p***	***95% CI***
Indirect effect						0.08	0.02	5.00	< .001	[0.05, 0.12]
Total effect						0.18	0.03	7.27	< .001	[0.13, 0.23]
R^2_{Level1}*(approx.)*	18%					11%				
Random effects	***Variance***		***X²***	***p***		***Variance***		***X²***	***p***	
Intercept, τ_{00} (for communal threat) or τ_{22} (for support seeking)	0.01		369.50	< .001		0.09		1369.72	< .001	
Social stressor, τ_{11} (for communal threat) or τ_{33} (for support seeking)	0.19		776.72	< .001		0.04		355.25	< .001	
Communal threat, τ_{44}						0.02		408.88	< .001	
Agentic threat, τ_{55}						0.01		342.64	.001	
Level 1 residual, σ_{CT}^2 (for communal threat) or σ_Y^2 (for support seeking)	0.04					0.03				
Indirect effect						0.02				
Total effect						0.06				

Note. *Df* for t-values was 349 and *df* for X^2 values was 264.

Table 2-5. Model 2-3: Effects of achievement stressor type on support provision through agentic threat.

	Agentic threat					Support provision				
Fixed effects	***b***	***SE***	***t***	***p***	***95% CI***	***b***	***SE***	***t***	***p***	***95% CI***
Intercept, γ_{00} (for agentic threat) or γ_{20} (for support provision)	-0.26	0.02	-17.15	< .001	[-0.30, -0.22]	1.31	0.01	88.29	< .001	[1.29, 1.33]
Achievement stressor, γ_{10} (for agentic threat) or γ_{30} (for support provision)	0.63	0.03	19.07	< .001	[0.57, 0.69]	-0.09	0.01	-6.45	< .001	[-0.11, -0.06]
Communal threat, γ_{40}						0.31	0.01	23.66	< .001	[0.29, 0.33]
Agentic threat, γ_{50}						-0.05	0.01	-6.72	< .001	[-0.07, -0.04]
						Estimate	***SE***	***z***	***p***	***95% CI***
Indirect effect						-0.03	0.01	-5.27	< .001	[-0.04, -0.02]
Total effect						-0.11	0.03	-9.29	< .001	[-0.14, -0.09]
R^2_{Level1}*(approx.)*	14%					36%				
Random effects	***Variance***	***X^2***	***p***			***Variance***		***X^2***	***p***	
Intercept, τ_{00} (for agentic threat) or τ_{22} (for support provision)	0.03	325.35	.202			0.06		1574.17	< .001	
Achievement stressor, τ_{11} (for agentic threat) or τ_{33} (for support provision)	0.16	629.52	< .001			0.01		394.92	.001	
Communal threat, τ_{44}						0.03		705.95	< .001	
Agentic threat, τ_{55}						0.01		411.54	< .001	
Level 1 residual, σ_{AT}^2 (for agentic threat) or σ_Y^2 (for support provision)	0.04					0.03				
Indirect effect						0.003				
Total effect						0.01				

Note. *Df* for t-values was 349 and *df* for X^2 values was 305.

Table 2-6. Model 2-4: Associations of achievement stressor type and support seeking through agentic threat.

	Agentic threat					Support seeking				
Fixed effects	***b***	***SE***	***t***	***p***	***95% CI***	***b***	***SE***	***t***	***p***	***95% CI***
Intercept, γ_{00} (for agentic threat) or γ_{20} (for support seeking)	-0.26	0.02	-17.14	< .001	[-0.30, -0.22]	1.37	0.02	72.41	< .001	[1.35, 1.39]
Achievement stressor, γ_{10} (for agentic threat) or γ_{30} (for support seeking)	0.63	0.03	19.02	< .001	[0.57, 0.69]	-0.03	0.02	-1.70	.089	[-0.06, 0.004]
Communal threat, γ_{40}						0.16	0.01	10.87	< .001	[0.14, 0.18]
Agentic threat, γ_{50}						0.07	0.01	6.45	< .001	[0.05, 0.09]
						Estimate	***SE***	***z***	***p***	***95% CI***
Indirect effect						0.05	0.02	2.18	.029	[0.004, 0.09]
Total effect						0.02	0.02	0.76	.449	[-0.03, 0.07]
R^2_{Level1}*(approx.)*	14%					10%				
Random effects	***Variance***		***X^2***	***p***		***Variance***		***X^2***	***p***	
Intercept, τ_{00} (for agentic threat) or τ_{22} (for support seeking)	0.03		325.23	.204		0.10		1412.46	< .001	
Achievement stressor, τ_{11} (for agentic threat) or τ_{33} (for support seeking)	0.16		629.79	< .001		0.01		337.92	.094	
Communal threat, τ_{44}						0.02		526.60	< .001	
Agentic threat, τ_{55}						0.01		346.54	.051	
Level 1 residual, σ_{AT}^2 (for agentic threat) or σ_Y^2 (for support seeking)	0.04					0.03				
Indirect effect						0.01				
Total effect						0.005				

Note. *Df* for t-values was 349 and *df* for X^2 values was 305.

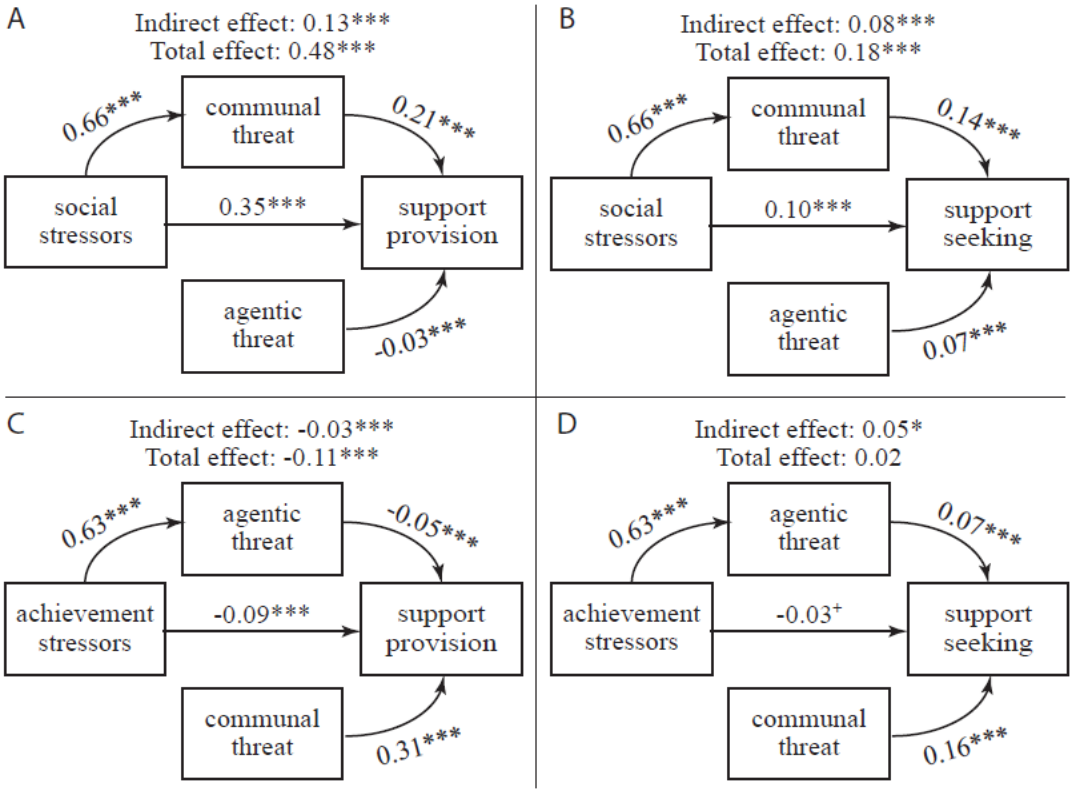

Figure 2-1. Direct and indirect effects of social and achievement stressors on support provision and seeking through communal and agentic threat.

Panels A and B show direct and indirect effects of social stressors on support behaviours through communal threat. Panels C and D show direct and indirect effects of achievement stressors on support behaviours through agentic threat. Unstandardized parameter estimates for each path of the model are shown. Unstandardized parameter estimates for indirect and total effects are presented above each model. *** $p < .001$, ** $p < .010$, * $p < .050$, $^{+}$ $p < .100$

Chapter 3: Who is Most Likely to Seek and Provide Support in the Face of Agentic and Communal threat? The Roles of Extraversion and Agreeableness

3.1 Introduction

In Chapter 2, I differentiated between agentic threat, which is the appraisal that one's own well-being is at stake in the situation, and communal threat, which is the appraisal that one's relationships or the well-being of others are at stake in the situation. I hypothesized that individuals would use higher levels of coping efforts meant to maintain self-interest under conditions of agentic threat. On the other hand, I hypothesized higher use of coping efforts meant to maintain relationships and others' well-being under conditions of communal threat. Consistent with this theorizing, I found that agentic threat was associated with increases in support seeking and decreases in support provision. Communal threat was associated with increases in support seeking and provision. Additionally, findings in Chapter 2 revealed individual differences in the strength of the associations between support behaviours and threat appraisals. The goal of the current study was to examine whether individual differences in the strength of the associations between support behaviours and threat appraisals are linked to Extraversion (E) and Agreeableness (A). These are personality dimensions that have not only been implicated in the social support process (Bowling, Beehr, & Swader, 2005), but also in theories of agency and communion (Fischer & Boer, 2012; Trapnell & Paulhus, 2012).

The Big Five Model is a widely accepted model of personality structure (McCrae & Terracciano, 2005). The Big Five personality dimensions of E and A are the most strongly implicated in the agentic-communal framework (Fischer & Boer, 2015; Trapnell & Wiggins, 1990). Individuals higher in E are described as more assertive, outgoing, and tend to seek more

excitement compared to those lower in E. Those higher in A tend to be more amiable and socially accommodating compared to those lower in A. In a meta-analysis, E was positively related to agentic values including power, achievement, hedonism, stimulation, and self-direction; A was positively related to communal values including benevolence, universalism, tradition, and conformity (Fischer & Boer, 2015). Because of their agentic orientation, individuals higher in E are expected to be better at matching their responses to the agentic demands of stressful situations compared to those lower in E. In contrast, because of their communal orientation, individuals higher in A are expected to be better at matching their responses to the communal demands of stressful situations compared to those lower in A.

As an extension of analyses presented in Chapter 2, I conducted further multilevel regression analyses of the Personality, Stress, and Coping Study to examine whether E and A moderate within-person associations between threat appraisals and support behaviours. Prior to the diary phase in Study 1 (presented in Chapter 2), participants also provided self-reports on E and A. Those higher in E were expected to show stronger within-person positive associations between agentic threat and support seeking compared to those lower in E (Hypothesis 3-1A). Additionally, those higher in E were expected to show stronger negative within-person associations between agentic threat and support provision compared to those lower in E (Hypothesis 3-1B). My second set of hypotheses was centered on the role of A in moderating associations between support behaviours and communal threat. Those higher in A were expected to show stronger positive within-person associations between communal threat and support seeking (Hypothesis 3-2A) and support provision (Hypothesis 3-2B) compared to those lower in A.

3.2 Materials and methods

3.2.1 Participants and Procedure

Data come from the Personality, Stress, and Coping Study. Information about participants and the study procedure is described in detail in Chapter 2 (Section 2.2). Relevant here, prior to completing the intensive longitudinal phase, participants provided a one-time report which included an assessment of personality using the Big Five Inventory, described below.

3.2.2 Measures

Personality was assessed using the Big Five Inventory (BFI; John & Srivastava, 1999). The BFI assesses E, A, Neuroticism (N), Conscientiousness (C), and Openness to experience (O) using a total of 48 items on a 5-point Likert scale (1 = "disagree strongly"; 5 = "agree strongly").

3.2.3 Analytic Strategy

I conducted multilevel regression analysis using Hierarchical Linear Modeling 6.0 (HLM; Raudenbush et al., 2004) with daily experiences (Level 1) nested within individuals (Level 2). This allowed me to examine the unique associations of within-person and between-person variables as well as their cross-level interactions. Separate models were run for support provision and support seeking. I began by testing null models for support provision and support seeking. Following tests of null models, threat appraisals (threat to agency and threat to communion) and personality dimensions (E and A) were entered as sets in a step-wise sequence. The first step included within-person effects of threats to agency and communion. In the second step, I added in the main effects of E and A, the interactive effect of E and threat to agency as well as the interactive effect of A and threat to communion. In the final step, I added in interactive effects for threat to agency and A and for threat to communion and E. Level 1 predictors (i.e., agentic threat, communal threat) were person-mean centered (i.e., centered on

each person's mean). Level 2 predictors (i.e., personality variables) were grand-mean centered (i.e., centered on the mean for all participants). Because my focus was on within-person associations between threat appraisals and personality dimensions, each person's average values on threat appraisals (i.e., between-person effects) were omitted from the model. All models were run estimating random effects for intercepts and slopes because biased fixed effects can be obtained when not modeling random effects (Schmidt-Catran & Fairbrother, 2016).

The model fit, based on a chi-square statistic using maximum likelihood, was calculated for each step of the model (Raudenbush & Bryk, 2002). To aid interpretation several estimates of explained variance were calculated (Raudenbush & Bryk, 2002, pp.74-79). The most conceptually relevant estimates of explained variance are reported within the results section of this Chapter; however, additional estimates of explained variance are reported in Appendix I. Appendix I also includes additional information about how each estimate of explained variance was calculated. Restricted maximum likelihood and robust standard errors were used in estimation of effect sizes and standard errors. The final model is presented below:

Level 1 (diary entries): $Y_{ij} = \beta_{0j} + \beta_{1j}AT_{ij} + \beta_{2j}CT_{ij} + r_{ij}$,

Level 2 (persons): $\beta_{0j} = \gamma_{00} + \gamma_{01}E + \gamma_{02}A + u_{0j}, \beta_{1j} = \gamma_{10} + \gamma_{11}E + \gamma_{12}A + u_{1j}, \beta_{2j} = \gamma_{20} + \gamma_{21}A + \gamma_{22}E + u_{2j}$

where i denotes level-units (i.e., diary entries), j denotes level-2 units (i.e., persons), and we assume that $r_{ij} \sim N(0, \sigma^2)$, $\begin{pmatrix} u0j \\ u1j \\ u2j \end{pmatrix} \sim N \begin{pmatrix} 0 & \tau00 & \tau01 & \tau02 \\ 0, & \tau10 & \tau11 & \tau12 \\ 0 & \tau20 & \tau21 & \tau22 \end{pmatrix}$, and $cov(u_{0j}, r_{ij}) = cov(u_{1j}, r_{ij}) = cov(u_{2j}, r_{ij}) = 0$. Here, Y_{ij} corresponds to the outcome support behaviour variable (i.e., support seeking or support provision); the average amount that the jth individual engaged in the support behaviour across all diary entries when threat to agency and threat to communion are at their

own average for individuals at average E and A is represented by β_{0j}; the effect of threat to agency on the support behaviour for the *j*th individual when other variables in the model are average is represented by β_{1j}; the effect of threat to communion on the support behaviour for the *j*th individual when other variables in the model are average is β_{2j}; the conditional grand mean, which is the average amount individuals engaged in the support behaviour when aggregating across all individuals when other variables in the model are average, is γ_{00}; the average effect of threat to agency on the support behaviour when aggregating across persons when other variables in the model are average is γ_{10}; the average effect of threat to communion on the support behaviour when aggregating across persons when other variables in the model are average is γ_{20}; the interaction term for E and threat to agency is γ_{11}; the interaction term for A and threat to agency is γ_{12}; the interaction term for A and threat to communion is γ_{21}; the interaction term for E and threat to communion is γ_{22}; the difference between the average amount that the *j*th person engaged in the support behaviour across the week and the amount that the *j*th person engaged in that support behaviour for the *i*th diary period when predictor variables in the model are average is r_{ij}; the difference between the average amount that the *j*th person engaged in the support behaviour and the grand mean when predictor variables in the model are average is u_{0j}; the difference between the association between threat to agency and the support behaviour for the *j*th person and the association between threat to agency and the support behaviour for the average person is u_{1j}; the difference between the association between threat to communion and the support behaviour for the *j*th person and the association between threat to communion and the support behaviour for the average person is u_{2j}; the within-person variance when predictor variables in the model are average is σ^2 ; the variance of the conditional grand mean—that is, the between person variation in how much they engaged in the support behaviour on average when

predictor variables in the model are average is τ_{00}; the variation in the effect of threat to agency on the support behaviour across persons when other predictor variables in the model are average is τ_{11}; the variation in the effect of threat to communion on the support behaviour across persons when other predictor variables in the model are average is τ_{22}.

3.3 Results

3.3.1 Preliminary Analyses

Table 3-1 presents descriptive statistics, internal consistencies, and sample-size weighted between-person correlations and pooled within-person correlations among study variables. The correlations were calculated using the statsBy function in the *psych* package in R (Revelle, 2017), which calculates the pooled within-person correlations and the sample size weighted between-person correlations. As can be seen in this table, the bivariate correlations between E and threat appraisals were small and nonsignificant. A was not significantly associated with agentic threat but showed a small negative correlation with communal threat (r = -.14, p = .035). E was significantly positively correlated with support seeking (r = .18, p = .009) and support provision (r = .12, p = .040). A was not significantly correlated with either support seeking or provision. See Chapter 2 for a description of internal consistency analyses; the internal consistencies for agentic threat, communal threat, support provision, and support seeking are reported in both Table 2-1 and Table 3-1 for completion and ease of examination for readers.

Support seeking. Multilevel models predicting support seeking are presented in Table 3-2. As can be seen in Model 3-1A in this table, within-person increases in agentic and communal threats were significantly associated with increases in support seeking (agentic threat: γ_{10} = 0.060, SE = 0.009, t (349) = 6.54, p < .001; communal threat: γ_{20} = 0.162, SE = 0.015, t (349) =

10.93, $p < .001$). In comparison to the Null Model 3-0A, adding threat appraisals to the model led to a significant improvement in model fit, $X^2(7) = 551.956$, $p < .001$. Additionally, when comparing Level 1 residual variances estimated in a random intercept model that included threat appraisals to the Level 1 residual variances estimated in the null model (Lahuis et a., 2014; see Appendix I), the R^2_{Level1}*(approx.)* for the model was .09897, indicating that threat appraisals accounted for about 10% of the within-person variability in support seeking.

Next, I added in main effects of E and A, along with the predicted interactive effect of E and agentic threat as well as the predicted interactive effect of A and communal threat. As can be seen in Model 3-2A in Table 3-2, including E and A in models predicting support seeking led to improved model fit compared to the models that only included the main effects of threats to agency and communion, $X^2(4) = 20.115$, $p = .001$.When adding E and A to the model, the ΔR^2_{Level2}*(approx.)* was 0.03323 (compared to the model including fixed and random effects of threat appraisals; Model 3-1A), indicating that E and A together accounted for about 3% of the between person (intercept) variability in support seeking. Those higher in E tended to engage in significantly higher levels of support seeking, $\gamma_{01} = 0.009$, $SE = 0.003$, $t\ (347) = 3.209$, $p = .002$. A did not show a significant association with support seeking, $\gamma_{02} = -0.000$, $SE = 0.003$, $t\ (347) = -0.117$, $p = .907$. There was a significant interactive effect of E and agentic threat in predicting support seeking, $\gamma_{11} = 0.003$, $SE = 0.001$, $t\ (348) = 2.076$, $p = .038$. The R^2_{Slope}*(approx.)* for agentic threat was 0.03453, indicating that E accounted for about 3% percent of the between-person variability in the strength of the association between agentic threat and support seeking. There was also a significant interactive effect of A and communal threat in predicting support seeking, $\gamma_{21} = 0.007$, $SE = 0.002$, $t\ (348) = 3.149$, $p = .002$. The R^2_{Slope}*(approx.)* for communal threat was 0.03996, indicating that A accounted for about 4% percent of the between-person

variability in the strength of the association between communal threat and support seeking. I describe results of simple slopes analyses for these interactive effects in Section 3.3.2.

Support provision. Multilevel models with support provision as the outcome variable are displayed in Table 3-3. As can be seen in Model 3-1B in this table, within-person increases in agentic threat were significantly associated with decreases in support provision, γ_{10} = -0.075, *SE* = 0.007, *t* (349) = -10.681, $p < .001$. In contrast, within-person increases in communal threat were significantly associated with increases in support provision, γ_{20} = 0.332, *SE* = 0.013, *t* (349) = 24.911, $p < .001$. In comparison to the Null Model 3-0B, adding threat appraisals to the model led to a significant improvement in model fit, $X^2(7) = 1779.409$, $p < .001$. When comparing Level 1 residual variances estimated in a random intercept model that included threat appraisals to the Level 1 residual variances estimated in the null model (Lahuis et a., 2014; see Appendix I), the R^2_{Level1}*(approx.)* was .35358, indicating that threat appraisals accounted for about 35% of the within-person variability in support provision.

