The Protective Role of Supportive Sibling Relationships against the Risks Stress from Poor Relationships with Parents and Peers Poses to Mental Health in Emerging Adulthood

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General Abstract

Even in advanced economies where family sizes has declined over the last 50 years, most children and youth today have at least one sibling. Despite this ubiquity and the known mental health benefits from a supportive sibling relationship, research on emerging adulthood has rarely examined if siblings may contribute in reducing psychological distress. Hence, the overarching question of my thesis was to examine mechanisms (protective, compensatory, and promotive) through which sibling support may mitigate the risky effects of parent and peer alienation on stress and psychological distress in emerging adulthood. The literature in childhood and adolescence appears to suggest that siblings are protective and foster mental health. However, the beneficial effects of siblings have rarely been theorized at the beginning of adulthood, notably in college students who are known to develop more independence from their family. Nevertheless, I was able to ground my thesis in two well-established theoretical frameworks. First, the stress-buffering hypothesis, which postulates that perceived social support should counteract the adverse effects of stress on mental health. Second, concepts of developmental psychopathology, which operationalize the notions of risk, protective, promotive and compensatory factors. Four empirical studies, presented across three articles, were conducted to address the overarching question of this thesis.

In Article 1, which presents the first study, we examined the protective role of a supportive sibling climate (i.e. supportive experiences across all siblings) in the hypothesized moderated-mediation model across three independent samples of emerging adults (N=310, N=259, and N=416) using latent moderated structural equation modeling (LMSEM). The hypothesized moderated-mediation model examined the protective (moderating) role of sibling support in a mediation model of the effect that parent and peer alienation has on psychological

distress through stress. Inconsistent with our hypothesized model, sibling climate did not moderate the paths linking parent and peer alienation to stress and psychological distress. Nonetheless, in support of the risk mediation model, general stress partially mediated the link between parent (and not peer) alienation and psychological distress. This first study underscored that while not protective, a supportive sibling climate may be a promotive of mental health, and that parents may have an enduring influence during emerging adulthood given that experiences of alienation in these relationships was indicative of more stress and psychological distress.

In Article 2, which reports the second and third studies, we used the same moderated-mediation model to examine whether a supportive sibling relationships with one's closest sibling could have protective effects among emerging adults (N=789 and N=325). Additionally, the mediating role of two stress-related mechanisms we also tested: (a) stress in general (Study 2) and interpersonal stress specific to parents and peers (Study 2 and 3). Contrary to our hypothesized protective effects, these studies found mixed effects in the form of both accentuating and attenuating influences of sibling support in the links among alienation, stress, and psychological distress. In Study 2, a worsening effect of siblings suggested peer alienation was related to more stress but only when emerging adults receive more support from a sibling. At the same time, stress from peer alienation was related to less psychological distress in the context of more sibling support. In study 3, a buffering effect of siblings indicated parent alienation was related to less psychological distress in the context of higher levels of support from siblings. Partly consistent with the proposed mediation model, both studies found parent and peer alienation were associated with more psychological distress and this path is mediated by stress in general and not interpersonal stress (only Study 2). Overall, these studies imply sibling

support only partially and rarely buffers the link between experiences of alienation and psychological distress as these protective effects failed to replicate across the studies.

Given the limited evidence for the protective role of siblings in the moderated-mediation model, in the last article, which reports the fourth study, we focused on the compensatory role of siblings on the development of stress and psychological distress over a semester, specifically in the context of parent and peer alienation among emerging adults (N =234). The 3-month longitudinal findings suggest psychological distress and stress decrease over the course of three academic months. Furthermore, parent and peer alienation nor sibling support were not predictive of stress or psychological distress over time.

Taken together, we found supportive sibling relationships, whether across multiple siblings or with one sibling, may not have a protective or compensatory effect against stress and psychological distress when accounting for experiences of alienation from parents and peers in emerging adulthood. Thus, the benefits of siblings in emerging adulthood might at best be promotive in the context of alienation. Furthermore, parent and peer alienation were not identified as risk factors in the longitudinal study, while they were consistently associated with stress and psychological distress in the cross-sectional studies. Finally, unexpectedly, stress and psychological distress were found to decrease over a semester suggesting emerging adults might be more resilient to manage the challenges of a semester than often claimed.

In conclusion, to answer the overarching question of this thesis, these findings suggest emerging adults might not be able to rely on their sibling relationships to protect them from psychological distress when faced with stressful experiences of parent and peer alienation. Rather, their supportive siblings might only mitigate psychological distress in the absence of any of these harmful experiences.

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Statement of Co-Authorship

The three articles of this thesis were prepared in collaboration with my thesis advisor, Dr. Dave Miranda, who is listed as a second author on all three articles. The first article, entitled "Can Supportive Siblings Protect against the Risk that Stress from Feelings of Alienation with Parents and Peers Poses to Mental Health in Emerging Adulthood?" was submitted to the *Journal of Family Issues* for publication and it is under review. The second article, entitled, "Can Siblings Protect Against Parent and Peer Alienation, Stress, and Psychological Distress?" was submitted for publication in the *Journal of Personal Relationships*, and is currently under review. The third article, entitled "Can Sibling Support Compensate for Parent and Peer Alienation? A Latent Growth Curve Analysis of Stress and Distress over Three Months among Emerging Adults" has not been submitted to a journal yet.