Next, I added in the main effects of E and A along with the predicted interactive effect of E and agentic threat as well as the predicted interactive effect of A and communal threat. As can be seen in Model 3-2A in Table 3-3, including E and A in models predicting support provision led to improved model fit compared to the models that only included the fixed and random main effects of threats to agency and communion, $X^2(4) = 23.410$, $p < .001$ and the ΔR^2_{Level2}*(approx.)* was 0.01199. This indicates that E and A together accounted for about 1% of the between person (intercept) variability in support provision. Those higher in E tended to engage in significantly higher levels of support provision compared to those lower in E, γ_{01} = 0.005, *SE* = 0.002, *t* (347) = 2.032, $p = .043$. A did not show a significant statistical effect on support provision, γ_{02} = -0.002, *SE* = 0.002, *t* (347) = -0.913, $p = .362$. There was a significant interactive effect of E and

agentic threat in predicting support provision, γ_{11} = -0.002, *SE* = 0.001, *t* (348) = -2.338, *p* = .020. The R^2_{Slope}*(approx.)* for agentic threat was 0.05664, indicating that E accounted for about 6% percent of the between-person variability in the strength of the association between agentic threat and support provision. There was also a significant interactive effect of A and communal threat in predicting support seeking, γ_{21} = 0.009, *SE* = 0.002, *t* (348) = 4.087, *p* < .001. The R^2_{Slope}*(approx.)* for communal threat was 0.08841, indicating that A accounted for about 9% percent of the between-person variability in the strength of the association between communal threat and support provision. I describe results of simple slopes analyses for these interactive effects in Section 3.3.2.

3.3.2 Hypothesis Testing: Simple Slopes Analyses

The moderating effects of E on the relation between threat to agency and support seeking are displayed in Figure 3-1A and were in support of Hypothesis 3-1A. Simple slopes analyses showed that the higher the individual was on E, the stronger the positive effect of threat to agency on support seeking (E at -1 *SD*: γ_{10} = 0.042, *SE* = 0.012, *t* (348) = 3.587, *p* < .001; E at mean levels: γ_{10} = 0.060, *SE* = 0.009, *t* (348) = 6.664, *p* < .001; E at +1 *SD*: γ_{10} = 0.079, *SE* = 0.014, *t* (348) = 5.727, *p* < .001). The moderating effects of E on the relation between threat to agency and support provision are displayed in Figure 3-1B and were in support of Hypothesis 3-1B. Simple slopes analyses indicated that the higher the individual was on E, the stronger the negative effect of threat to agency on support provision (E at -1 SD: γ_{10} = -0.059, *SE* = 0.010, *t* (348) = -5.954, *p* < .001; E at mean levels: γ_{10} = -0.074, *SE* = 0.069, *t* (348) = -10.638, *p* < .001; E at +1 SD: γ_{10} = -0.089, *SE* = 0.009, *t* (348) = -9.808, *p* < .001).

The moderating effects of A on the relation between threat to communion and support seeking are displayed in Figure 3-1C and were in support of Hypothesis 3-2A. Simple slopes

analyses indicated that the higher the individual was on A, the stronger the positive effect of threat to communion on support seeking (A at -1 *SD*: γ_{20} = 0.125, *SE* = 0.018, *t* (348) = 7.155, *p* < .001; A at mean levels: γ_{20} = 0.166, *SE* = 0.015, *t* (348) = 11.240, *p* < .001; A at +1 *SD*: γ_{20} = 0.207, *SE* = 0.022, *t* (348) = 9.540, *p* < .001). The moderating effects of A on the relation between threat to communion and support provision are displayed in Figure 3-1D and were in support of Hypothesis 3-2B. Simple slopes analyses indicated that the higher the individual was on A, the stronger the positive effect of threat to communion on support provision (A at -1 *SD*: γ_{20} = 0.283, *SE* = 0.017, *t* (348) = 16.50, *p* < .001; A at mean levels: γ_{20} = 0.335, *SE* = 0.013, *t* (348) = 25.822, *p* < .001; A at +1 *SD*: γ_{20} = 0.386, *SE* = 0.019, *t* (348) = 20.323, *p* < .001).

3.3.3 Covariate Analyses

Following hypothesis-testing, I added in the unpredicted interactive effects of E and threat to communion as well as the unpredicted interactive effects of A and threat to agency (See Models 3-3A and 3-3B in Tables 3-2 and 3-3 respectively). These models showed that E did not significantly moderate the effect of threat to communion on support behaviours and A did not significantly moderate the effect of threat to agency on support behaviours. Additionally, adding these unpredicted interactive effects to the model did not lead to increases in the amount of slope variance accounted for, with ΔR^2_{Slopes}*(approx.)* ranging from -0.00448 – 0.01239 (see Appendix I). Statistical assumptions of linearity, homoscedasticity, and normal distribution of residuals were examined, and all three assumptions were met for all models presented in 3-2 and in 3-3.

Final models examining moderating effects of E and A on the associations between threat appraisals and support behaviours were also tested when controlling for a number of other variables. Several separate models were run controlling for main effects of stressor type, controllability, seriousness, entry (morning or evening), and day of the study in turn. In addition,

several models were run controlling for main effects of N, C, O, ethnicity, and gender in turn, along with their cross-level interactions with threats to communion and agency. Effect codes were used to control for effects of stressor type (achievement stressor, social stressor or other stressor), ethnicity, and gender. Stressor controllability and seriousness were group mean centered. N, C, and O were grand mean centered. Controlling for each of these variables in turn did not substantively alter results with one exception: The interactive effects of E and threat to agency on support seeking was no longer significant but remained in the predicted direction when controlling for N, $\gamma_{11} = 0.002$, $SE = 0.002$, $t\ (347) = 1.545$, $p = .123$.

3.4 Discussion

3.4.1 Research Summary

There has been a growing interest in understanding the potential antecedents of social support. Using an intensive longitudinal design, this study found evidence that the strength of the associations between support behaviours and threat appraisals are associated with the extent to which individuals are Extraverted and Agreeable. Although people tended to increase their support seeking and decrease their support provision at times when they experienced increases in agentic threat, these associations were moderated by E. My findings suggest that those higher in E increase their support seeking and decrease their support provision at times when they experience increases in threat to agency to a greater extent compared to those lower in E. This may be because those higher in E tend to place high value on agency (Fischer & Boer, 2015). Additionally, my findings suggest that those higher in E seek and provide higher levels of support, compared to those lower in E, at all levels of threat to agency. Those higher in E tend to use active forms of coping (Conner-Smith & Flachsbart, 2007). They may tend to seek and

provide high levels of support because they are active copers, while also tending to match their coping to the agentic demands of the situation.

Although the average person tended to increase their support seeking and provision at times when they experienced increases in communal threat, these associations were moderated by A. My findings suggest that at times when a those higher in A experience communal threat, they tend to increase their support seeking and provision to a greater extent compared to those lower in A. This may be because those high in A have been found to place high value on communion (Fischer & Boer, 2015) and thus will engage in greater coping efforts to maintain communion when it is threatened.

3.4.2 Strengths, Limitations, and Future Directions

An important and challenging question is what constitutes adaptive coping (Thornton & Dumke, 2005). I suggest that engaging in support behaviours that match what is at stake in the stressful situation may indicate coping flexibility and lead to improvements in well-being over time. This is similar to previous arguments on what makes for adaptive coping. For example, Hoppmann and Blanchard-Fields (2010) argued that selecting problem-solving strategies that match the person's goals is adaptive. Others have found that matching problem- focused coping with controllable stressors and emotion- focused coping with uncontrollable stressors is associated with fewer psychological symptoms (Forsythe & Compas, 1987; Zakowski et al., 2001). Although I expect that strong matching of support behaviours to threat appraisals reflects coping flexibility and may be adaptive, the current study did not examine well-being. Examining threat appraisal-support behaviour matching as it relates to well-being may allow for a contextualized interpretation of the findings presented here and would be a key step before this research is applied to intervention design.

Although I only examined individuals' own perspectives, social support is a process that involves the personalities, appraisals, and behaviours of more than one individual. Future research should aim to integrate my theoretical model of agentic and communal threat with research examining social support transactions in dyadic contexts (Collins & Feeney, 2000; Iida et al., 2008). Studies indicate that one partner experiencing more stress is often associated with seeking, and the other partner providing, higher levels of support (Collins & Feeney, 2000; Iida et al., 2008). It is possible that the effects of one partner's distress on their own support seeking and their partner's support provision are mediated by an interplay of both partner's appraisals of communal and agentic threat. Furthermore, results of the current study indicate that levels of A and E in both the individual seeking and the person providing support might together be associated with the extent to which support is sought and provided when one or both individuals are distressed. Future research should obtain reports from dyads engaging in support mobilization to better understand how the personalities and appraisals of both individuals are jointly associated with the support process.

My model of communal and agentic threat may help to explain why one's own anxiety and stress are not consistently associated with the amount of support provided to others across studies (Iida et al., 2008). It is possible that one's own distress has different effects on support provision depending upon the extent to which the distress is embedded within cognitive appraisals of agentic and communal threat. More specifically, if a person's distress is paired with the appraisal that agency is at stake in the situation, that person may be unlikely to provide support. In contrast, if a person's distress is paired with the appraisal that communion is at stake in the situation, that person may be likely to provide support. Additionally, one's own distress may be expected to have different effects on support provision depending upon the extent to

which the individuals involved are extraverted and agreeable. The interplay of recipient and provider appraisals and personalities may shed greater light on the circumstances under which individuals mobilize support.

Future research should examine whether E and A moderate associations between threat appraisals and support behaviours because those high in these personality dimensions are more likely to change their goals in response to agentic or communal threat compared to those lower in these personality dimensions. A competing hypothesis is that E and A moderate associations between threat appraisals and support behaviours because those high in these personality dimensions are more skilled at responding to the demands of stressful situations. For example, those higher in E may show stronger positive associations between threat to agency and support seeking because they are more likely to set a goal to maintain agency in response to agentic threat compared to those lower in E. Alternatively, those higher in E may show stronger positive associations between threat to agency and support seeking not because they are more likely to set a goal to maintain agency than those lower in E, but instead because they are more likely to increase their support seeking when they set goals to maintain agency. Future research could test these competing hypotheses by measuring threat appraisals, goals, and behaviours in those high and low in E and A.

Given that data were collected in Vancouver, British Columbia, it is not surprising that most of the sample was of Asian heritage, reflecting the demographic characteristics of the city. Additionally, given the sample was psychology undergraduate students, and a disproportionate number of these are female, most of the sample was also female. These demographic characteristics could have impacted the results of the current study. Communal values tend to be higher in Asian cultures and in females compared to in western cultures and in males (Markus &

Kitayama, 1991; Trapnell & Paulhus, 2012). However, I did not find that cultural heritage or gender moderated the associations between threat appraisals and support behaviours in this study. Additionally, controlling for these variables did not influence the results.

Another consideration is that most of the stressors that were reported were related to academic achievement and to relationships with others. It is likely that individuals in other populations experience other types of stressors with greater frequencies, such as work stressors, financial stressors, or stressors related to parenting. However, appraisals of threat to agency and communion would be expected to be highly relevant in these stressor contexts as well. The question remains as to whether agentic and communal threats are differentially associated with support behaviours in these other stressor contexts. Future studies should replicate and extend these associations to other populations experiencing other types of stressors.

This study focused on associations between broad constructs, which may be particularly useful for parsimonious theory development (Barrick & Mount, 2005). However, associations between more specific facets of personality dimensions, threat appraisals, and support behaviours should be examined as well. Examining associations among narrow constructs may lead to a more nuanced understanding of the circumstances under which social support transactions occur. Additionally, more variance in support behaviours may be explained by specifically defined traits (Paunonen & Ashton, 2001). For example, it is possible that the gregariousness facet of E is associated with support behaviours when hedonistic needs are at stake, whereas the assertiveness facet of E is associated with support behaviours when achievement or power are at stake. Another example is that the tendermindedness and altruistic facets of A may be associated with support behaviours when the needs of others are at stake, whereas the interpersonal trust facet of A may be associated with support behaviours when

relationships with others are at stake. Although these possibilities were beyond the scope of this study, they may represent fruitful areas of future research.

E and A improved prediction of support seeking and provision behaviours, but effects were small. After accounting for the influence of E and A, there was substantial unexplained variability in the strength of the associations between threat appraisals and support behaviours. To better understand individual differences in threat appraisal-support behaviour matching, future research could aim to examine factors beyond E and A that have been found to be associated with individuals' abilities to act in accordance with situational demands. For example, there may be other factors that are associated with prioritizing agency and communion. Older adults tend to prioritize communal goals over agentic goals when engaging in everyday problem solving to a greater extent than younger adults (Hoppmann & Blanchard-Fields, 2010). Beyond prioritization of communion and agency, improving people's coping resources may make them more likely to match their coping responses to both communal and agentic threat. For example, perceived power (Côté et al., 2011), self-control (Tangney, Baumeister, & Boone, 2004), or perceived support availability (House, 1981) may help people be more in tune with the demands of stressful situations more generally. Higher levels of personal resources might be positively associated with agentic and communal threat appraisal-support behaviour matching.

3.4.3 Conclusions

In Chapter 2, I found evidence for key roles of threats to agency and communion in support mobilization. Increases in agentic threat were associated with increases in support seeking and decreases in support provision. Increases in communal threat were associated with increases in support seeking and provision. In Chapter 3, I presented findings that extend knowledge on the roles of agentic and communal threat in the support process. Specifically, I

found that those higher in E tend to show stronger matching between agentic threat appraisals and support behaviours compared to those lower in E. In contrast, those higher in A show stronger matching between communal threat appraisals and support behaviours compared to those lower in A. These findings indicate that those higher in E may be more in tune with agentic demands during stressful situations compared to those lower in E; those higher in A may be more in tune with communal demands during stressful situations compared to those lower in A. Although there are several limitations of this study and further questions to be addressed in future research, the findings presented here extend understanding of the interplay between personality and in-the-moment threat appraisals as they relate to support mobilization. Ultimately, a better understanding of the circumstances under which individuals are likely to mobilize support might allow for matched interventions that could help people seek and provide support during stress.

Table 3-1. Descriptive statistics and bivariate correlations.

Correlations	1	2	3	4	5	6
1. Extraversion	--	.16**	.06	.07	.12*	.18**
2. Agreeableness		--	-.05	-.14*	.02	-.02
3. Agentic threat			--	.50***	.30***	.36***
4. Communal threat			.12***	--	.73***	.56***
5. Support provision			-.12***	.56***	--	.61***
6. Support seeking			.15***	.29***	.26***	--
Descriptive Statistics						
Mean	3.26	3.83	2.65	1.55	1.27	1.36
SD	0.79	0.64	1.08	0.86	0.43	0.51
Possible Range	1.00-5.00	1.00-5.00	1.00-5.00	1.00-5.00	1.00-3.00	1.00-3.00
Observed Range	1.25-5.00	1.11-5.00	1.00-5.00	1.00-5.00	1.00-3.00	1.00-3.00
α	.84	.80				
ICC			.35	.33	.27	.35
R_c[1]			.49	.74	.90	.86
R_{KF}[1]			.94	.96	.98	.98

Note. N = 349-350 persons and n = 3845-3849 days. Sample-size weighted between-person correlations are presented above the diagonal and pooled within-person correlations are presented below the diagonal. These were computed using the statsBy function in the *psych* package in R (Revelle, 2017; R Core Team, 2017). Missing data were handled using pairwise deletion for correlations and listwise deletion for descriptive statistics.

[1]Reliability of change ("within-person internal consistency"; R_c) and reliability of average of all items and time ("between-person internal consistency"; R_{KF}) were calculated for all repeatedly-assessed variables according to recommendations by Cranford and colleagues (2006) and Shrout and Lane (2012). These calculations were calculated using the multilevel.reliability function in the lme4 package in R (Bates, Maechler, Bolker, & Walker, 2015; R Core Team, 2017).

*** $p < .001$, ** $p < .010$, * $p < .050$

Table 3-2. Predicting support seeking as a function of threat to agency, threat to communion, extraversion, and agreeableness.

	Null Model 3-0A				Model 3-1A				Model 3-2A				Model 3-3A			
Fixed effects	***b***	***SE***	***t***	***p***	***b***	***SE***	***t***	***p***	***b***	***SE***	***t***	***p***	***b***	***SE***	***t***	***p***
Intercept, γ_{00}	1.361	0.018	77.602	<.001	1.362	0.018	77.437	<.001	1.362	0.017	78.761	<.001	1.362	0.020	78.763	<.001
AT, γ_{10}					0.060	0.009	6.54	<.001	0.060	0.009	6.664	<.001	0.060	0.009	6.671	<.001
CT, γ_{20}					0.162	0.015	10.93	<.001	0.166	0.015	11.239	<.001	0.166	0.015	11.319	<.001
E, γ_{01}									0.009	0.003	3.209	.002	0.010	0.003	3.319	.001
A, γ_{02}									-0.000	0.003	-0.117	.907	-0.000	0.003	-0.159	.874
AT X E, γ_{11}									0.003	0.001	2.076	.038	0.003	0.001	2.031	.043
CT X A, γ_{21}									0.007	0.002	3.149	.002	0.007	0.002	2.859	.005
AT X A, γ_{12}													-0.000	0.001	-0.117	.907
CT X E, γ_{22}													0.002	0.002	0.944	.346
Random effects	***Variance***		***X^2***	***p***	***Variance***		***X^2***	***p***	***Variance***		***X^2***	***p***	***Variance***		***X^2***	***p***
Intercept, τ_{00}	0.091		2448.083	<.001	0.095		3019.223	<.001	0.092		2934.501	<.001	0.092		2934.837	<.001
Level 1, σ^2	0.167				0.132				0.132				0.132			
AT, τ_{11}					0.008		441.985	<.001	0.008		437.082	<.001	0.008		437.001	<.001
CT, τ_{22}					0.029		649.051	<.001	0.028		637.971	<.001	0.028		634.837	<.001
Model Fit	***-2 * Log***		***ΔX^2 (df)***	***p***	***-2 * Log***		***ΔX^2 (df)***	***p***	***-2 * Log***		***ΔX^2 (df)***	***p***	***-2 * Log***		***ΔX^2 (df)***	***p***
	4709.478				4157.522		551.956 (7)	<.001	4137.406		20.115 (4)	.001	4136.460		0.947 (2)	>.500

Note. *Df* for *t*-values ranged from 347-349. *Df* for random effect X^2 values ranged from 327-349. AT = Agentic threat, CT = Communal threat, E = Extraversion, A = Agreeableness.

Table 3-3. Predicting support provision as a function of threat to agency, threat to communion, extraversion, and agreeableness.

	Null Model 3-0B				Model 3-1B				Model 3-2B				Model 3-3B			
Fixed effects	***b***	***SE***	***t***	***p***	***b***	***SE***	***t***	***p***	***b***	***SE***	***t***	***p***	***b***	***SE***	***t***	***p***
Intercept, γ_{00}	1.276	0.013	94.703	<.001	1.278	0.014	94.320	<.001	1.277	0.013	95.033	<.001	1.278	0.013	95.031	<.001
AT, γ_{10}					-0.075	0.007	-10.681	<.001	-0.074	0.007	-10.638	<.001	-0.074	0.007	-10.618	<.001
CT, γ_{20}					0.332	0.013	24.911	<.001	0.335	0.013	25.822	<.001	0.332	0.013	25.708	<.001
E, γ_{01}									0.005	0.002	2.032	.043	0.005	0.002	2.193	.029
A, γ_{02}									-0.002	0.002	-0.913	.362	-0.002	0.002	-0.873	.384
AT X E, γ_{11}									-0.002	0.001	-2.338	.020	-0.003	0.001	-2.412	.017
CT X A, γ_{21}									0.009	0.002	4.087	<.001	0.008	0.002	3.616	.001
AT X A, γ_{12}													-0.000	0.001	-0.150	.881
CT X E, γ_{22}													0.004	0.002	1.917	.056
Random effects	***Variance***		***X^2***	***p***	***Variance***		***X^2***	***p***	***Variance***		***X^2***	***p***	***Variance***		***X^2***	***p***
Intercept, τ_{00}	0.050		1744.988	<.001	0.057		3092.081	<.001	0.056		3062.584	<.001	0.056		3064.430	<.001
Level 1, σ^2	0.139				0.075				0.075				0.075			
AT, τ_{11}					0.005		494.560	<.001	0.004		487.255	<.001	0.004		487.253	<.001
CT, τ_{22}					0.030		872.581	<.001	0.027		843.583	<.001	0.027		834.861	<.001
Model Fit	***-2 * Log***		***ΔX^2 (df)***	***p***	***-2 * Log***		***ΔX^2 (df)***	***p***	***-2 * Log***		***ΔX^2 (df)***	***p***	***-2 * Log***		***ΔX^2 (df)***	***p***
	3865.116				2085.707		1779.409 (7)	<.001	2062.297		23.410 (4)	<.001	2058.100		3.299 (2)	.190

Note. *Df* for *t*-values ranged from 347-349. *Df* for random effect X^2 values ranged from 327-349.

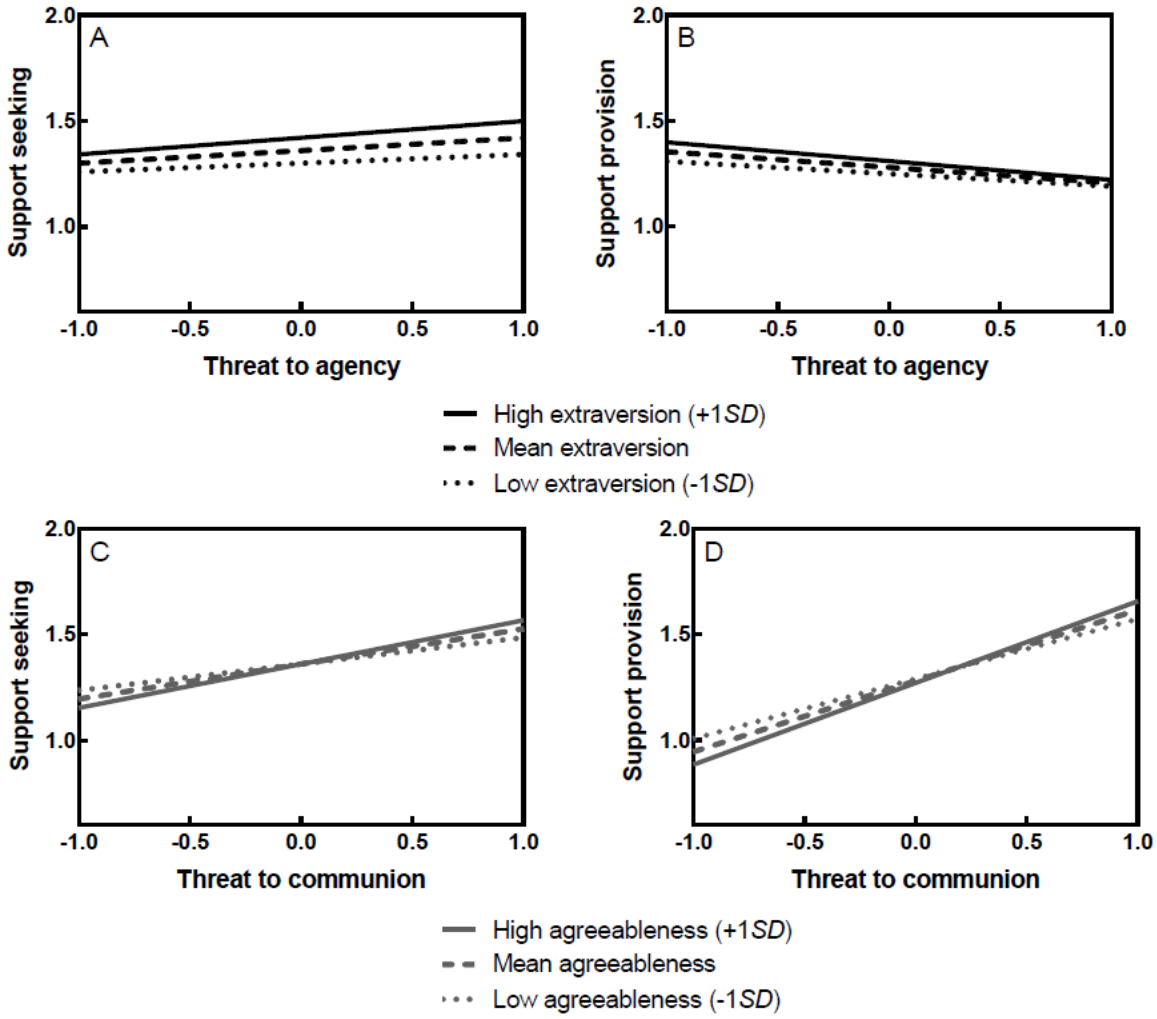

Figure 3-1. Support behaviours as a function of threat appraisals and personality.

The moderating effect of E on the association between threat to agency and support seeking is shown in panel A. The moderating effect of E on the association between threat to agency and support provision is shown in panel B. The moderating effect of A on the association between threat to communion and support seeking is shown in panel C. The moderating effect of A on the association between threat to communion and support provision is shown in panel D. All simple slopes are significant, $p < .001$

Chapter 4: Emotional Support from the Spouse for Persons with Rheumatoid Arthritis: Getting the Wrong Kind is a Pain

4.1 Introduction

For couples coping with chronic pain caused by diseases like rheumatoid arthritis (RA), what is the best way for the spouse to provide emotional support? Should he express how concerned he is about his partner? Should she assure her spouse that he is loved, valued, and important? Do his avoidant or critical responses influence his partner's well-being over time? The literature is mixed regarding the effectiveness of emotional support. Some studies find beneficial effects of emotional support receipt from the spouse (Collins & Feeney, 2000; DeLongis et al., 2004; Pasch & Bradbury, 1998; Schulz & Schwarzer, 2004), whereas others find detrimental effects of emotional support receipt from the spouse (Bolger et al., 2000; Gleason et al., 2008; Shrout et al., 2006). Differences in findings may be attributable to limitations due to aggregating across multiple types and instances of support as well as limitations inherent in only examining one partner's perspective.

In Chapters 2 and 3, I focused on examining the roles of several putative antecedents of support. In Chapter 4 of this dissertation, I turned my attention to examine associations between several types of partner emotional support mobilization and subsequent changes in pain among persons with RA. One limitation of the work conducted in Chapters 2 and 3, and in much of the work examining associations between support mobilization and recipient well-being, is in the assessment of support. Specifically, consistent with much of the research on coping with stress, support seeking and provision were assessed with regard to any other person, without assessing which person from whom the support was being sought or which person to whom support was

being provided. In Chapter 4, I focused specifically on the spousal relationship, which has been described as the most important and meaningful social connection for married adults (Selcuk et al., 2016). Another limitation of the work presented in Chapters 2 and 3 and in much of the support mobilization literature (Barrera, 1986; DeLongis et al., 2004; Jang et al., 2003) is that only individual reports were obtained. However, support is, by definition, an interpersonal process involving more than one person. To better map onto theories of support mobilization (Collins & Feeney, 2000), in the research presented in Chapter 4, I took a dyadic perspective by examining the perceptions of both support recipients and providers.

Couples who are coping with chronic illness may be particularly important to study to understand support processes. A chronic illness diagnosis can lead to many daily stressors, which make support from the partner to especially crucial (Revenson & DeLongis, 2011). I focused on couples in which one partner had been diagnosed with RA. RA is an autoimmune disease with no known cure (Woolf & Pfleger, 2003) and is associated with chronic pain, stiffness and inflammation of the joints, fatigue, and frequent shifts in mood (Smith & Wallston, 1992). Research indicates that pain is the most distressing symptom for persons with RA (Young, 1992) and it is conceptualized as a biopsychosocial issue that may be partially managed using psychosocial approaches (Turk & Melzack, 2001). It is possible that the way in which spouses support persons with RA might play an important role in pain management.

In this study, individuals diagnosed with RA and their partners were asked to provide reports about six and 12 hours after waking to examine the associations between specific types of emotional spousal support mobilized in the morning on subsequent changes in pain from morning to evening. I predicted that mornings when higher levels of esteem support were mobilized than typical for that couple would be associated with subsequent decreases in pain

(Hypothesis 4-1). I also predicted that times when higher levels of solicitous (Hypothesis 4-2) and negative support (Hypothesis 4-3) were mobilized than typical for that couple would be associated with subsequent increases in pain. I expected that these associations would be maintained when morning levels of potential confounding variables were controlled, including the amount of time spent with the partner and mood in those with RA.

I was also interested in exploring whether spouses change their supportive behaviours following increases in RA pain. Thus, I conducted reverse-time-lagged analyses. In these analyses, I examined whether mornings when persons with RA experienced higher levels of pain than typical for them were associated with subsequent within-couple shifts in esteem, solicitous, and negative support from the spouse.

4.2 Materials and Methods

4.2.1 Participants and Procedure

Couples were recruited as part of the UBC RA Project, a large study on community-dwelling persons with RA, which included an initial interview phase and a seven-day intensive longitudinal phase (Beggs, Holtzman, and DeLongis, 2015; Holtzman & DeLongis, 2007). This study is the first to report findings from the spouses of these participants. Eight-hundred potential study participants were randomly selected from a database of persons with RA registered with the Mary Pack Arthritis Society and mailed an initial contact letter describing the study and inviting participation. The Mary Pack Arthritis Society is a local organization that offers treatment and education to persons with arthritis across British Columbia, Canada. One hundred eighty-eight individuals contacted the research office and 160 agreed to be screened by telephone to ensure that they had been diagnosed with RA, experienced pain due to RA in the past month,

and were able to read, write, and speak English. Participants in the current sample were also required to be living with a spouse or common law partner. Spouses were invited to participate following expressed interest by the person with RA. Of the 160 persons with RA who agreed to participate in additional eligibility screening, 20 (13%) declined to participate, 17 (11%) were excluded because they had not experienced RA pain in the past month, and 52 (33%) were excluded because they were not married or living with a common law partner. Thus, 71 (44%) met inclusion criteria for the larger study of persons with RA. Forty-one (26%) participated in the study but their spouse did not also participate and 30 persons with RA (19%) met inclusion criteria and had a spouse willing to participate. One of these couples had to be dropped from analyses because the person with RA never saw her spouse in the morning and therefore did not report morning support mobilization. Those who contacted the research office regarding their potential participation were entered into a draw for $1000. Additionally, all of those who met criteria and participated in the data collection phase were mailed a small gift valued at $10 CAD.

The final sample consisted of 29 couples (29 persons with RA and 29 cohabitating spouses). Persons with RA were mostly female (*n* = 21, 72%), which is consistent with sex differences in RA prevalence rates (Public Health Agency of Canada [PHAC], 2010), identified as Caucasian (*n* = 26, 90%), had children (*n* = 26, 90%), and had a mean age of 61.1 years (*SD* = 10.5, range = 42 - 82). The mean number of years since RA diagnosis was 17.7 (*SD* = 13.4, range = 1 - 50). Of the participating persons with RA, seven (24%) were employed, twelve (41%) were retired, five (17%) were on sick leave, two (7%) were on disability, and three (11%) were homemakers at the time of the study. Persons with RA and spouses had a relationship length averaging 31 years (*SD* = 15.8, range = six months-59 years). Spouses were mostly male (*n* = 19, 66%) and Caucasian (*n* = 25, 86%), with a mean age of 62.9 years (*SD* = 9.1, range = 46

- 85). Of the participating spouses, eleven (38%) were employed, thirteen (45%) were retired, one (3.7%) was on sick leave, and one (3.7%) was a homemaker at the time of the study. The modal family income was between $25,000 and $50,000 CAD.

Participants provided informed consent over the phone along with an initial interview and then completed brief structured telephone interviews twice a day for one week, which were scheduled at approximately six and 12 hours after waking up. At each interview, persons with RA and partners were each asked to answer questions on mood, pain, spouse responses, and other constructs. Only measures relevant for the current analysis are described here. Relevant for the current analyses, persons with RA were asked to report on pain and support receipt from the spouse; spouses were asked to report support provision to the person with RA. These reports were in reference either to their experiences so far that day (for the morning assessment) or since the last interview (for the evening assessment). The twice daily phone interviews lasted approximately ten minutes per interview and were administered by a trained female research assistant. Consistent interviewers were assigned to each participant to develop and maintain rapport. Participants were asked to find a private and quiet place in which to complete the daily interviews, and interviews were conducted separately with each member of the couple. With the permission of participants, all interview sessions were tape recorded and transcribed. Telephone methods were used (as opposed to electronic methods) due to the difficulties that may have arisen with holding and operating handheld devices and/or typing, given the previously noted functional disabilities and limitations common to individuals with RA. This study was approved by the affiliated institution's Behavioural Research Ethics Board.

4.2.2 Measures

At each timepoint, persons with RA were asked to report the extent to which they saw or spoke to their partner (1 = *Not at all*, 4 = *A lot*). Positive and negative affect were also assessed using the Affects Balance Scale (Derogates, 1975). Positive affect was assessed with five items. Negative affect was the combined score of the five-item depression and five-item anxiety subscales because they were highly correlated (average r = .69, ranging from .53 to .89).

Persons with RA reported intensity of pain associated with RA during the previous half-day using a numerical rating scale (NRS) from 0 (*no pain*) to 10 (*pain as bad as it could be*). The NRS has demonstrated positive and significant associations with other measures of pain intensity (Jensen, Karoly, & Braver, 1986; Wilkie, Lovejoy, Dodd, & Tesler, 1990) and sensitivity to treatments aimed at influencing pain intensity (Paice & Cohen, 1997).

Persons with RA and their spouses provided reports on support mobilized from the spouse using a modified version of the Berlin Social Support Scales (BSSS; Schulz & Schwarzer, 2000). Participants provided responses on a 5-point Likert scale (0 = *does not apply*, 1= *not at all*, 2 = *a little*, 3 = *somewhat*, 4 = *a lot*). I collapsed across the "does not apply" and "not at all" categories such that either response received a score of one. Esteem, solicitous, and negative support receipt from spouses were reported by persons with RA; esteem, solicitous, and negative support provision to persons with RA were reported by their spouses. Esteem support receipt was assessed with two items ("He/she showed you that he/she loves and accepts you", "He/she made you feel valued and important"). Spouse esteem support provision was assessed with two parallel items ("You showed him/her that you love and accept him/her", "You made him/her feel valued and important"). Solicitous support receipt and provision were each assessed with two items (Receipt: "He/she comforted you when you were feeling bad", "He/she expressed

concern about your condition"; Provision: "You comforted him/her when he/she was feeling bad", "You expressed concern about his/her condition"). Negative support receipt and provision were each assessed with two items (Receipt: "He/avoided you", "He/she complained about you"; Provision: "You avoided him/her, "You complained about him/her"). If participants indicated that they had not seen or spoken to their spouse since the last diary entry, spouse support questions were skipped for that timepoint and treated as missing.

4.2.3 Analytic Strategy

Because of the multilevel structure of the data in which days were nested within couples, I conducted multilevel analyses in R (Bates, & Maechler, 2017; Bates et al., 2015; Kuznetsova, Brockhoff, & Christensen, 2017; R Core Team, 2017; Revelle, 2017; Sarkar, 2008; Wickham, 2009; 2017; Wickham, & Miller, 2017). In these analyses, within-couple variation was modeled at Level 1 and between-couple variation was modeled at Level 2. I began by calculating Intraclass Correlations (ICCs) for all study variables to examine the amount of variance attributable to stable differences between couples and variance attributable to fluctuations over time within couples (see Table 4-1). ICCs were higher than .18 for all variables, indicating that a multilevel approach was appropriate.

In all models, all predictor variables (i.e., morning pain, all support variables, and all covariates) were centered on the mean for each couple (i.e., person-mean centered) so that I could examine within-couple associations. Because my focus was on within-couple associations and because of the small sample, each couple's average levels of each predictor variable was left out of the model. For each model, I calculated the amount of within-couple variance accounted for in pain by the set of predictors, R^2_{Level1}*(approx.)*. I also calculated change in the amount of within-couple variance accounted for in evening pain by the set of predictors in each model

compared to the amount of within-couple variance accounted for in evening by the predictors in the previous model, ΔR^2_{Level1}*(approx.)*. For more information about explained variance calculations, see Appendix I.

I ran four models that included evening pain as the outcome variable (See Table 4-2). The first model shown in Table 4-2 is the null model for evening pain (Model 4-0). The second model shown in Table 4-2 is a random intercept model including person-mean centered midday RA pain as a Level 1 predictor (Model 4-1). The third model shown in Table 4-2 is a random intercept model including person-mean centered midday esteem, solicitous, and negative support as predictors of evening RA pain (Model 4-2). Person-mean centered midday reports of pain were included in the model so that I could examine associations of support and residualized change in pain from morning to evening. I included both spouses' reports of support mobilization so that I could examine the unique effects of each partner's perspective. Following Model 4-2, I added group-mean centered persons with RA's reports of midday reports of quantity of time spent with the partner, negative affect, and positive affect to Level 1 of the model (Model 4-3).

Although fixed effects can be biased when not including random effects in the models (Schmidt-Catran & Fairbrother, 2016), this model would not converge when including random slopes because of the small sample. Therefore, the model was run as a random intercept model. The equation for this final model is presented below:

Level 1 (diary entries):

$$Y_{ij} = \beta_{0j} + \beta_{1j}MorningPain_{ij} + \beta_{2j}EsteemReceipt_{ij} + \beta_{3j}SolicitousReceipt_{ij} + \beta_{4j}NegativeReceipt_{ij} + \beta_{5j}EsteemProvision_{ij} + \beta_{6j}SolicitousProvision_{ij} + \beta_{7j}NegativeProvision_{ij} + \beta_{8j}NA_{ij} + \beta_{9j}PA_{ij} + \beta_{10j}Time_{ij} + r_{ij},$$

Level 2 (couples): $\beta_{0j} = \gamma_{00} + u_{0j}, \beta_{1j} = \gamma_{10}, \beta_{2j} = \gamma_{20}, \beta_{3j} = \gamma_{30}, \beta_{4j} = \gamma_{40}, \beta_{5j} = \gamma_{50}, \beta_{6j} = \gamma_{60}, \beta_{7j} = \gamma_{70}, \beta_{8j} = \gamma_{80}, \beta_{9j} = \gamma_{90}, \beta_{10j} = \gamma_{100}$

where *i* denotes level-units (i.e., diary entries), *j* denotes level-2 units (i.e., persons), and we assume that $r_{ij} \sim N(0, \sigma^2)$, $u_{0j} \sim N(0, \tau_{00})$, and $Cov(u_{0j}, r_{ij}) = 0$. Here, Y_{ij} is the pain severity of time *i* for couple *j*, β_{0j} is the intercept for couple *j*, and β_{1j} - β_{10j} are the slopes for couple *j*. For example, β_{1j} is the effect of morning pain on evening pain for the *j*th couple when other variables in the model are equal to zero. The conditional grand mean is γ_{00}, which is the average level of evening RA pain when aggregating across all couples when other variables in the model are at zero; the effects of each predictor variable on evening pain when other predictor variables in the model are at zero are γ_{10} - γ_{100}; for example, γ_{10} is the effect of morning pain on evening pain when other variables in the model are at zero. The Level 1 residual is r_{ij}; the Level 2 residual is u_{0j}; the Level 1 residual variance is σ^2; the intercept variance is τ_{00}.

I also ran a series of models examining whether within-person fluctuations in pain were significantly associated with subsequent residualized changes in each type of persons with RA support receipt and spouse support provision. In these models, evening reports of each type of support were specified as a function of person-mean centered morning levels of that type of support and person-mean centered morning pain. Although fixed effects can be biased when not including random effects in the models (Schmidt-Catran & Fairbrother, 2016), several of the models would not converge when including random slopes. Therefore, all models were run with random intercepts and fixed slopes and restricted maximum likelihood was used in estimation.

4.3 Results

4.3.1 Preliminary Analyses

Response rates on the twice-daily interviews were excellent, with 404 of the possible 406 morning and evening interviews completed by persons with RA and 404 of 406 interviews completed by spouses. Twenty-seven of the included persons with RA and twenty-seven of the included spouses completed all fourteen interviews. Two persons with RA and two spouses each missed one interview. With few exceptions, there were no missing items within the completed interviews. A single item was missing for negative affect in persons with RA for one of the morning interviews. I addressed this by taking the average of the remaining nine items for that interview. Persons with RA and spouses reported not seeing each other on 4% of the half-days. In these cases, participants did not complete the support items. Therefore, some participants had fewer than 14 interviews included in the analyses if they 1) missed an interview, or 2) did not see their spouse. The restricted maximum likelihood estimation of linear mixed-effects models applied here is robust to missingness and can account for unbalanced numbers of observations per group (Bates et al., 2015; Kuznetsova et al., 2017).

Table 4-1 displays descriptive statistics for study variables. I calculated reliability of change ("within-person internal consistency"; R_c) and reliability of average of all items and time ("between-person internal consistency"; R_{KF}) for all multi-item repeatedly assessed variables using procedures recommended by Cranford and colleagues (2006) and Shrout and Lane (2012). These calculations were conducted using the multilevel.reliability function in the lme4 package (Bates et al., 2015). As can be seen in the table, the grand means for esteem support receipt and provision indicate that esteem support was mobilized "somewhat"– "a lot" across person-days. Esteem support mobilization variables had within-couple reliabilities (R_c) ranging from .46 to .56

and between-couple reliabilities (R_{KF}) ranging from .95 to .98. The grand means for solicitous support receipt and provision indicate that solicitous support was mobilized "a little"–"somewhat". Solicitous support mobilization variables had within-couple reliabilities (R_c) ranging from .34 to .54 and between-couple reliabilities (R_{KF}) ranging from .95 to .96. The grand means for negative support receipt and provision were low, corresponding to the "not at all" response option. Negative support mobilization variables had within-couple reliabilities (R_c) ranging from .00 to .59 and between-couple reliabilities (R_{KF}) ranging from .60 to .88.[1, 2] I inspected frequencies of study variables. These analyses revealed that frequencies of negative support were low, with values >1 on only 8% of the AM persons with RA reports, 7% of the PM persons with RA reports, 7% of the AM spouse reports, 7% of the PM spouse reports.

Although the focus of this study is on within-couple associations among spouse responses and RA pain, for the purpose of future meta-analyses, within- and between- couple correlations of study variables are reported in Table 4-2. These correlations were calculated using the statsBy function in the *psych* package in R (R Core Team, 2017; Revelle, 2017), which calculates the pooled within-group correlations and the sample size weighted between-couple correlations. Within-couple associations of each type of morning support and evening pain were in the expected directions. Mornings when persons with RA received higher levels of esteem support and lower levels of solicitous and negative support than typical for them were non-significantly associated with lower levels of evening pain (for esteem support: r = -.10, p = .176; for solicitous support: r = .06, p = .427; for negative support: r = .12, p = .108). Additionally, mornings when partners provided higher levels of esteem support than typical for them were non-significantly associated with lower evening RA pain, r = -.07, p = .230. There were significant associations between partner reports of solicitous and negative support provision and evening RA pain:

mornings when partners reported providing higher levels of solicitous and negative support than typical for them were associated with higher evening levels of RA pain (for solicitous support: r = .16, p = .030; for negative support: r = .17, p = .017). Readers should interpret the between-couple correlations with caution given the low sample size; however, the overall pattern suggests that persons with RA who experienced higher levels of pain tended to receive higher levels of all types of support as reported by persons with RA and partners, although most of these correlations were not significant.

4.3.2 Hypothesis Testing

Multilevel regression analysis was conducted predicting residualized change in RA pain as a function of each type of support mobilization to persons with RA as reported by both partners. These results are displayed in Model 4-2 in Table 4-3. Persons with RA reports of esteem and solicitous support were not significantly associated with subsequent changes in pain (esteem: γ_{20} = -0.26, SE = 0.16, t (146) = 1.63, p = .105; solicitous: γ_{30} = 0.06, SE = 0.14, t (147) = 0.45, p = .656). However, mornings when persons with RA reported receiving higher levels of negative support than typical for them were associated with subsequent increases in pain, γ_{40} = 0.63, SE = 0.31, t (146) = 2.00, p = .045. Additionally, mornings when partners reported providing higher levels of esteem support and lower levels of solicitous support than typical for them were associated with subsequent decreases in RA pain from morning to evening (esteem: γ_{50} = -0.48, SE = 0.16, t (146) = -2.93, p = .004; solicitous: γ_{60} = 0.35, SE = 0.15, t (147) = 2.38, p = .019). Increases in partner negative support provision were not significantly associated with subsequent residualized changes in RA pain, γ_{80} = 0.74, SE = 0.38, t (147) = 1.94, p = .055. Support receipt and provision variables accounted for 6% of the variance in evening RA pain beyond the variance accounted for by midday RA pain. When time spent with the partner,

negative affect, and positive affect were included in the model (see Model 4-3 in Table 4-3), results were unchanged. Statistical assumptions of linearity, homoscedasticity, and normal distribution of residuals were examined, and all three assumptions were met for all models presented in Table 4-3.

4.3.3 Reverse Time-Lagged Analyses

Next, I examined whether morning-to-morning within-person fluctuations in RA pain were associated with subsequent changes in each type of support in six multilevel regression models—one for each type of support (i.e., persons with RA reports of received esteem support, received solicitous support, received negative support; spouse reports of provided esteem support, provided solicitous support, and provided negative support). Each model included midday levels of the relevant support outcome so that I could examine residualized change in support from midday to evening. Change in explained variance accounted for in each support outcome was also calculated when comparing the models that included midday pain and midday levels of the relevant support outcome to models that only included the midday levels of the relevant support outcome (See Appendix I, Table I-5 for more information). Fluctuations in morning pain were not significantly associated with subsequent changes in levels of esteem support receipt reported by persons with RA, b = 0.02, SE = 0.03, t (156) = 0.71, p = .482, $\Delta R^2_{Level1}(approx.)$ = -0.00275, or with subsequent changes in levels of esteem support provision reported by partners, b = 0.03, SE = 0.03, t (155) = 1.18, p = .240, $\Delta R^2_{Level1}(approx.)$ = 0.00287. However, increases in morning pain were significantly associated with subsequent increases in solicitous support receipt reported by persons with RA, b = 0.13, SE = 0.04, t (157) = 2.94, p = .004, $\Delta R^2_{Level1}(approx.)$ = 0.04403, as well as with subsequent increases in solicitous support provision reported by partners, b = 0.09, SE = 0.03, t (156) = 2.68, p = .008, $\Delta R^2_{Level1}(approx.)$ =

0.03619. Finally, within-person increases in RA pain were not significantly associated with decreases in persons with RA reports of negative support receipt, b = -0.02, SE = 0.01, t (158) = -1.84, p = .067, ΔR^2_{Level1}*(approx.)* = 0.01065. Changes in pain were not significantly associated with changes in negative support provision reported by partners, b = 0.001, SE = 0.01, t (158) = -0.12, p = .902, ΔR^2_{Level1}*(approx.)* = -0.00593.

4.4 Discussion

4.4.1 Research Summary

In this chapter, I investigated the question of how spouses might best provide emotional support to persons diagnosed with a chronic pain condition. This is one of a handful of intensive longitudinal studies to address this question and this is the first to examine associations between multiple types of spouse emotional support responses and subsequent changes in pain. I found that esteem support provision by spouses was associated with subsequent decreases in pain across the day. In contrast, solicitous support provision by spouses and negative support receipt by persons with RA were associated with subsequent increases in pain across the day. This study provides evidence that examining only total emotional support may mask important differences in the association of specific types with outcomes. In the past, most studies have tended to lump different types of emotional support together, focusing on examining global emotional support. However, consistent with operant and interpersonal models of pain, this study suggests that the effects of these three types of support on RA pain outcomes may be quite different. This study also provides evidence that assessing both partners' perceptions of partner responses provides complementary information that would be missed if only one partner's perceptions were assessed.

Previously, Burns and colleagues (2013) examined time-ordered associations between pain and spouse criticism and hostility. Specifically, these authors found that higher spouse hostility was associated with subsequent increases in pain, and pain was associated with subsequent decreases in spouse criticism and hostility. Similar to Burns and colleagues' (2013) study, this study provides insights into time-ordering of associations in the fluctuations of spouse responses and pain. Increases in negative support receipt were associated with subsequent increases in pain. Although pain was not significantly associated with subsequent change in negative support receipt with alpha set at .05, a more liberal alpha of .10 would lead to the conclusion that higher levels of pain were associated with subsequent decreases in negative support receipt. Future research utilizing larger samples should further examine the time-lagged associations between pain and negative support receipt.

This study replicates and extends the work of Burns and colleagues (2013), by going beyond negative spouse responses and examining esteem and solicitous spouse support. Although I found evidence that esteem support provision by spouses are associated with subsequent decreases in RA pain, I did not find evidence that RA pain is associated with subsequent shifts in esteem support mobilization as reported by either the person with RA or the spouse. These results extend previous research indicating that there may be benefits of esteem support to individuals with chronic illness (Hemphill et al., 2016; Beggs et al., 2015; Rosen et al., 2014; 2015; Song et al., 2015; Weinberger, Tierney, Booher, & Hiner, 1990). This is the first study of which I am aware to examine daily time-ordered associations between esteem support and fluctuations in chronic pain.

I found that within-couple increases in spouse reports of solicitous support provision were associated with subsequent increases in RA pain. In reverse time-lagged analyses, I found

that higher levels of RA pain were associated with subsequent increases in solicitous spouse responses as reported by both partners. Importantly, this study was correlational and therefore could not determine whether spouse responses led to changes in RA pain, nor could it determine whether RA pain led to changes in how spouses respond. However, if there are bidirectional causal relationships between RA pain and spouse responses, the directions of these associations indicate a vicious cycle of RA pain and spouse solicitousness: not only may solicitous support lead to increases in RA pain, but also increases in RA pain may lead spouses to be more solicitous.

Future research employing experimental methods should be used to examine whether intervening on spouse responses can lead to reductions in pain. For example, couples could be brought to the laboratory and one partner could be asked to complete a standardized laboratory task like the cold pressor task. The cold pressor task involves putting one's nondominant hand into water maintained at 1 to 2°C and keeping the hand in the water until the sensation becomes too uncomfortable. Two outcomes can be examined using this protocol: first, the length of time each participant is able to keep his or her hand in the water and second, the amount of pain he or she experiences during the task. The other partner could be asked to express confidence in the partner and express that the partner is loved and valued (esteem support) or could be given no instructions. Partners could be recorded and intimate partner support behaviours could be coded for esteem, solicitous, and negative support. It would then be possible to examine whether partners who were asked to provide esteem support 1) provided more esteem support compared to controls, and 2) had partners who were able to better tolerate the pain compared to controls. Previous research indicates that having a friend provide support or just be present while completing this task leads to lower pain severity compared to when completing this task alone

(Brown, Sheffield, Leary, & Robinson, 2003). Another study found a positive correlation between recipient perceptions of the partner's tendency to provide solicitous support and recipient pain during the cold pressor task when in the presence of the partner but not in the absence of the partner (Flor, Breitenstein, Birbaumer, & Furst, 1995). However, there are no studies of which I am aware that have asked partners to provide esteem support while recipients are completing the cold pressor task.

Within-person correlations showed small associations between each type of support and RA pain. Including esteem, solicitous, and negative support receipt as reported by persons with RA and esteem, solicitous, and negative support provision as reported by their spouses in a multilevel model lead to a 6% reduction in the Level 1 residual compared to a model only including midday pain in the model. If partner support leads to changes in RA pain, results here indicate that the combined effect of esteem, solicitous, and negative support receipt and provision is small. However, even small shifts in RA pain may be meaningful when considering that the outcome is pain intensity experienced across a half-day and effects might build up over time. Importantly, results were unchanged when including persons with RA reports of time spent with the spouse, negative mood, and positive mood to the models. Additionally, these control variables were not significantly associated with changes in RA pain in this model and adding them to the model led to an increase in the Level 1 residual, indicating that they did not account for any additional variance in RA pain beyond spouse responses and midday reports of pain. Reverse time-lagged analysis showed that midday RA pain accounted for between 0 to 4% of residualized change variability in evening support variables. If RA pain leads to changes in spouse support, these results indicate that the effects are close to zero for esteem and negative support and small for solicitous support.

Examining the unstandardized regression coefficients in the final model provide further information that negative support receipt in persons with RA, partner esteem support provision, and partner solicitous support each had practically significant associations with RA pain. Holding all other variables in the final model constant at each couple's own mean levels, a within-partner one-unit increase on a four-point scale in esteem support provision was associated with a 0.46-unit decrease in RA pain. This indicates that, for example, on days when partners report that they "showed [the person with RA] that [they] love and accept him/her" and that they "made [the person with RA] feel valued and important" "a lot", persons with RA tended to report almost one and a half units lower evening pain on an eleven-point scale compared to on days when they reported acting in these ways "not at all". Additionally, holding all other variables in the model constant at each couple's own mean levels, a within-person one-unit increase in negative support receipt was associated with a 0.64-unit increase on the pain outcome measure. This indicates that, for example, on days when persons with RA reported that their spouse avoided them and criticized them "a lot", persons with RA tended to report almost two units higher evening pain compared to on days when they report that their spouse avoided and criticized them "not at all". The other associations between spouse support and RA pain were relatively smaller, but likely still meaningful when considering that even small improvements in RA pain might add up over time.

Together, these findings point to a potentially meaningful target for interventions for couples coping with chronic pain. One way that spouses could become better support providers might be to learn to change the way they respond to the person with a chronic pain condition, especially when she is in pain. Spouses could be taught to express love, admiration, acceptance, and confidence in the person instead of expressing concern or worry. Changing the way that

spouses react to chronic pain might pave the way for better pain management. The potential vicious cycle of solicitous support and pain should be examined in future research because of potential applicability for interventions in couples coping with chronic pain.

4.4.2 Strengths, Limitations, and Future Directions

In this chapter, my primary goal was to examine a model in which spouse support is expected to lead to changes in adjustment to chronic illness. However, a competing model is that RA pain is independent of social influences, and that associations that have been observed between RA pain and spouse responses are simply due to spouses reacting to disability. This study was correlational and cannot provide information about the direction of causality. Future research should aim to experimentally manipulate spouse responses and assess subsequent changes in pain.

In this study, most of the persons with RA were female and most of the spouses were male, reflecting the gender distribution of RA in the population (PHAC, 2010). Previous studies have found gender differences in the extent to which individuals benefit from support (Neff & Karney, 2005). Given the small number of male persons with RA in the current study, it is possible that findings do not generalize to chronic pain populations in which a greater number of the affected persons are male. Aiming to examine associations between spouse support and pain in other chronic pain populations is important to examine generalizability of the findings here.

This study focused on the within-couple relations between partner responses and pain using a small sample of persons with RA and their partners. I caution readers that although this study provides initial evidence on the role of support, more work is needed with larger samples to replicate these results. As is often the case in community samples of couples, there were relatively few instances of negative support. This low frequency may have limited power to

detect some of the effects of spouse negative responses. Because of the small sample and consequently limited power for between subject analyses, I was not able to test more complex models, such as models examining aggregated averages of spouse responses on average change in RA pain from morning to evening, the unique effects of morning and evening reports of spouse responses on RA pain, or interactive effects among different spouse response variables. Future research could examine these more complex and potentially more informative models. Additionally, it was not possible to examine stable factors that might be associated with the extent to which partner responses were associated with changes in pain. For example, persons with RA who are more satisfied with their relationship partner in general may not be as impacted by negative support receipt compared to those who are less satisfied with their relationship partner (DeLongis et al., 2010). Additionally, there may be differences between persons with RA in support effectiveness depending on how much pain they tend to experience. Future research with larger samples could examine more complex models, including stable factors that might moderate associations among the variables examined here. Importantly however, results were unchanged when controlling for the quantity of time spent with the spouse, negative affect, and positive affect.

Future research is needed to examine how spouse responses might influence well-being. Findings here suggest that solicitous and negative spouse responses are associated with increases in RA pain, and esteem spouse support are associated with decreases in RA pain. I propose three potential mediators to examine in future research. The first is self-esteem. Associations have previously been found between receiving support and reduced self-esteem in recipients (Nadler, 1987; Nadler, Fisher, & Itzhak, 1983). Fisher, Nadler, and Whitcher-Alagna (1982) theorized that support includes self-threatening and supportive components. They argued that the self-

threatening components lead to increased psychological distress whereas the supportive components lead to decreased psychological distress. More recently, Leary (2012) theorized that self-esteem changes as a function of the extent to which people perceive that they are relationally valued and accepted by others. I propose that whether support negatively impacts self-esteem depends on the type of support being mobilized. Solicitous and negative support may have detrimental effects on well-being in persons with RA because these forms of support both communicate that the spouse believes that the person with RA is struggling and may not be able to handle things on his or her own. In contrast, esteem support communicates that the person with RA is loved and valued and would be expected to lead to improvements in self-esteem.

Along with self-esteem, spouse responses may influence well-being in persons with RA by altering perceptions of spouse responsivity, which is the perception of understanding and validation from the spouse (Reis & Shaver, 1988). Perceived spouse responsivity has been found to fluctuate across days (Laurenceau, Feldman Barrett, & Rovine, 2005) and has been associated with long-term improvements in well-being (Selcuk et al., 2014). In one cross-sectional study of couples in which one partner was experiencing a lupus flare-up, spouse reports of esteem support were significantly associated with higher levels of perceived spouse responsiveness, which was, in turn, associated with lower depressive symptoms in the person experiencing the flare-up (Fekete, Stephens, Mickelson, & Druley, 2007). In contrast, lower levels of perceived spouse responsiveness in the person experiencing the flare-up mediated the positive association between spouse negative support provision and depressive symptoms in the person experiencing the flare-up. Although this study identified perceived spouse responsiveness as a promising potential mechanism linking spouse responses and well-being for those coping with chronic illness, research is needed that examines time-ordered associations and the causal direction of effects.

Intensive longitudinal studies would allow for the examination of whether spouse responses are associated with subsequent shifts in perceived spouse responsiveness, and whether these shifts in spouse responsiveness account for changes in recipient pain and other indicators of well-being. Intervention studies could aim to increase spouses' esteem support and examine whether this leads to changes in recipient perceptions of spouse responsiveness as well as recipient well-being.

4.4.3 Power

This study included a small sample with seven days nested within twenty-nine couples. Since there was some missing data, there were 182 person-days included in the main analyses. Importantly, not all predicted associations between support types and RA pain were significantly different from zero with alpha set at 0.05 (two-tailed). One possible explanation for the null findings is that the true associations between solicitous support receipt in persons with RA, esteem support receipt in persons with RA, and negative support provision from partners and changes in pain are close to zero. An alternative explanation for the null findings is that the study lacked power to detect the true associations between these types of support and RA pain. The latter is a possibility since the analyses were based on a relatively small number of timepoints nested within 29 couples.

I conducted a power analysis to get more information about the sample size required for a future study aiming for 80% or 90% power to detect the observed effects estimated in Model 4-2 in Table 4-3. My power analysis was conducted according to recommendations by Browne, Lahi, & Parker (2009) using the MLPowSim Software Package (Browne & Lahi, 2009). This Software package provides code that can be run in R (R Core Team, 2017). A simulation approach is used whereby many sets of data are generated that come from a population where the alternative

hypothesis is true. The percentage of rejected null hypotheses are counted across the datasets, which provides an estimate of power. The power analysis I conducted was for a two-level unbalanced data nested model because there was some missing data that led some couples to have fewer than seven days of diaries. Alpha was set at .05 (two-tailed). I estimated power for 7, 14, and 21 days of data at Level 1 and for 25, 50, 75, 100, and 125 couples at Level 2, resulting in 15 Level 1-Level 2 sample size combinations. I specified 10% missing data because that was slightly more than the amount of missing data observed in this study when considering missingness due to nonresponse and missingness due to not seeing the partner and therefore not providing responses for the support items. The estimates for the effects of each predictor, the intercept variance, and the Level 1 residual were specified to be the same as the effects observed in Model 4-2. The covariances among the predictors were specified to be the same as the observed covariances for group-mean centered variables. Each test included 500 simulations. The R code for this analysis is included in Appendix III and the results are presented in Table 4-4. To improve interpretation, I also obtained standardized estimates of the effects of each predictor by re-estimating Model 4-2 with all variables in the model standardized using the standard deviations observed across all person-days. I include the standardized effect sizes obtained from this analysis in Table 4-4 for reference.

I found that there would be at least 80% power to detect all effects except for the effect of received solicitous support for a future study with 14 diary days nested within 50 couples. There would be at least 90% power to detect all effects except for the effect of received solicitous support for a future study with 14 days nested within 75 couples or with 21 days nested within 50 couples. Even with the largest sample size tested, which was 21 days nested within 125 couples, there was still only 30% power, $CI_{.95}$ = [25%, 34%] to detect the standardized effect of 0.016 for

received solicitous support. Since the effect for solicitous support receipt is so small, it may not be practically significant and may not be of central importance to detect.

There are several limitations of my power analysis. First, estimates for effect sizes tend to be less reliable when obtained with small samples and it is possible that population effect sizes are smaller than the ones observed in this study. Additionally, many researchers advocate for the inclusion of random slopes in multilevel models to provide information about the extent to which within-person associations differ across individuals. Future researchers may aim for even larger samples to detect smaller effects or to test more complex models.

4.4.4 Conclusions

Research, including the studies presented in Chapters 2 and 3, typically examines coping from an individualistic perspective without examining the social context. The findings presented in this Chapter suggest that spouse responses play a key role in promoting adaptation in individuals coping with chronic pain. Within the limitations of the current study and sample, findings advocate for the expression of love and acceptance to individuals with chronic pain. They also advocate against expressions from the provider of worry about or criticism of the recipient.

Given the potential for this study's findings to provide meaningful insight on potentially useful psychosocial pain management interventions, future research using a larger sample size is worthwhile. Additionally, studies examining associations between support and pain in other chronic pain populations will be worthwhile to probe generalizability of the findings presented here. Furthermore, though I examined associations between spouse support and subsequent changes in RA pain, which provides information about time-ordering in fluctuations of the variables, experimental studies would be worthwhile to examine causality. The work presented

in Chapter 4 highlights the potential for support to be both beneficial and detrimental and underscores the need to study social support as a multidimensional construct.

Table 4-1. Descriptive statistics of study variables.

	Persons with RA							Partners						
	Mean	**SD**	**Possible Range**	**Observed Range**	**ICC**	R_c	R_{KF}	**Mean**	**SD**	**Possible Range**	**Observed Range**	**ICC**	R_c	R_{KF}
AM observations														
AM pain	4.10	2.14	0 - 10	0 - 10	.69									
Esteem	3.10	0.85	1.00 - 4.00	1.00 - 4.00	.60	.46	.95	2.51	0.89	1.00 - 4.00	1.00 - 4.00	.65	.54	.97
Solicitous	2.22	1.03	1.00 - 4.00	1.00 - 4.00	.64	.34	.95	2.11	0.95	1.00 - 4.00	1.00 - 4.00	.62	.54	.96
Negative	1.10	0.30	1.00 - 4.00	1.00 - 4.00	.29	.59	.88	1.14	0.27	1.00 - 4.00	1.00 – 2.50	.18	.00	.60
Time	2.86	1.00	1 - 4	1 - 4	.39			2.78	0.94	1 - 4	1 - 4	.37		
NA	1.30	0.40	1.00 – 4.00	1.00 – 2.60	.50	.75	.97							
PA	2.74	0.77	1.00 – 4.00	1.00 – 4.00	.53	.82	.98							
PM observations														
PM pain	3.86	2.17	0 - 10	0 - 8	.69									
Esteem	3.18	0.83	1.00 - 4.00	1.00 - 4.00	.60	.56	.96	2.60	0.89	1.0 - 4.0	1.00 - 4.00	.78	.48	.98
Solicitous	2.29	1.02	1.00 - 4.00	1.00 - 4.00	.54	.53	.95	2.09	0.91	1.0 - 4.0	1.00 - 4.00	.66	.38	.96
Negative	1.09	0.22	1.00 - 4.00	1.00 - 2.50	.18	.25	.68	1.14	0.24	1.0 - 4.0	1.00 - 2.00	.31	.00	.72
Time	3.20	0.89	1 - 4	1 - 4	.40			3.11	0.88	1 - 4	1 - 4	.44		
NA	1.23	0.38	1.00 – 4.00	1.00 – 3.10	.54	.70	.98							
PA	2.92	0.70	1.00 – 4.00	1.00 – 4.00	.57	.78	.98							

Note. Means and standard deviations were calculated across all person-days. Because of missing data, *n*s range from 190 to 203 days nested within 29 couples. AM = midday assessment; PM = evening assessment; Esteem = esteem support; Solicitous = solicitous support; Negative = negative support; Time = time with partner; NA = negative affect; PA = positive affect.

Table 4-2. Within- and between- couple bivariate correlations among study variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
AM person with RA report														
1. Pain	-	.05	.20	.13	.07	.42*	.08	.89***	.09	.23	.04	.06	.34^{+}	.24
2. Esteem	-.00	-	.67***	-.50**	.59***	.41*	-.50**	.16	.85***	.63***	-.40*	.62***	.43*	-.52**
3. Solicitous	.07	.30***	-	-.30	.35^{+}	.43*	-.30	.24	.59***	.91***	-.17	.38*	.41*	-.26
4. Negative	-.06	-.13^{+}	.11	-	-.48**	-.36^{+}	.70***	.12	-.49**	-.36^{+}	.78***	-.52**	-.33^{+}	.82***
AM partner report														
5. Esteem	.08	.01	.06	.06	-	.66***	-.21	.04	.54**	.31^{+}	-.40*	.92***	.67***	-.47*
6. Solicitous	.11	.02	.08	.03	.35***	-	-.12	.39*	.33^{+}	.36^{+}	-.28	.68***	.95***	-.22
7. Negative	.12^{+}	.05	.01	.02	.05	-.03	-	-.03	-.44*	-.38*	.49**	-.32^{+}	-.16	.57**
PM person with RA report														
8. Pain	.50***	-.10	.06	.12	-.09	.16*	.17*	-	.16	.26	.07	.00	.30	.26
9. Esteem	.05	.32***	.11	-.04	.07	-.04	-.06	-.06	-	.66***	-.30	.54**	.27	-.48**
10. Solicitous	.22*	.15*	.23**	-.02	-.00	.00	.02	.17*	.16*	-	-.18	.31^{+}	.23	-.26
11. Negative	-.15*	-.13^{+}	-.12	-.19**	-.05	.05	-.02	-.11	-.12^{+}	-.09	-	-.44*	-.20	.51**
PM partner report														
12. Esteem	.10	.03	-.03	.01	.23**	.13^{+}	-.01	-.07	.07	.05	.04	-	.74***	-.44
13. Solicitous	.22*	-.03	.10	.01	.01	.26***	-.15^{+}	.22**	-.04	.22**	.02	.27***	-	-.24
14. Negative	-.04	.04	.06	.06	.01	.01	-.06	-.05	.05	.05	.00	.03	.04	-

Note. Pooled within-couple correlations are presented below the diagonal and sample size weighted between-couple correlations are presented above the diagonal. Because of missing data, *n*s range from 183 to 201 days nested within 29 couples. AM = midday assessment; PM = evening assessment; Esteem = esteem support; Solicitous = solicitous support; Negative = negative support.
$^{+}$ $p < .100$, * $p < .050$, ** $p < .010$, *** $p < .001$

Table 4-3. Predicting residualized change in RA pain from morning to evening as a function of morning esteem, solicitous, and negative support mobilized to persons with RA as reported by both partners.

	Null Model 4-0			Model 4-1			Model 4-2			Model 4-3		
Fixed effects	***Estimate (SE)***	***t (df)***	***p***	***Estimate (SE)***	***t (df)***	***p***	***Estimate (SE)***	***t (df)***	***p***	***Estimate (SE)***	***t (df)***	***p***
Intercept, γ_{00}	3.91 (0.36)	11.01 (28)	<.001	3.91 (0.35)	11.01 (28)	<.001	3.89 (0.36)	10.72 (28)	<.001	3.89 (0.37)	10.69 (28)	<.001
AM pain, γ_{10}				0.52 (0.07)	7.90 (171)		0.50 (0.07)	7.56 (147)	<.001	0.50 (0.07)	7.03 (143)	<.001
AM esteem receipt, γ_{20}							-0.26 (0.16)	-1.63 (146)	.105	-0.26 (0.17)	-1.52 (142)	.130
AM solicitous receipt, γ_{30}							0.06 (0.14)	0.45 (147)	.656	0.05 (0.14)	0.36 (143)	.718
AM negative receipt, γ_{40}							0.63 (0.31)	2.00 (146)	.048	0.64 (0.32)	1.99 (142)	.048
AM esteem provision, γ_{50}							-0.48 (0.16)	-2.93 (146)	.004	-0.46 (0.17)	-2.68 (142)	.008
AM solicitous provision, γ_{60}							0.35 (0.15)	2.38 (146)	.019	0.33 (0.15)	2.22 (142)	.028
AM negative provision, γ_{70}							0.74 (0.38)	1.94 (147)	.055	0.56 (0.42)	1.34 (143)	.184
AM time with spouse, γ_{80}										-0.03 (0.13)	-0.22 (144)	.828
AM negative affect, γ_{90}										-0.04 (0.35)	-0.12 (143)	.905
AM positive affect, γ_{100}										-0.03 (0.19)	-0.16 (143)	.874
Random effects	**Variance**			**Variance**			**Variance**			**Variance**		
Intercept, τ_{00}	3.447			3.493			3.637			3.640		
Level 1, σ^2	1.475			1.087			1.004			1.018		
Explained variance												
R^2_{Level1}*(approx.)*				26%			32%			31%		
ΔR^2_{Level1}*(approx.)*							6%			-1%		

Note. Models based on 181-201 days from 29 couples. AM = midday assessment; PM = evening assessment; Esteem = esteem support; Solicitous = solicitous support; Negative = negative support. R^2_{Level1}*(approx.)* for is the percent of the within-person variance accounted for in the outcome variable by all predictor variables in the model compared to null models. Δ R^2_{Level1}*(approx.)* is the difference in the proportion of variance accounted for in the outcome variable by all predictor variables in one model compared to the next most complex model (see Appendix I for more information).

Table 4-4. Empirical power and 95% confidence intervals with true effect sizes and all other parameter values set to the values observed in Model 4-2 with 25, 50, 75, 100, and 125 couples and 7, 14, and 21 days of diary entries.

N couples	*n* days		AM pain β = 0.256	AM esteem receipt β = -0.058	AM solicitous receipt β = 0.016	AM negative receipt β = 0.068	AM esteem provision β = -0.107	AM solicitous provision β = 0.087	AM negative provision β = 0.066
25	**7**	**Power**	1.00	0.25	0.05	0.36	0.72	0.53	0.35
		LB, UB	1.00, 1.00	0.22, 0.29	0.03, 0.07	0.32 0.41	0.68, 0.76	0.48, 0.57	0.31, 0.39
	14	**Power**	1.00	0.53	0.06	0.66	0.97	0.86	0.66
		LB, UB	1.00, 1.00	0.49, 0.57	0.04, 0.08	0.62, 0.71	0.96, 0.99	0.83, 0.89	0.61, 0.70
	21	**Power**	1.00	0.71	0.08	0.87	0.99	0.94	0.82
		LB, UB	1.00, 1.00	0.67, 0.75	0.05, 0.10	0.84, 0.90	0.98, 1.00	0.92, 0.96	0.79, 0.86
50	**7**	**Power**	1.00	0.52	0.08	0.66	0.95	0.79	0.64
		LB, UB	1.00, 1.00	0.47, 0.56	0.06, 0.11	0.62, 0.70	0.93, 0.97	0.75, 0.83	0.60, 0.68
	14	**Power**	1.00	0.82	0.11	0.93	1.00	0.98	0.93
		LB, UB	1.00, 1.00	0.79, 0.85	0.08, 0.14	0.91, 0.95	0.99, 1.00	0.97, 1.00	0.90, 0.95
	21	**Power**	1.00	0.94	0.15	0.98	1.00	1.00	0.99
		LB, UB	1.00, 1.00	0.92, 0.96	0.12, 0.18	0.97, 0.99	1.00, 1.00	0.99, 1.00	0.98, 1.00
75	**7**	**Power**	1.00	0.70	0.09	0.79	1.00	0.93	0.80
		LB, UB	1.00, 1.00	0.66, 0.74	0.07, 0.12	0.76, 0.83	0.99, 1.00	0.91, 0.95	0.77, 0.84
	14	**Power**	1.00	0.93	0.15	0.99	1.00	1.00	0.99
		LB, UB	1.00, 1.00	0.91, 0.96	0.12, 0.18	0.98, 1.00	1.00, 1.00	1.00, 1.00	0.98, 1.00
	21	**Power**	1.00	1.00	0.24	1.00	1.00	1.00	1.00
		LB, UB	1.00, 1.00	0.99, 1.00	0.20, 0.28	1.00, 1.00	1.00, 1.00	1.00, 1.00	1.00, 1.00
100	**7**	**Power**	1.00	0.78	0.09	0.91	1.00	0.98	0.90
		LB, UB	1.00, 1.00	0.75, 0.82	0.07, 0.12	0.88, 0.93	1.00, 1.00	0.97, 1.00	0.87, 0.93
	14	**Power**	1.00	0.98	0.18	1.00	1.00	1.00	1.00
		LB, UB	1.00, 1.00	0.97, 0.99	0.15, 0.22	0.99, 1.00	1.00-1.00	1.00, 1.00	0.99, 1.00
	21	**Power**	1.00	1.00	0.29	1.00	1.00	1.00	1.00
		LB, UB	1.00, 1.00	0.99, 1.00	0.25, 0.33	1.00, 1.00	1.00-100	1.00, 1.00	1.00, 1.00
125	**7**	**Power**	1.00	0.89	0.16	0.94	1.00	1.00	0.95
		LB, UB	1.00, 1.00	0.86, 0.92	0.12, 0.19	0.92, 0.96	1.00-1.00	0.99, 1.00	0.93, 0.97
	14	**Power**	1.00	0.99	0.23	1.00	1.00	1.00	1.00
		LB, UB	1.00, 1.00	0.99, 1.00	0.20, 0.27	1.00, 1.00	1.00-1.00	1.00, 1.00	1.00, 1.00
	21	**Power**	1.00	1.00	0.30	1.00	1.00	1.00	1.00
		LB, UB	1.00, 1.00	1.00, 1.00	0.26, 0.34	1.00, 1.00	1.00-1.00	1.00, 1.00	1.00, 1.00

Note. Power calculated for unbalanced two-level model with 10% missing data at Level 1 and alpha set at 0.05 (two-tailed).
LB = Lower bound of 95% confidence interval, UB = Upper bound of 95% confidence interval. Code for this analysis is presented in Appendix III.

Chapter 5: General Discussion

The current body of research investigated the process of support mobilization. The support process was examined in two intensive longitudinal studies examining associations between support mobilization and potential antecedents and consequences of support. Results presented in Chapter 2 indicated key roles of threats to agency and communion in support seeking and provision. Results presented in Chapter 3 extended results from Chapter 2 by suggesting important roles of the personality dimensions extraversion (E) and agreeableness (A) as moderating the associations between threats and support behaviours. In Chapter 4, I turned my attention to couples in which one partner was diagnosed with rheumatoid arthritis (RA), examining the putative consequences of intimate partner support on cross-day fluctuations in recipient pain. Here I took a contextual methodological approach that took both support recipients' and providers' perspectives into consideration. Together, these studies provide support for the theory that support mobilization is a complex interpersonal process that unfolds over time and may play a role in recipient well-being.

5.1 Research Summary

Chapter 2 reports results of a study in which undergraduate students completed electronic structured diaries at midday and evening for seven consecutive days. During each assessment, participants provided a brief description of the worst stressor of the half-day. They also reported their appraisals of the extent to which that stressor was threatening to agency and to communion, and the extent to which they responded to that stressor by seeking and providing support. Trained undergraduate coders classified the open-ended descriptions into three categories: achievement, social, and other stressor type. Using multilevel mediation

analyses, I examined within-person associations between stressor type, threats to agency and communion, and support behaviours. Consistent with my expectations, I found that compared to half-days when they experienced any other stressor, achievement stressors were associated with within-person increases in agentic threat. In turn, within-person increases in agentic threat were associated with increases in support seeking and decreases in support provision. These results provide evidence that people may divert resources toward maintaining their own needs and away from the needs of others when they perceive agency to be at stake.

Results from Chapter 2 also showed that compared to half-days when undergraduates experienced any other stressor, times when they experienced social stressors were associated with within-person increases in communal threat. In turn, within-person increases in communal threat were associated with increases in support seeking and provision. These results provide support for the notion that support seeking and provision may both be used when people perceive communion to be at stake.

In Chapter 2, associations between threat appraisals and support behaviours were accompanied by significant variance components (i.e., significant random effects). This indicates that there is variability between individuals in the extent to which threats to agency and communion are coupled with changes in support seeking and provision. Therefore, in Chapter 3, I aimed to examine associations between personality and individual differences in the strength of the associations between threat appraisals and support behaviours. Specifically, I examined the roles of E and A, personality dimensions previously found to be associated with agentic and communal values (Fischer & Boer, 2015).

Results in Chapter 3 revealed that the associations between threat to agency and support behaviours were significantly stronger for those higher in E compared to those lower

in E. Specifically, those higher in E tended to show a stronger positive association between support seeking and agentic threat compared to lower in E. Additionally, those higher in E tended to show a stronger negative association between support provision and agentic threat compared to those lower in E. These results are consistent with theorizing that those higher in E tend to place greater value on agency and may respond with greater effort to maintain agency when it is threatened compared to those lower in E.

In contrast to the effect of E, results in Chapter 3 revealed that the associations between threat to communion and support behaviours were significantly stronger for those higher in A compared to those lower in A. Those higher in A tended to show greater increases in support seeking and provision at times when they experienced increases in communal threat compared to those lower in A. These results are consistent with the theory that those higher in A tend to place greater value on communion and may respond with greater effort to maintain communion when it is threatened compared to those lower in A.

In Chapter 4, I turned my attention to the theorized consequences of support mobilization for recipient well-being, focusing on couples in which one member of the dyad was diagnosed with RA. This study was the first of which I am aware to examine within-couple associations between esteem, solicitous, and negative support and subsequent changes in RA pain across half-days. This study also went beyond many previous studies by including perceptions of both partners. I found that esteem support provision by spouses was associated with subsequent decreases in pain across the day. In contrast, solicitous support provision by spouses and negative support receipt by persons with RA were associated with subsequent increases in pain across the day. This study provides support for both the Operant and Interpersonal models of RA pain. The Operant Model argues that expressions of concern for the

person with chronic pain may be inadvertently reinforcing and lead to increases in pain over time. The positive association of partner reported solicitous support and RA pain observed in this study supports the Operant Model. The Interpersonal Model argues that expressions of love may be intimacy-building and lead to improvements in well-being whereas negative support may be intimacy-undermining and lead to declines in well-being over time. The associations of esteem and negative support and RA pain observed in this study support the Interpersonal Model. Overall, this study provides evidence that focusing exclusively on the effects of overall emotional support may mask important differences in the associations of specific types of emotional support and well-being. This study also indicates that assessing both partners' perceptions of partner responses provides complementary information that would be missed if only one partner's perceptions were assessed.

5.2 Strengths, Limitations, and Future Directions

5.2.1 Within-Person Design and Analyses

The studies in this dissertation used intensive longitudinal methodology and emphasized examining within-person associations across time. In Chapter 2, I examined within-person associations between stressor type, threats to agency and communion, and support behaviours. In Chapter 4, I examined within-couple associations between both partners' perceptions of several types of support and RA pain. Examining within-person associations is a key strength of these studies for several reasons. A key reason is that within-person analyses map onto theories about the process of support (Collins & Feeney, 2000). The underlying theory of support mobilization makes many predictions about what will happen within an individual or dyad across time rather than about what will happen across a set of individuals or dyads. That is, many of the

predictions, including those tested in this dissertation, are about intraindividual (or intradyadic) processes rather than interindividual processes. These intra- processes would not be adequately captured using a cross-sectional design (Curran & Bauer, 2011).

A second reason examining within-person associations is a strength is that many alternative explanations for the findings can be ruled out. Specifically, the fact that within-person associations were examined limits the potential that stable contextual or personality variables acted as third-variable confounds or could provide alternative explanations for the associations among the variables. Chapter 3 focused on individual differences in the strength of the within-person associations between threat appraisals and support behaviors as they were related to E and A. It is possible that other stable factors might account for the associations between E and A and matching between threats and support. However, the Chapter 3 results were virtually unchanged when statistically controlling for many variables, including neuroticism, conscientiousness, openness to experience, and demographic variables. Future research could aim to examine whether other person-level factors, such as age (Hoppmann & Blanchard-Fields, 2010), power (Côté et al., 2011), or self-control (Tangney, Baumeister, & Boone, 2004) moderate associations between threat appraisals and support behaviours.

5.2.2 Time-Ordered Associations

Beyond the ability to examine within-person associations, another key strength of intensive longitudinal designs is that they often allow for the examination of the strength of the lagged associations among the variables. Chapter 4 presents results from a study that was designed to examine lagged associations among the variables. Persons with RA reported pain at midday and evening; both partners reported support mobilized to persons with RA at midday and evening as well. This allowed for the examination of the association between midday reports of

support and subsequent residualized changes in RA pain from midday to evening. It also allowed for the examination of the association between midday reports of pain and subsequent residualized changes in each type of support from midday to evening. Thus, these results allowed for a better understanding of the strength of the associations between within-person shifts in support and subsequent shifts in pain across half-days rather than just an examination of associations between concurrently changing variables. In contrast, the study presented in Chapters 2 and 3 used a design in which undergraduates were asked to report threat appraisals and their support behaviours with regard to the worst stressor during that same time-period. It did not make conceptual sense to examine whether threat appraisals linked to a stressor experienced in the first half of the day were associated with support behaviours linked to what was often a different stressor experienced in the second half of the day. Therefore, the study was not designed to assess stressor type and threat appraisals in relation to subsequent or lagged shifts in support behaviours. Future research could aim to examine appraisals and coping responses for the same stressor at multiple timepoints. This would also allow researchers to understand how appraisals and coping in the context of the same stressor shift across time.

5.2.3 Memory Biases

Intensive longitudinal studies minimize the contribution of memory biases compared to if participants were asked to report on events farther back in time (Shiffman et al., 1997). Though likely preferable to recalling back weeks or months, researchers have made arguments that reports made during intensive longitudinal studies may not be fully immune to memory biases (Takarangi, Garry, & Loftus, 2006). For example, the peak-and-end rule describes how people report an experience depending on the most intense feeling during the experience and their feelings at the end of the experience. In one study, people rated their pain during a colonoscopy

each minute during the colonoscopy and then provided a global report shortly after it ended (Redelmeier & Kahneman, 1996). Participants' global reports of pain were significantly associated with the most intense pain and the pain they experienced at the end of the procedure but were not associated with the average pain they experienced. In the current studies, it was possible that participants experienced some recall biases when reporting on the previous half-day. For example, in Chapter 4, reports of pain could have been unduly influenced by the most intense pain experienced in that half-day as well as levels of recent pain. If there were peak-and-end effects, then a potential interpretation of the findings is that support reported at midday was associated with changes in the most intense pain experienced from midday to evening, or changes in pain from right before the midday assessment to right before the evening assessment. Future studies could aim to replicate the findings presented here by using experience sampling methodology in which participants are asked to provide reports on current pain several times per day. This might allow for a better understanding of the associations between support and fluctuations in pain throughout the day.

5.2.4 Correlation and Causation

All research presented in this dissertation are correlational. Although using an intensive longitudinal methodology allows many alternative explanations for the observed associations to be ruled out, this methodology does not provide information about causality. For example, an alternative explanation for the findings presented in Chapter 2 is that support seeking or provision shifts perceptions of what was at stake in the situation. Providing support might highlight the communally-threatening aspects of a stressful situation. Researchers could begin disentangling these effects by asking people how they think they would respond to hypothetical situations emphasizing communal or agentic threat. Alternatively, a researcher could ask couples

to come to the laboratory and randomly assign partners to either be in the support seeker role or support provider role (Collins & Feeney, 2000). The support seeker could be asked to choose a personal problem for discussion. Prior to the conversation, the other dyad-member could be told what problem the support seeker wishes to discuss and either be asked to list the aspects of the situation that are threatening to the support seeker's well-being (communal threat condition) or to list the aspects of the situation that are threatening to their own well-being (agentic threat condition). The support conversation could be recorded and coded for the amount and types of support provided. Previous experiments have been conducted that have examined support mobilization in the laboratory involving both confederate-participant dyads (Bolger & Amarel, 2007) and intimate partner dyads (Verhofstadt, Buysse, Ickes, Clercq, & Peene, 2005).

An alternative explanation for the findings presented in Chapter 4 is that RA pain is independent from social influences and may change how partners respond. As described in the Discussion Section of Chapter 4, laboratory research could also be conducted in which one partner is either asked to provide esteem support or to respond how he or she normally would while the other partner completes the cold pressor task, a painful laboratory task involving holding one's hand in cold water (Brown et al., 2003). Participants may experience less severe pain and hold their hands in the water for longer in the esteem support condition compared to the control condition. Although this study would provide causal evidence that esteem support has a beneficial effect in reducing pain severity, this study would lack ecological validity. Another study could aim to educate partners about the potential benefits of providing higher levels of esteem support and lower levels of solicitous and negative support and examine whether this education leads to declines in pain. Those that receive the education program could be compared to a waitlist control group.

5.2.5 Support as an Interpersonal Process

An important consideration for research examining support mobilization is that support mobilization is an interpersonal process and, by definition, involves more than one person. The studies presented in Chapters 2 and 3 do not fully take this into consideration, focusing on only individuals' reports of stressors, perceptions of stress, and support behaviours. Additionally, Chapters 2 and 3 do not assess the individuals with whom participants were exchanging support. The measurement of support seeking and provision allowed participants to report support exchanged with anyone, did not limit measurement to a specific relationship, and allowed for the possibility that support was, for example, sought from one person and provided to another. In contrast, a key strength of the study presented in Chapter 4 is that support was examined specifically between partners, and the perspectives of both members of the dyad were taken into account. Results presented in Chapter 4 indicate that each member of the dyad has a unique perspective, and information would have been missed had only one perspective been taken into consideration. To address the limitation of the studies presented in Chapter 2 and 3, future research should examine support exchanged within a particular relationship as it relates to the stressor context and take both recipient and provider perspectives into account.

5.2.6 Within-person Internal Consistencies of Assessments

Some of the measures used in the studies presented here had low within-person internal consistencies (R_c), which was assessed using methods recommended by Cranford and colleagues (2006) and Shrout & Lane (2012). Specifically, R_c is an estimate of reliability that assesses precision of measurement of systematic change of individuals across days (Cranford et al., 2006). I tabulated the R_c along with the number of items for all multi-item repeatedly administered scales in Table 5-1. The scales that had the lowest within-person internal

consistencies tended to include the fewest number of items. The Pearson Correlation between the number of items and the within-person reliabilities for the scales was .72. All of the scales with four or more items had within-person reliabilities above .70 and all of the scales with fewer than four items had within-person reliabilities below .70. Using short scales is common practice in intensive longitudinal research to minimize participant burden (Cranford et al., 2006). Including more items to assess each construct would be expected to lead to higher within-person reliabilities; however, participant burden would have to be balanced by assessing fewer constructs.

One potential source of low within-person internal consistencies is that participants were asked to complete self-reports in daily life. Assessing the support process as participants go about their daily lives is a key strength of this research because this leads to higher external validity compared to assessing support in laboratory settings. However, asking participants to provide reports in daily life may also lead to more error variance in assessments compared to research relying on self-reports under more controlled conditions.

Theory indicates that criticism and avoidance are both ways of providing negative support (Bodenmann, 2005). Negative support receipt and provision were each assessed with two items—one that tapped into criticizing and another that tapped into avoiding the individual with RA. However, negative support receipt and provision showed the lowest within-person internal consistencies, even when compared to the other two-item scales. For example, when I examined the within-couple correlation of the two items assessing support provision, I found that the correlation between the items was close to zero (See Footnote 2). Because of theory indicating that criticism and avoidance could be two ways of providing negative support, conceptualizing the negative support receipt and provision scales as formative factors might be more defensible

than conceptualizing them as reflective scales (Bollen & Lennox, 1991). Alternatively, it is possible that our understanding of the support mobilization process could be improved by examining criticism and avoidance separately. To address this possibility, I conducted supplementary analyses that included each negative support provision item as separate predictors of change in RA pain, which I describe in Footnote 2. Consistent with results when including both items in a single composite score (See Table 4-3), neither item was individually significantly associated with changes in RA pain. However, assessing criticism and avoidance each using multiple items might improve reliability of assessment and lead to more power to detect each of their associations with recipient well-being.

Communion and agency are theorized to be broad constructs that have provided an organizing framework for understanding values, motives, goals, and multiple other areas of human functioning (Gurtman & Pincus, 2003; Hogan, 1987; Horowitz & Strack, 2010). I argue that within-person internal consistencies were relatively low for threats to agency and communion because these are especially broad mega-constructs that were assessed with only three and four items respectively. For example, a recently constructed scale designed to assess communal and agentic values includes 12 items for each, and showed alphas ranging from .81 to .85 (Trapnell & Paulhus, 2012). Applying the Spearman-Brown formula (see Appendix II), the estimated internal consistency reliability of the communal and agentic values scales if they only included four items for each subscale range from .57 to .64, which is smaller than the within-person internal consistency for the 4-item communal threat scale (R_c = 0.72). If they only included three items for each scale, the estimated alphas range from .51 to .58, which are comparable in size to within-person reliability for the 3-item agentic threat scale (R_c = .49). Given the conceptual breadth of these constructs, future research should aim to include a higher

number of items to improve scale reliabilities. Alternatively, future research could aim to examine more specific types of communal and agentic threat, which may not require as many items to assess.

5.2.7 The "Does Not Apply" Option in Support Scales

In all studies presented here, support seeking, provision, and receipt were assessed with scales that included "does not apply" in the response scale. In the Personality, Stress, and Coping Study presented in Chapters 2 and 3, "does not apply" and "not at all" were assessed in the same category, both rated as 1 on a 3-point Likert scale. In the UBC RA Project presented in Chapter 4, "does not apply" and "not at all" were assessed as separate categories (0 or 1, respectively). The inclusion of "does not apply" in the Likert scale is consistent with previous studies of coping responses (e.g., Folkman et al., 1986b). Participants may want to indicate that they did not behave in a particular way or that a specific behaviour did not occur because the situation did not call for that response. However, the goal of my analysis was to examine engagement in each behaviour regardless of participant appraisals of why they did not engage in that behaviour. In the study presented in Chapter 4, for example, participants were only asked to complete the support items for half-days when they interacted with their partner at least "a little". However, partners endorsed "does not apply" on approximately 6% of timepoints for the item, "showed you accept him/her" and 7% of timepoints for the item "made him/her feel valued and important". The research question asks whether days when spouses perceived that they engaged in higher levels of esteem support than typical for them are associated with changes in pain. Spouses' appraisals of why they did not engage in each response (i.e., because they perceived it as not applicable or for some other reason), are not the subject of investigation. In summary, including this response category is important because it may improve ease of responding.

However, the purpose of the current study was to compare days when a certain support behaviour occurred at a higher level than typical for that person compared to when it occurred at a lower level than typical for that person. Whether the respondent believes that she did not engage in the behavior because it was not applicable for the situation or whether she did not engage in the behavior for another reason goes beyond the scope of the work presented in this dissertation. However, future research could examine perceptions of why individuals did not engage in support behaviours. Knowledge about such perceptions may be helpful to understand why support is often not provided when it could be useful.

5.2.8 Effect Sizes

The studies presented here revealed a wide range of effect sizes. For example, stressor type, threat appraisals, and support seeking and provision tended to show medium to strong associations. In contrast, the associations between E and A and individual differences in the strength of matching between threat appraisals and support behaviours were quite small. Additionally, the size of the associations between support receipt and provision and pain in those with RA were small. There are three main factors that may be at play that have an impact on the effect sizes observed here.

The first factor that might have influenced effect sizes observed in this study is measurement times. Constructs assessed near in time may be more strongly related than constructs assessed farther apart in time. In the research presented here, the variables that showed medium to strong associations (i.e., stressor type, threat appraisals, and support behaviours in Chapter 2) were assessed at the same time. In contrast, E and A were assessed prior to reports of the worst stressor of the day and showed small associations with support behaviours and small associations with individual differences in threat-support behaviour matching. Small to medium

associations were also observed between support mobilization and RA pain in the UBC RA Project, potentially because pain and support were assessed approximately six hours apart.

The second factor that might have impacted effect sizes was differences in context specificity of measurement. Some variables were assessed within the context of a specific situation, whereas other constructs were assessed as overall experiences in the previous half-day. Constructs are expected to be more strongly related if they are both assessed in the context of the same situation. For example, if two constructs are assessed in reference to the most troublesome problem of the half-day, they may be expected to be strongly associated. In contrast, when constructs are assessed in the context of all experiences in the previous half-day, they may be expected to be less strongly associated because there may be a greater number of other factors at play that could influence responses on one variable but not the other. When one of the constructs is assessed in terms of what individuals perceived that they tend to do across occasions in their life, as when E and A are assessed, this might be expected to show small associations with how people report they responded to a specific situation.

A third important consideration in interpreting effect sizes is measurement overlap. Specifically, the association between threat to communion and support provision was strong, with a within-person correlation of .56. The fact that there is a strong association between threat to communion and support provision may lead to arguments that there is a tautological relationship these variables. However, there is a conceptual difference between perceiving that one's relationships or the well-being of someone else is at stake in a situation and actually providing support. For example, a person could perceive that her friend's well-being is at stake in a situation but not have the resources or desire to provide help. Instead, she could recognize that the friend's well-being is at stake and instead of helping the friend, could respond with

hostility and blame the friend for her problems. In line with this reasoning, results indicated inter-individual variability in the extent to which threat to communion was significantly associated with support provision. In Chapter 3, I found support for the notion that individual differences in communal threat-support provision matching are systematically associated with A. The results indicate that those lower in A are less likely to provide support when they perceive communal threat compared to those higher in A. This finding discounts the possibility that there is a tautological relationship between threat to communion and support provision because one does not necessarily occur in the presence of the other.

Part of the reason for measurement overlap is that all research presented here relied exclusively on self-report data. Because of reliance on self-report, in the Personality, Stress, and Coping Study, the assessments of the worst stressor of the half-day, threat appraisals, and support behaviours were all each individual's own perception of events. Future research could aim to assess threat appraisals using self-reports assessments while assessing support behaviours using self-reports, partner-reports, and behavioural observation following exposure to controlled laboratory stressors. This methodology would complement the research presented here by alleviating concerns about overlap in assessment of stressor type, threat appraisals, and support behaviours. Other studies could aim to obtain behavioural assessments of support in daily life; for example, researchers have videotaped families as they go about their daily lives (Repetti, Wang, & Sears, 2013). Others have used naturalistic observation using audio recording technology paired with daily self-reports to understand support (Robbins, López, Weihs, & Mehl, 2014).

5.2.9 Integrating Results for a Better Understanding of the Support Process

In Chapters 2 and 3, I examined the first half of the putative support mobilization process linking stressful events and support mobilization. In Chapter 4, I examined the second half of the putative support mobilization process linking support mobilization and changes in recipient well-being. Future research could aim to integrate the work presented here in a single study linking stressful events, support mobilization, and changes in recipient well-being. This would allow for a more cohesive understanding of the cascading interpersonal process. For example, previous research indicates that coping responses may be differentially effective depending on the stressor context. More specifically, previous studies have found positive associations between perceived control and problem solving, a finding paired with results indicating that problem solving is also a more effective response to more controllable stressors compared to less controllable stressors (Forsythe & Compas, 1987). Future studies could extend findings presented here by examining whether support seeking and provision are differentially effective in promoting well-being depending on threat appraisals and personality dimensions of both the support recipient and provider. For example, providing support may be a more effective way to manage stressors that are higher in threat to communion compared to stressors that are lower in threat to communion. One question that should be addressed concerns the roles of threat appraisals and personality dimensions in predicting different types of support provision. Potentially, higher quality support, including higher levels of esteem support and lower levels of solicitous and negative support, may be provided when the support provider is not distracted by threats to agency. Personality dimensions could also be examined as predictors of different types of support. Potentially, those higher in A may show stronger links between increases in threats to communion and increases in responsive support compared to those lower in A; those higher in E may show stronger links

between increases in threats to agency and decreases in responsive support compared to those lower in E. Another area for future research would be to examine the associations between different types of support and provider well-being.

5.2.10 Support Mobilization Beyond the Stress Context

In this body of work, I focus on support that occurs to help manage stress. However, others have described and examined support in other contexts. For example, Feeney, Collins, Van Vleet, & Tomlinson (2013) have examined secure base support, which is support provided to help the recipient achieve her goals and is not only mobilized under conditions of stress. Others (Gable, Reis, Impett, & Asher, 2004), have described capitalization, which is support that occurs to help people maximize the benefits of positive events. Future research should examine the roles of threat appraisals in support providers and recipients in influencing secure base support and capitalization. Other future studies could examine the associations between different types of support (i.e., esteem, solicitous, and negative) and recipient well-being in the context of goal pursuit and experiences of positive events.

5.3 Implications

Stress can have large detrimental effects on a variety of aspects of a person's life. Stress is related to a host of mental health problems, including depression and anxiety (Kraajj, Arensman, & Spinhoven, 2002; Smith, Peterson, Degenhardt, & Johnson, 2007). Higher levels of stress are associated with poorer mood and worse health outcomes (Bolger et al., 1989; Holt-Lunstad et al., 2015; Weinberger et al., 1990). Furthermore, stress can degrade relationships, with higher levels of stress being associated with higher verbal aggression, lower relationship satisfaction, and higher risk of relationship dissolution (Bodenmann et al., 2010; Kiecolt-Glaser,

Bane, Glaser, & Malarkey, 2003; Randall & Bodenmann, 2009). Previous research indicates that the otherwise detrimental effects of stress can be alleviated with the support of others (Pow et al., 2017; Rueger et al., 2016). Decades of research indicate that the perception that support would be available if needed has consistent stress-buffering effects (Taylor, 2011). Another substantial body of work indicates that feeling socially connected may also be protective (Holt-Lunstad et al., 2015).

Although social support availability and social connectedness have long been regarded as having incredible importance for well-being, few studies have investigated support exchanges. Across the studies that have examined support mobilization, few have examined potential antecedents of support, and results are mixed regarding support receipt's associations with recipient well-being. A limited understanding of support exchanges is a barrier to translating decades of research on social support to create interventions. A recent study examining an intervention aimed at helping couples learn how to provide better quality support for each other showed null or even detrimental effects compared to the control group (Rogge et al., 2013). Even though researchers have spent decades examining support, what we are still lacking are clear recommendations for people about how best to support others during stress. Yet, if we can identify specific suggestions for people, this might lead to large benefits for individual emotional and physical well-being, and lead to benefits to society in terms of decreased healthcare costs and increased productivity. The goal of this dissertation was to take a step forward in getting a better understanding of the process of support as it unfolds in daily life.

Unlike much of the research on social support, this research went beyond examining perceived support availability and social embeddedness and instead focused on support mobilization. Support mobilization is important to understand because it is at the level of in-the-

moment behaviour. Examining behaviour brings us closer to identifying targets for stress-management interventions. Studies 1 and 2 helped to shed light on the associations between threat appraisals and support seeking and provision. Given research indicating that support mobilization has mixed associations with well-being, the implications of these findings for interventions might depend on better understanding how threat appraisals are related to different types of support or how threat appraisals are directly related to well-being. For example, future research may indicate that there are benefits for well-being when individuals respond to communal threat by increasing their support provision. If this is found, then a potential intervention could help participants to identify times when they are experiencing communal threat and direct them to respond with support provision at those times.

Study 3 went beyond most research by obtaining assessments of three types of emotional support rather than just examining overall levels of emotional support. This research indicates that not all forms of emotional support are equally beneficial. The results suggest that, at least in the context of couples coping with RA, partners could be better support providers if they focus on communicating that the person with RA is valued and loved. Additionally, they might best avoid letting the person with RA know that they believe she is struggling to cope effectively through solicitousness and criticism. Given findings are correlational, the next logical step in this line of research may include experimentally manipulating the type of support being mobilized to persons with RA. Additionally, future studies should attempt to extend these findings to other outcomes, including self-esteem, intimacy, and other well-being outcomes.

5.4 Conclusions

The studies presented in this dissertation highlight the importance of understanding social support mobilization as an interpersonal process that can be understood within a stress and coping framework. Results indicate coupling of support mobilization, the type of stress being experienced, individuals' appraisals of threat to agency and communion, and individual differences in agentic and communal orientations. Additionally, results point to the importance of examining different types of emotional support using an interpersonal approach to further our understanding of the role of support in recipient well-being. In life, experiencing stress is inevitable. With a better understanding of the conditions under which people are likely to come together during stress and with a better understanding of how people might best come together during stress, we might be able to unlock the power of relationships to enhance well-being.

Table 5-1. Number of items and within-person internal consistencies of repeatedly measured variables in Chapters 2, 3, and 4.

Construct	Number of items	R_c
Support provision	8	.90
Support seeking	6	.86
Positive mood	5	.80
Negative mood	10	.79
Communal threat	4	.74
Esteem support provision	2	.55
Esteem support receipt	2	.53
Agentic threat	3	.49
Negative support receipt	2	.48
Solicitous support receipt	2	.47
Solicitous support provision	2	.45
Negative support provision	2	.00

Note. Constructs are in order from highest to lowest within-person internal consistency.

Footnotes

[1]Here I report the R_c, which is the internal consistency reliability of change within persons throughout the study (Cranford et al., 2006). However, it is important to note that the items we used in Chapter 4 to assess negative support can be considered formative rather than reflective indicators (Bollen & Lennox, 1991). That is, reflective indicators are indicators that are "caused by" an underlying latent variable and should be highly correlated (Bollen & Lennox, 1991). However, formative indicators are conceptualized as components that "cause" or "determine" the construct and are not necessarily expected to be highly correlated (Bollen & Lennox, 1991). Even though complaining about one's spouse and avoiding one's spouse are two components that are theorized to function together as negative support (Bodenmann, 2005), they may not occur at the same time and may not be expected to be highly correlated. Previous studies have conceptualized supportive behaviors using this measurement model (Collins & Feeney, 2000, p. 13).

[2]An examination of the items making up spouse negative support provision indicated that the items were not correlated at the within-person level (r = -.01, *ns*). Because complaining about one's spouse and avoiding one's spouse are two components that are theorized to function together as negative support (Bodenmann, 2005), I created a variable summing across those items despite low within-person internal consistency of the items. However, I ran an additional model to supplement my main analyses that included both items as separate within-person predictors of changes in RA pain. Neither item was significantly associated with changes in pain from morning to evening (ps > .100). Additionally, having these items in the model as separate predictors rather than as one composite predictor did not change the associations I observed for the other support variables.

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Appendices

Appendix I. Explained Variance

General description. An important challenge in using multilevel models is determining the amount of variance explained in the outcome by the predictor variables in the model. There are several existing measures that have been used to estimate explained variance in multilevel models, including a measure that assesses explained variance at Level 1 (Bryk & Raudenbush, 1992), a measure that assesses explained slope variance (Bryk & Raudenbush, 1992), a measure that assesses explained variance at Level 2 (Bryk & Raudenbush, 1992), and several measures that assess combined variance accounted for at Levels 1 and 2 (Snidjers & Bosker, 1994; Hofmann, Morgeson, & Gerras, 2003; Nakagawa & Schielzeth, 2013). Recently, LaHuis, Hartman, Hakoyama, & Clark (2014) examined the bias and precision of these explained variance measures (except explained slope variance) using a series of Monte Carlo simulations. They found that all types of explained variance had low bias across a variety of model types (e.g., a variety of Level 1 and 2 sample sizes, population sizes of R^2, and outcome ICCs). Additionally, all types of explained variance showed high precision (in terms of low standard deviations) across the model types except for the measure of Level 2 explained variance (Bryk & Raudenbush, 1992). Importantly, however, they found relatively more accurate estimates of Level 2 explained variance as sample size increased.

I used three different assessments of explained variance in the studies presented in this dissertation. All three were first proposed by Raudenbush & Bryk (1992, pp. 74-85) and allow for separate assessment of explained Level 1 variance, Level 2 variance, and slope variance. The equation for Level 1 explained variance is below (Raudenbush & Bryk, 1992, p.79):

$$R^2_{Level1}(approx.) = \frac{\sigma^2_{null} - \sigma^2_{fitted}}{\sigma^2_{null}}$$

Where σ^2_{null} is the Level 1 residual variance for the outcome as estimated by the null or empty model and σ^2_{fitted} is the Level 1 residual variance for the outcome as estimated by the model of interest, which includes predictor variables. In their simulation study, LaHuis and colleagues (2014) found more accurate estimates of Level 1 explained variance for random intercept, fixed slope models compared to estimate of Level 1 explained variance for random intercept, random slope models. Estimates of Level 1 explained variance for random intercept and slope models tended to lead to upwardly biased estimates in their analyses. Because fixing the slopes does not substantially change estimates of effect sizes (Snidjers & Bosker, 1994), Level 1 explained variance was calculated from the Level 1 residuals obtained from each null or empty model and the Level 1 residuals obtained from each random intercept model with fixed slopes for Level 1 predictors. I use R^2_{Level1}*(approx.)* to provide an estimate of explained within-person variance in all three studies presented in this dissertation.

The equation for Level 2 explained variance is below (Raudenbush & Bryk, 1992, p. 74):

$$R^2_{Level2}(approx.) = \frac{\tau^2_{00/null} - \tau^2_{00/fitted}}{\tau^2_{00/null}}$$

Where $\tau^2_{00/null}$ is the Level 2 intercept variance for the outcome as estimated by the null or empty model and $\tau^2_{00/fitted}$ is the Level 2 intercept variance for the outcome as estimated by the model of interest, which includes predictor variables. I used R^2_{Level2}*(approx.)* to provide an estimate of explained between-person variance in Study 2, which is presented in Chapter 3. One important limitation of R^2_{Level2}*(approx.)* is that negative values can be obtained. This is because τ^2_{00} is a function of the within- and between-group variances (Snijders & Bosker, 1994). If a Level 1

predictor is added and σ^2 decreases but between-group variability is not changed, then τ^2_{00} will increases and consequently, R^2_{Level2}*(approx.)* will be negative.

The equation for slope explained variance is below (Raudenbush & Bryk, 1992, p. 85):

$$R^2_{Slope}(approx.) = \frac{\tau^2_{qq/fitted1} - \tau^2_{qq/fitted2}}{\tau^2_{qq/fitted1}}$$

Where $\tau^2_{qq/fitted1}$ is the Level 2 slope variance for the association between a Level 1 predictor and the outcome as estimated by a random intercepts and slopes model without any predictors of the slope variance in the model. and $\tau^2_{qq/fitted2}$ is the Level 2 slope variance for the association between a Level 1 predictor and the outcome as estimated by a random intercepts and slopes model that includes the main effects of a Level 2 predictor and the cross-level interaction between the focal Level 1 predictor and the Level 2 predictor. I used R^2_{Slope}*(approx.)* to provide an estimate of explained between-person variance in the slopes for communal and agentic threat in Study 2, which is presented in Chapter 3.

Another index that can be useful to calculate is ΔR^2*(approx.)* for Level 1, Level 2, and slope variance. Calculating ΔR^2*(approx.)* is useful in two main situations. The first is when one wants to examine the amount of Level 2 variance accounted for by Level 2 predictors when Level 1 predictors are also included in the model. This is because the Level 1 predictors may be leading to increases in τ^2_{00}, which may lead to underestimation of the amount of explained variance accounted for by the Level 2 predictors. Another time ΔR^2*(approx.)* provides useful information is when one would like to examine the amount of variance explained by sequential sets of predictors. ΔR^2*(approx.)* can be calculated for change in explained variance at Level 1, Level 2, or in slopes. The equations are below:

$$\Delta R^2_{Level1}(approx.) = \frac{\sigma^2_{null} - \sigma^2_{fitted2}}{\sigma^2_{null}} - \frac{\sigma^2_{null} - \sigma^2_{fitted1}}{\sigma^2_{null}}$$

$$\Delta R^2_{Level2}(approx.) = \frac{\tau^2_{00/null} - \tau^2_{00/fitted2}}{\tau^2_{00/null}} - \frac{\tau^2_{00/null} - \tau^2_{00/fitted1}}{\tau^2_{00/null}}$$

$$\Delta R^2_{Slopes}(approx.) = \frac{\tau^2_{qq/fitted1} - \tau^2_{qq/fitted2}}{\tau^2_{qq/fitted1}} - \frac{\tau^2_{qq/fitted1} - \tau^2_{qq/fitted3}}{\tau^2_{qq/fitted1}}$$

Study 1. Study 1 presented in Chapter 2 tested several models that examined whether threats to agency and communion mediate associations between stressor type and coping. These models were estimated as lower level multilevel mediation models using procedures outlined by Bauer, Preacher, and Gil (2006). This approach involves using a two-intercept model in which one intercept corresponds to the mediator variable and the other intercept corresponds to the outcome. This method also included modelling heterogeneous σ^2 values for the mediator and the outcome, which is specified with the following equation:

$$Var(r) = \sigma^2 \; and \log(\sigma^2) = a_0 + a_1(M)$$

The specification of the above equation in the model allows for heterogeneous level 1 residual variance for the outcome and the mediator, with level 1 residual variance of the outcome being obtained by calculating e^{a_0} and the level 1 residual variance of the mediator being obtained by calculating $e^{a_0+a_1}$. Estimates for a_0 and a_1, along with calculations of level 1 residual variances, σ^2, and explained variances, $R^2_{Level1}(approx.)$, are shown in Table I-1. Consistent with

recommendations (LaHuis et al., 2014), I estimated the mediation models as random intercept fixed slope models to provide a more accurate assessment of R^2_{Level1}*(approx.).*

Study 2. Study 2 presented in Chapter 3 tested several models that examined whether agreeableness (A) and extraversion (E) moderate associations between threat appraisals and support behaviours. In this study, I calculated R^2*(approx.)* and ΔR^2*(approx.)* for Level 1 variance, Level 2 variance, and for slope variance. All explained variance estimates for all models tested in Chapter 3 are included in Table I-2 and I-3 in this Appendix. I only include explained variance estimates that provide conceptually relevant information in the text of Chapter 3. The R^2*(approx.)* and ΔR^2*(approx.)* estimates that are conceptually relevant and included in the main text of Chapter 3 are bolded in Tables I-2 and I-3.

In the first set of models, I estimated null models for support seeking and provision (Models 3-0A and 3-0B in Tables 3-2, 3-3, I-2, and I-3). In the second set of models, I added threat to communion and threat to agency to each of the null models in random intercept, fixed slopes models (Models 3-1A.1 and 3-1B.1 in Tables I-2 and I-3). Using Level 1 residuals obtained in random intercept models allowed me to calculate R^2_{Level1}*(approx.)*'s that are likely to be more accurate compared to using Level 1 residuals obtained in random intercept and slopes models. Using Level 1 residuals obtained in random intercept and slopes models may lead to upwardly biased estimates of the amount of within-person variance accounted for by threat appraisals (LaHuis et al., 2014). In the third set of models, I included random slopes to estimate the slope variances for the associations between agentic threat and each support behaviour outcome, as well as to estimate slope variances for the associations between communal threat and each support behaviour outcome (Models 3-1A and 3-1B in Tables 3-2, 3-3, I-2, and I-3).

In the fourth set of models, I included E as a predictor of the intercept variance in the outcome and as a predictor of the slope variance for the association between agentic threat and the outcome. I also included A as a predictor of the intercept variance in the outcome and as a predictor of the slope variance for the association between communal threat and the outcome (Models 3-2A and 3-2B in Tables 3-2, 3-3, I-2, and I-3). The estimates for slope variances, τ^2_{11} and τ^2_{22}, obtained in the fourth set of models, could be compared to the estimates for slope variances obtained in the third set of models to determine the amount of slope variance accounted for by E and A, R^2_{Slope}*(approx.)*. Additionally, the estimates for the intercept variances, τ^2_{00}, obtained in the fourth set of models, could be compared to the estimates for intercept variances obtained in the null model while taking the estimates for intercept variances obtained in the model that included only Level 1 predictors. As stated above, it is important to take into consideration the τ^2_{00} obtained in a model with the Level 1 predictors and not the Level 2 predictors because τ^2_{00} is inflated when including Level 1 predictors in the model. Therefore, the amount of Level 2 intercept variance accounted for by E and A were estimated with the following equation:

$$\Delta R^2_{Level2}(approx.) = \frac{\tau^2_{00/null} - \tau^2_{00/Model3-2}}{\tau^2_{00/null}} - \frac{\tau^2_{00/null} - \tau^2_{00/Model3-1}}{\tau^2_{00/null}}$$

In the fifth set of models, I added in E as a predictor of the slope variance for the association between communal threat and the outcome. I also added in A as a predictor of the slope variance for the association between agentic threat and the outcome (Models 3-3A and 3-3B in Tables 3-2, 3-3, I-2, and I-3). Of interest was the estimates of ΔR^2_{Slopes}*(approx.)* when comparing to the fourth set of models to see if adding in the unpredicted cross-level interactions

of E and communal threat as well as A and agentic threat lead to any additional explained slope variance.

Study 3. In Study 3, the focus was on within-couple associations between support mobilization and RA pain. Explained Level 1 variance, R^2_{Level1}*(approx.),* was calculated for each model presented in Table 4-2. Change in explained variance, ΔR^2_{Level1}*(approx.),* was also calculated to examine whether adding variables to each model accounted for additional variance beyond the predictors included in the previous model. All calculations for these explained variance estimates are shown in Tables I-4 in this appendix.

Beyond examining whether midday reports of support mobilization to persons with RA were associated with subsequent changes in RA pain, another important goal of Study 3 was to examine whether midday reports of RA pain were associated with subsequent changes in support mobilization. These models are reported in text in Chapter 4. In terms of explained variance, ΔR^2_{Level1}*(approx.)* provided information about the amount of variance accounted for in each type of evening spouse support by midday RA pain beyond the variance accounted for by midday reports of the relevant midday spouse support variable. For example, one of the models included evening spouse solicitous support provision as the outcome, and midday spouse solicitous support provision and midday RA pain as the predictors. I aimed to quantify the amount of variance accounted for by midday RA pain beyond the variance accounted for by midday spouse solicitous support provision. Therefore, I calculated ΔR^2_{Level1}*(approx.)* by subtracting the R^2_{Level1}*(approx.)* for the model that included only midday spouse solicitous support from the R^2_{Level1}*(approx.)* for the model that included both midday spouse solicitous support and midday RA pain. These calculations are presented in Table I-5.

Table I-1. Calculations of R^2_{Level1}*(approx.)* in mediator and outcome variables in Study 1, Chapter 2.

Model Number and Description	Model Type	a_0	a_1	$\sigma^2_{outcome}$	$\sigma^2_{mediator}$	R^2_{Level1}*(approx.)* *Outcome*	R^2_{Level1}*(approx.)* *Mediator*
MODEL 2-1:	Null model	-1.97607	1.18514	0.138612917	0.453422916		
Social stressor, communal threat, support provision	Full model	-2.54431	1.55403	0.078527217	0.371472664	= (0.138612917-.078527217) / 0.138612917 = 0.43348	= (0.453422916-0.371472664) / 0.453422916 0.18074
MODEL 2-2:	Null model	-1.78725	0.99632	0.167419942	0.453422916		
Social stressor, communal threat, support seeking	Full model	-1.89848	0.90817	0.149796136	0.37146152	= (0.167419942-0.149796136) / 0.167419942 = 0.10527	= (0.453422916-0.37146152) / 0.453422916 = 0.18076
MODEL 2-3:	Null model	-1.97607	1.61042	0.138612917	0.69374557		
Achievement stressor, agentic threat, support provision	Full model	-2.42364	1.90842	0.088598531	0.597369159	= (0.138612917-0.088598531) / 0.138612917 = 0.36082	= (0.69374557-0.597369159) / 0.69374557 = 0.13892
MODEL 2-4:	Null model	-1.78725	1.4216	0.167419942	0.69374557		
Achievement stressor, agentic threat, support seeking	Full model	-1.89277	1.37764	0.150653919	0.597422925	= (0.167419942-0.150653919) / 0.167419942 = 0.10014	= (0.69374557-0.597422925) / 0.69374557 = 0.13884

Table I-2. Calculations of $R^{2(}approx.)$ and $\Delta R^{2(}approx.)$ *for Level 1 variance, Level 2 variance, and Slope variance* for support seeking models in Study 2, Chapter 3.

Model Number and Abbreviated Equations	τ^2_{00}	σ^2	τ^2_{11} (AT)	τ^2_{22} (CT)	$R^2_{Level1}(approx.)$	$R^2_{Level2}(approx.)$	$R^2_{ATSlope}(approx.)$	$R^2_{CTSlope}(approx.)$
Model 3-0A Level 1: $Y_{ij} = \beta_{0j} + r_{ij}$, Level 2: $\beta_{0j} = \gamma_{00} + u_{0j}$	0.09118	0.16742						
Model 3-1A.1 Level 1: $Y_{ij} = \beta_{0j} + \beta_{1j}AT_{ij} + \beta_{2j}CT_{ij} + r_{ij}$, Level 2: $\beta_{0j} = \gamma_{00} + u_{0j}, \beta_{1j} = \gamma_{10}, \beta_{2j} = \gamma_{20}$	0.09302	0.15085			= (0.16742-0.15085) / 0.16742 = **0.09897**	= (0.09118-0.09302) / 0.09118 = -0.02018		
Model 3-1A Level 1: $Y_{ij} = \beta_{0j} + \beta_{1j}AT_{ij} + \beta_{2j}CT_{ij} + r_{ij}$, Level 2: $\beta_{0j} = \gamma_{00} + u_{0j}, \beta_{1j} = \gamma_{10} + u_{1j}, \beta_{2j} = \gamma_{20} + u_{2j}$	0.09524	0.13178	0.00782	0.02903	= (0.16742-0.13178) / 0.16742 = 0.21288	= (0.09118-0.09524) / 0.09118 = -0.04453		
Model 3-2A Level 1: $Y_{ij} = \beta_{0j} + \beta_{1j}AT_{ij} + \beta_{2j}CT_{ij} + r_{ij}$, Level 2: $\beta_{0j} = \gamma_{00} + \gamma_{01}E + \gamma_{02}A + u_{0j}, \beta_{1j} = \gamma_{10} + \gamma_{11}E + u_{1j}, \beta_{2j} = \gamma_{20} + \gamma_{21}A + u_{2j}$	0.09221	0.13171	0.00755	0.02787	= (0.16742-0.13171) / 0.16742 = 0.21330	= (0.09118-0.09221) / 0.09118 = -0.01130	= (0.00782-0.00755) / 0.00782 = **0.03453**	= (0.02903-0.02787) / 0.02903 = **0.03996**
Model 3-3A Level 1: $Y_{ij} = \beta_{0j} + \beta_{1j}AT_{ij} + \beta_{2j}CT_{ij} + r_{ij}$, Level 2: $\beta_{0j} = \gamma_{00} + \gamma_{01}E + \gamma_{02}A + u_{0j}, \beta_{1j} = \gamma_{10} + \gamma_{11}E + \gamma_{12}A + u_{1j}, \beta_{2j} = \gamma_{20} + \gamma_{21}E + \gamma_{22}A + u_{2j}$	0.09223	0.13171	0.00757	0.02800	= (0.16742-0.13171) / 0.16742 = 0.21330	= (0.09118-0.09223) / 0.09118 = -0.01152	= (0.00782-0.00757) / 0.00782 = 0.03197	= (0.02903-0.02800) / 0.02903 = 0.03548
$\Delta R^{2(}approx.)$:	**Model 3-1A.1 → Model 3-1A**				= 0.21288-0.09897 = 0.11391	= -0.04453+0.02018 = -0.02435		
	Model 3-1A → Model 3-2A				= 0.21330-0.21288 = 0.00042	= -0.01130+0.04453 = **0.03323**		
	Model 3-2A → Model 3-3A				= 0.21330-0.21330 = 0	= -0.01152+0.01130 = **-0.00022**	= 0.03197-0.03453 = **-0.00256**	= 0.03548-0.03996 = **-0.00448**

Note. Models 3-0A, 3-1A, 3-2A, and 3-3A correspond to models presented in Table 3-2. $R^{2(}approx.)$ and $\Delta R^{2(}approx.)$ measures that provided conceptually relevant information are bolded and were described in the main text of Chapter 3. AT=Agentic threat, CT = Communal threat, E = Extraversion, A = Agreeableness.

Table I-3. Calculations of $R^{2(approx.)}$ and $\Delta R^{2(approx.)}$ *for Level 1 variance, Level 2 variance, and Slope variance* for support provision models in Study 2, Chapter 3.

Model Number and Abbreviated Equations	τ^2_{00}	σ^2	τ^2_{11} (AT)	τ^2_{22} (CT)	R^2_{Level1}*(approx.)*	R^2_{Level2}*(approx.)*	$R^2_{ATSlope}$*(approx.)*	$R^2_{CTSlope}$*(approx.)*
Model 3-0B Level 1: $Y_{ij} = \beta_{0j} + r_{ij}$ Level 2: $\beta_{0j} = \gamma_{00} + u_{0j}$	0.05001	0.13861						
Model 3-1B.1 Level 1: $Y_{ij} = \beta_{0j} + \beta_{1j}AT_{ij} + \beta_{2j}CT_{ij} + r_{ij}$ Level 2: $\beta_{0j} = \gamma_{00} + u_{0j}, \beta_{1j} = \gamma_{10}, \beta_{2j} = \gamma_{20}$	0.05520	0.08960			= (0.13861-0.08960) / 0.13861 = **0.35358**	= (0.05001-0.05520) / 0.05001 = -0.10378		
Model 3-1B Level 1: $Y_{ij} = \beta_{0j} + \beta_{1j}AT_{ij} + \beta_{2j}CT_{ij} + r_{ij}$ Level 2: $\beta_{0j} = \gamma_{00} + u_{0j}, \beta_{1j} = \gamma_{10} + u_{1j}, \beta_{2j} = \gamma_{20} + u_{2j}$	0.05686	0.07465	0.00459	0.02986	= (0.13861-0.07465) / 0.13861 = 0.46144	= (0.05001-0.05686) / 0.05001 = -0.13697		
Model 3-2B Level 1: $Y_{ij} = \beta_{0j} + \beta_{1j}AT_{ij} + \beta_{2j}CT_{ij} + r_{ij}$ Level 2: $\beta_{0j} = \gamma_{00} + \gamma_{01}E + \gamma_{02}A + u_{0j}, \beta_{1j} = \gamma_{10} + \gamma_{11}E + u_{1j}, \beta_{2j} = \gamma_{20} + \gamma_{21}A + u_{2j}$	0.05626	0.07469	0.00433	0.02722	= (0.13861-0.07469) / 0.13861 = 0.46115	= (0.05001-0.05626) / 0.05001 = -0.12498	= (0.00459-0.00433) / 0.00459 = **0.05664**	= (0.02986-0.02722) / 0.02986 = **0.08841**
Model 3-3B Level 1: $Y_{ij} = \beta_{0j} + \beta_{1j}AT_{ij} + \beta_{2j}CT_{ij} + r_{ij}$ Level 2: $\beta_{0j} = \gamma_{00} + \gamma_{01}E + \gamma_{02}A + u_{0j}, \beta_{1j} = \gamma_{10} + \gamma_{11}E + \gamma_{12}A + u_{1j}, \beta_{2j} = \gamma_{20} + \gamma_{21}E + \gamma_{22}A + u_{2j}$	0.05628	0.07468	0.00445	0.02685	= (0.13861-0.07468) / 0.13861 = 0.46122	= (0.05001-0.05628) / 0.05001 = -0.12537	= (0.00459-0.00445) / 0.00459 = 0.03050	= (0.02986-0.02685) / 0.02986 = 0.10080
$\Delta R^{2(approx.)}$**:**	**Model 3-1B.1 → Model 3-1B**				= 0.46144-0.35358 = 0.10786	= -0.13697+0.10378 = -0.03319		
	Model 3-1B → Model 3-2B				= 0.46115-0.46144 = -0.00029	= -0.12498+0.13697 = **0.01199**		
	Model 3-2B → Model 3-3B				= 0.46122-0.46115 = 0.00007	= -0.12537+0.12498 = **-0.00039**	= 0.03050-0.05664 = **-0.02614**	= 0.10080-0.08841 = **0.01239**

Note. Models 3-0B, 3-1B, 3-2B, and 3-3B correspond to models presented in Table 3-3. $R^{2(approx.)}$ and $\Delta R^{2(approx.)}$ measures that provided conceptually relevant information are bolded and were described in the main text of Chapter 3. AT=Agentic threat, CT = Communal threat, E = Extraversion, A = Agreeableness.

Table I-4. Calculations of R^2_{Level1}*(approx.)* for evening RA pain in Study 3, Chapter 4.

Model Number and Abbreviated Equations	Model Type	σ^2	R^2_{Level1}*(approx.)*	ΔR^2_{Level1}*(approx.)*
Model 4-0 Level 1: $Y_{ij} = \beta_{0j} + r_{ij}$, Level 2: $\beta_{0j} = \gamma_{00} + u_{0j}$	Null Model	1.475		
Model 4-1 Level 1: $Y_{ij} = \beta_{0j} + \beta_{1j}MP_{ij} + r_{ij}$, Level 2: $\beta_{0j} = \gamma_{00} + u_{0j}$, $\beta_{1j} = \gamma_{10}$	Fitted Model	1.087	= (1.475-1.087) / 1.475 = 0.26305	
Model 4-2 Level 1: $Y_{ij} = \beta_{0j} + \beta_{1j}MP_{ij} + \beta_{2j}ER_{ij} + \beta_{3j}SR_{ij} + \beta_{4j}NR_{ij} + \beta_{5j}EP_{ij} + \beta_{6j}SP_{ij} + \beta_{7j}NP_{ij} + r_{ij}$, Level 2: $\beta_{0j} = \gamma_{00} + u_{0j}$, $\beta_{1j} = \gamma_{10}$, $\beta_{2j} = \gamma_{20}$, $\beta_{3j} = \gamma_{30}$, $\beta_{4j} = \gamma_{40}$, $\beta_{5j} = \gamma_{50}$, $\beta_{6j} = \gamma_{60}$, $\beta_{7j} = \gamma_{70}$	Fitted Model	1.004	= (1.475-1.004) / 1.475 = 0.31932	= 0.31932-0.26305 = 0.05627
Model 4-3 Level 1: $Y_{ij} = \beta_{0j} + \beta_{1j}MP_{ij} + \beta_{2j}ER_{ij} + \beta_{3j}SR_{ij} + \beta_{4j}NR_{ij} + \beta_{5j}EP_{ij} + \beta_{6j}SP_{ij} + \beta_{7j}NP_{ij} + \beta_{8j}T + \beta_{9j}NM + \beta_{10j}PM + r_{ij}$, Level 2: $\beta_{0j} = \gamma_{00} + u_{0j}$, $\beta_{1j} = \gamma_{10}$, $\beta_{2j} = \gamma_{20}$, $\beta_{3j} = \gamma_{30}$, $\beta_{4j} = \gamma_{40}$, $\beta_{5j} = \gamma_{50}$, $\beta_{6j} = \gamma_{60}$, $\beta_{7j} = \gamma_{70}$, $\beta_{8j} = \gamma_{80}$, $\beta_{9j} = \gamma_{90}$, $\beta_{10j} = \gamma_{100}$	Fitted Model	1.018	= (1.475-1.018) / 1.475 = 0.30983	= 0.30983-0.31932 = -0.00949

Note. Models 4-0, 4-1, 4-2, and 4-3 correspond to models presented in Table 4-2. MP = Midday pain, ER = Midday esteem support receipt, SR = Midday solicitous support receipt, NR = Midday negative support receipt, EP = Midday esteem support provision, SP = Midday solicitous support provision, NP = Midday negative support provision, T = Midday time spent with partner, NM = Midday negative mood, PM = Midday positive mood.

Table I-5. Calculations of R^2_{Level1}*(approx.)* for each type of support as reported in the evening in Study 3, Chapter 4.

Support Outcome	Model Type	Abbreviated Equations	σ^2	R^2_{Level1}*(approx.)*	ΔR^2_{Level1}*(approx.)*
Evening received esteem support	Null	Level 1: $Y_{ij} = \beta_{0j} + r_{ij}$, Level 2: $\beta_{0j} = \gamma_{00} + u_{0j}$	0.2537		
	Fitted 1	Level 1: $Y_{ij} = \beta_{0j} + \beta_{1j}ER_{ij} + r_{ij}$, Level 2: $\beta_{0j} = \gamma_{00} + u_{0j}$, $\beta_{1j} = \gamma_{10}$	0.2368	= (0.2537-0.2368) / 0.2537 = 0.0666	
	Fitted 2	Level 1: $Y_{ij} = \beta_{0j} + \beta_{1j}ER_{ij} + \beta_{2j}MP_{ij} + r_{ij}$, Level 2: $\beta_{0j} = \gamma_{00} + u_{0j}$, $\beta_{1j} = \gamma_{10}$, $\beta_{2j} = \gamma_{20}$	0.2375	= (0.2537-0.2375) / 0.2537 = 0.06385	= 0.06385-0.0666 = **-0.00275**
Evening received solicitous support	Null	Level 1: $Y_{ij} = \beta_{0j} + r_{ij}$, Level 2: $\beta_{0j} = \gamma_{00} + u_{0j}$	0.4929		
	Fitted 1	Level 1: $Y_{ij} = \beta_{0j} + \beta_{1j}SR_{ij} + r_{ij}$, Level 2: $\beta_{0j} = \gamma_{00} + u_{0j}$, $\beta_{1j} = \gamma_{10}$	0.4662	= (0.4929-0.4662) / 0.4929 = 0.05416	
	Fitted 2	Level 1: $Y_{ij} = \beta_{0j} + \beta_{1j}SR_{ij} + \beta_{2j}MP_{ij} + r_{ij}$, Level 2: $\beta_{0j} = \gamma_{00} + u_{0j}$, $\beta_{1j} = \gamma_{10}$, $\beta_{2j} = \gamma_{20}$	0.4445	= (0.4929-0.4445) / 0.4929 = 0.09819	= 0.09819-0.05416 = **0.04403**
Evening received negative support	Null	Level 1: $Y_{ij} = \beta_{0j} + r_{ij}$, Level 2: $\beta_{0j} = \gamma_{00} + u_{0j}$	0.040914		
	Fitted 1	Level 1: $Y_{ij} = \beta_{0j} + \beta_{1j}NR_{ij} + r_{ij}$, Level 2: $\beta_{0j} = \gamma_{00} + u_{0j}$, $\beta_{1j} = \gamma_{10}$	0.030038	= (0.040914-0.030038) / 0.040914 = 0.26583	
	Fitted 2	Level 1: $Y_{ij} = \beta_{0j} + \beta_{1j}NR_{ij} + \beta_{2j}MP_{ij} + r_{ij}$, Level 2: $\beta_{0j} = \gamma_{00} + u_{0j}$, $\beta_{1j} = \gamma_{10}$, $\beta_{2j} = \gamma_{20}$	0.029602	= (0.040914-0.029602) / 0.040914 = 0.27648	= 0.27648-0.26583 = **0.01065**
Evening provided esteem support	Null	Level 1: $Y_{ij} = \beta_{0j} + r_{ij}$, Level 2: $\beta_{0j} = \gamma_{00} + u_{0j}$	0.1739		
	Fitted 1	Level 1: $Y_{ij} = \beta_{0j} + \beta_{1j}EP_{ij} + r_{ij}$, Level 2: $\beta_{0j} = \gamma_{00} + u_{0j}$, $\beta_{1j} = \gamma_{10}$	0.1673	= (0.1739-0.1673) / 0.1739 = 0.03795	
	Fitted 2	Level 1: $Y_{ij} = \beta_{0j} + \beta_{1j}EP_{ij} + \beta_{2j}MP_{ij} + r_{ij}$, Level 2: $\beta_{0j} = \gamma_{00} + u_{0j}$, $\beta_{1j} = \gamma_{10}$, $\beta_{2j} = \gamma_{20}$	0.1668	= (0.1739-0.1668) / 0.1739 = 0.04082	= 0.04082-0.03795 = **0.00287**
Evening provided solicitous support	Null	Level 1: $Y_{ij} = \beta_{0j} + r_{ij}$, Level 2: $\beta_{0j} = \gamma_{00} + u_{0j}$	0.2873		
	Fitted 1	Level 1: $Y_{ij} = \beta_{0j} + \beta_{1j}SP_{ij} + r_{ij}$, Level 2: $\beta_{0j} = \gamma_{00} + u_{0j}$, $\beta_{1j} = \gamma_{10}$	0.2819	= (0.2873-0.2819) / 0.2873 = 0.01880	
	Fitted 2	Level 1: $Y_{ij} = \beta_{0j} + \beta_{1j}SP_{ij} + \beta_{2j}MP_{ij} + r_{ij}$, Level 2: $\beta_{0j} = \gamma_{00} + u_{0j}$, $\beta_{1j} = \gamma_{10}$, $\beta_{2j} = \gamma_{20}$	0.2715	= (0.2873-0.2715) / 0.2873 = 0.05499	= 0.05499-0.01880 = **0.03619**
Evening provided negative support	Null	Level 1: $Y_{ij} = \beta_{0j} + r_{ij}$, Level 2: $\beta_{0j} = \gamma_{00} + u_{0j}$	0.013820		
	Fitted 1	Level 1: $Y_{ij} = \beta_{0j} + \beta_{1j}NP_{ij} + r_{ij}$, Level 2: $\beta_{0j} = \gamma_{00} + u_{0j}$, $\beta_{1j} = \gamma_{10}$	0.013243	= (0.013820-0.013243) / 0.013820 = 0.04175	
	Fitted 2	Level 1: $Y_{ij} = \beta_{0j} + \beta_{1j}NP_{ij} + \beta_{2j}MP_{ij} + r_{ij}$, Level 2: $\beta_{0j} = \gamma_{00} + u_{0j}$, $\beta_{1j} = \gamma_{10}$, $\beta_{2j} = \gamma_{20}$	0.013325	= (0.013820-0.013325) / 0.013820 = 0.03582	= 0.03582-0.04175 = **-0.00593**

Note. MP = Midday pain, ER = Midday esteem support receipt, SR = Midday solicitous support receipt, NR = Midday negative support receipt, EP = Midday esteem support provision, SP = Midday solicitous support provision, NP = Midday negative support provision. ΔR^2_{Level1}*(approx.)* values are bolded and are included in the main text of Chapter 4.

Appendix II. Predicted Reliability

Spearman-Brown formula for predicted reliability (Brown, 1910; Spearman, 1910):

$$\rho^{*}_{xx'} = \frac{n\rho_{xx'}}{1+(n-1)\rho_{xx'}}$$

Appendix III. Power Calculations for Study 3, Chapter 4

R code generated using MLPowSim Software for power analysis for Model 4-2 in Table 4-3:

```
###   A programme to obtain the power of parameters in 2 level
#       unbalanced model with Normal response
#                   generated on 05/03/19
###~~~~~~~~~~~~~~~~~~~~     Required packages ~~~~~~~~~~~~~~~~~~~~~~~~~###
   library(MASS)
   library(lme4)
###~~~~~~~~~~~~~~~~~~~~~     Initial inputs    ~~~~~~~~~~~~~~~~~~~~~~~###

set.seed(1)
siglevel<-0.025
z1score<-abs(qnorm(siglevel))
simus<-500
n1low<-7
n1high<-21
n1step<-7
unbalprob<-0.10
n2low<-25
n2high<-125
n2step<-25
npred<-7
randsize<-1
beta<-c(3.890,0.500,-0.260,0.060,0.630,-0.480,0.350,0.740000)
betasize<-length(beta)
effectbeta<-abs(beta)
sgnbeta<-sign(beta)
xtype<-c(3.000000,3.000000,3.000000,3.000000,3.000000,3.000000,3.000000)
meanpred<-c(0,0.000,0.000,0.000,0.000,0.000,0.000,0.000)
varpred<-matrix(c(1.257,-0.001,0.045,-0.015,0.046,0.068,0.027,-0.001,0.250,0.086,-0.015,-
0.003,0.005,0.005,0.045,0.086,0.329,0.016,0.016,0.024,0.001,-0.015,-0.015,0.016,0.056,0.007,0.004,0.001,0.046,-
0.003,0.016,0.007,0.241,0.095,0.005,0.068,0.005,0.024,0.004,0.095,0.296,-0.003,0.027,0.005,0.001,0.001,0.005,-0.003,0.038),npred,npred)
varpred2<-
matrix(c(0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.0000
00,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.0
00000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000
,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000),npred,npred)
sigma2u<-matrix(c(3.637),randsize,randsize)
sigmae<-sqrt(1.004)
n1range<-seq(n1low,n1high,n1step)
n2range<-seq(n2low,n2high,n2step)
n1size<-length(n1range)
n2size<-length(n2range)
totalsize<-n1size*n2size
finaloutput<-matrix(0,totalsize,6*betasize)
rowcount<-1
##--------------------       Inputs for model fitting       ----------------##

fixname<-c("x0","x1","x2","x3","x4","x5","x6","x7")
 fixform<-"1+x1+x2+x3+x4+x5+x6+x7"
randform<-"(1|l2id)"
expression<-paste(c(fixform,randform),collapse="+")
modelformula<-formula(paste("y ~",expression))
data<-vector("list",2+length(fixname))
names(data)<-c("l2id","y",fixname)

#####--------- Initial input for power in two approaches ----------------#####

   powaprox<-vector("list",betasize)
    names(powaprox)<-c("b0","b1","b2","b3","b4","b5","b6","b7")
     powsde<-powaprox
```

```
cat("       The programme was executed at", date(),"\n")
cat("------------------------------------------------------------------------\n")

###----------------------  Sample size combination  ----------------------###


          for(n2 in seq(n2low,n2high,n2step)){
               n2run<-n2
               for(n1 in seq(n1low,n1high,n1step)){

cat(" Start  of simulation for ",n2run," macro and unbalanced micro with base ",n1," units \n")
sdepower<-matrix(0,betasize,simus)
  powaprox[1:betasize]<-rep(0,betasize)
   powsde<-powaprox


 ###----------------------   Simulation step  ----------------------###

  for(iter in 1:simus){
        if (iter/10==floor(iter/10)){
                                                                                                                cat("
Iteration remain=",simus-iter,"\n")
                                    }
                n1unbal<-rbinom(n2run,n1,1-unbalprob)
               n1unbal<-n1unbal[n1unbal>0]
              n2<-length(n1unbal)
             cumn1<-c(0,cumsum(n1unbal))
            length=sum(n1unbal)
           y<-rep(0,length)
          x<-matrix(1,length,betasize)
         z<-matrix(1,length,randsize)
       l2id<-rep(c(1:n2),n1unbal)
## +++++++++++++++++++       Set up X matrix       +++++++++++++++++++  ##

   micpred<-mvrnorm(length,meanpred[-1],varpred)
  macpred<-mvrnorm(n2,rep(0,npred),varpred2)
 x[,(2:dim(x)[2])]<-micpred+macpred[l2id,]
##---------------------------------------------------------------------##
               e<-rnorm(length,0,sigmae)
               u<-mvrnorm(n2,rep(0,randsize),sigma2u)
                fixpart<-x%*%beta
                 randpart<-rowSums(z*u[l2id,])
                 y<-fixpart+randpart+e
##--------------------        Inputs for model fitting       ----------------##

              data$l2id<-as.factor(l2id)
              data$y<-y
              data$x0<-x[,1]
              data$x1<-x[,2]
              data$x2<-x[,3]
              data$x3<-x[,4]
              data$x4<-x[,5]
              data$x5<-x[,6]
              data$x6<-x[,7]
              data$x7<-x[,8]
###~~~~~~~~~~~       Fitting the model using lmer funtion    ~~~~~~~~~~~###

(fitmodel <- lmer(modelformula,data,method="REML"))

######~~~~~~~~~~~   To obtain the power of parameter(s) ~~~~~~~~~~~######

estbeta<-fixef(fitmodel)
 sdebeta<-sqrt(diag(vcov(fitmodel)))
  for(l in 1:betasize)
  {
   cibeta<-estbeta[l]-sgnbeta[l]*z1score*sdebeta[l]
    if(beta[l]*cibeta>0)             powaprox[[l]]<-powaprox[[l]]+1
      sdepower[l,iter]<-as.numeric(sdebeta[l])
```

```
  }

##-------------------------------------------------------------------------##
 } ##  iteration end here

 ###---------                Powers and their CIs            ---------###

                    for(l in 1:betasize){

meanaprox<-powaprox[[l]]<-unlist(powaprox[[l]]/simus)
Laprox<-meanaprox-z1score*sqrt(meanaprox*(1-meanaprox)/simus)
Uaprox<-meanaprox+z1score*sqrt(meanaprox*(1-meanaprox)/simus)
meansde<-mean(sdepower[l,])
varsde<-var(sdepower[l,])
USDE<-meansde-z1score*sqrt(varsde/simus)
LSDE<-meansde+z1score*sqrt(varsde/simus)
powLSDE<- pnorm(effectbeta[l]/LSDE-z1score)
powUSDE<- pnorm(effectbeta[l]/USDE-z1score)
powsde[[l]]<-pnorm(effectbeta[l]/meansde-z1score)


                          ###                    Restrict the CIs within 0 and 1                ###
                                                 if(Laprox<0) Laprox<-0
                                                 if(Uaprox>1) Uaprox<-1
                                                 if(powLSDE<0) powLSDE<-0
                                                 if(powUSDE >1) powUSDE<-1

finaloutput[rowcount,(6*l-5):(6*l-3)]<-c(Laprox,meanaprox,Uaprox)
finaloutput[rowcount,(6*l-2):(6*l)]<-c(powLSDE,powsde[[l]],powUSDE)

                              }

###~~~~~~~~~~      Set out the results in a data frame    ~~~~~~~~~~###

result<-matrix(c(powaprox,powsde),byrow=T,nrow=2)
 result<-as.data.frame(result)
              row.names(result)<-c("Approx Approach","SDE Approach")
               names(result)<-names(powaprox)

cat("                power of parameter(s) for the sample size  of ",n1,"first and",n2,"second levels \n")
                          print(result)
                           rowcount<-rowcount+1
cat("-----------------------------------------------------------------------\n")
                        } ## end of the loop  over the first level
                      } ## end of the loop  over the second level

 ###---------        Export output in a file                  ---------###

finaloutput<-as.data.frame(round(finaloutput,3))
output<-data.frame(cbind(rep(n2range,each=n1size),rep(n1range,n2size),finaloutput))
names(output)<-
c("N","n","zLb0","zpb0","zUb0","sLb0","spb0","sUb0","zLb1","zpb1","zUb1","sLb1","spb1","sUb1","zLb2","zpb2","zUb2","sLb2","spb2","sU
b2","zLb3","zpb3","zUb3","sLb3","spb3","sUb3","zLb4","zpb4","zUb4","sLb4","spb4","sUb4","zLb5","zpb5","zUb5","sLb5","spb5","sUb5","z
Lb6","zpb6","zUb6","sLb6","spb6","sUb6","zLb7","zpb7","zUb7","sLb7","spb7","sUb7")
write.table(output,"powerout.txt",sep="\t ",quote=F,eol="\n",dec=".",col.names=T,row.names=F,qmethod="double")

output
```