As first author in all three of these articles, I was primarily responsible for developing the literature review, conceptualizing study design, measures, and research questions, preparing and managing the research ethics approval process, organizing and managing all aspects of data collection, preparation, and analysis, and preparing of each manuscript. As the second author, my supervisor, supported me in refining my research design, theoretical justification, and specific questions, navigating the ethics process, reviewing and running analysis, and providing thorough feedback on all manuscripts. The third article was prepared in collaboration with Dr. Julien Morizot at the University of Quebec at Montreal. As the third author, Dr. Morizot provided analytical expertise in the latent growth curve analysis, helped address methodological and analytical issues, and was also involved in the preparation of the manuscript.

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CHAPTER 1: General Introduction

Persistent interpersonal stress with significant others is known to increase the risk of poor mental health in emerging adults. In particular, difficulties in relationships with parents and peers are linked to stress, which can cause psychological distress, including depression (Allen, Porter, McFarland, McElhaney, & Marsh, 2007) and anxiety (Raudino, Fergusson, & Horwood, 2013). In identifying potential protective factors that can mitigate psychological distress in emerging adults, supportive sibling relationships are a plausible but largely understudied possibility.

This lack of research is surprising given that siblings are close to being a ubiquitous social resource. Even in advanced economies where family sizes have declined over the last 50 years, most children and youth today have at least one sibling (McHale, Updegraff, & Whiteman, 2013, Statistics Canada, 2011). However, how much can we reasonably expect from sibling relationships in the prevention of psychological distress? Unfortunately, there is insufficient evidence on whether sibling relationships can actually mitigate psychological distress. Therefore, I investigated the potential protective effect of sibling relationships by examining its mitigating effect on a risk factor of psychological distress, specifically experiences of alienation, in the context of two close relationships, namely parents and peers. The research question I submit is as follows: Can emerging adults rely on their sibling relationships to protect them from psychological distress when faced with stressful experiences of parent and peer alienation? This thesis provides theoretical and empirical insight into this question through four studies presented in three articles.

I grounded this thesis theoretically in a number of established conceptual frameworks. When examining how relationships impact our physical and mental health, researchers usually draw on the concept of social support (Cohen, 2004; Cohen, Gottlieb, & Underwood, 2000). For

instance, the Stress-Buffering Hypothesis proposes that social support can be protective, by buffering the effect of stressful experiences on mental health (Cohen et al., 2000; Cohen & Wills, 1985). In this thesis, I proposed the Stress-Buffering Hypothesis as a sound theoretical explanation for the potential protective role of siblings in mitigating the effect of alienating relationships. In positing the effect of alienation on mental health, I employ the developmental psychopathology framework (Rutter, 1985; Zimmerman, 2013), which is also helpful in understanding the promotive and protective processes that can mitigate these effects. In employing these theoretical approaches, the research question is further clarified below.

Organization of this Thesis

I explored the research question through four original studies. The studies examine stress from parent/peer alienation and uses statistical modelling to *explain* the relationship between sibling relationships and psychological distress through stress, as well as to *predict* the potential protective effect of sibling relationships on stress and psychological distress. The analytical models deployed to test these relationships are the *Latent Moderated-Mediation Model* and *Latent Growth Curve Model*. Both models are based on structural equation modelling (SEM), which refers to a series of techniques used to examine the interrelationships between multiple latent independent and dependent variables. The *Latent Moderated-Mediation Model* is used in studies 1, 2, and 3, to determine whether the link between experiences of alienation with parents/peers and psychological distress is mediated by stress, and whether this mediating effect is moderated by supportive sibling relationships among emerging adults. The *Latent Growth Curve Model* is used in study 4, to investigate the predictive effects of parent and peer alienation and sibling support on the longitudinal trajectory of stress and psychological distress over the course of three months.

With respect to studies 1, 2, and 3, incremental adjustments are made to the variables under study to investigate their potential moderating-mediating effects from a different angle. For instance, study 1 uses the moderated-mediation model to test the protective effect of a supportive sibling climate (as perceived across all siblings). Study 2 and study 3 test the protective effect of a supportive sibling relationships at a more granular level by using a tailored measure of a supportive relationship with one's closest sibling. This adjustment is in line with theoretical considerations of social support as existing globally across multiple members of one's social network, and as an individual experience in one given relationship (Cohen et al., 2000).

Recognizing the importance of replication of results for the validity of findings, the hypothesized moderated-mediation model is tested across five independent samples in three studies. Study 3 attempts to replicate the findings of study 2, and extend the proposed risk mediation model to include two mediating mechanisms, namely interpersonal and general stress. This adjustment recognizes that interpersonal challenges can be experienced as stress in general and specifically as interpersonal stress. As such, the relationship between parent/peer alienation and psychological distress is examined through these key stress-related mechanisms.

Finally, study 4 involves a 3-wave longitudinal study conducted over the course of three months within an academic semester. By examining the parallel growth curves of stress and distress, we can conceptualize the mutual changes in both variables over time and the predictive relations of parent/peer alienation and sibling support on their longitudinal interrelation.

The combined findings from the four studies allows us to examine the mechanisms between parent/peer alienation and psychological distress, specifically the moderating role of (a) a general supportive climate across all siblings, and (b) a supportive relationship with a specific sibling, as well as the mediating role of (a) general stress and (b) interpersonal stress. This

explanatory inquiry is further extended by examining the potential predictive effects of supportive sibling relationships and experiences of alienation on the latent growth curve of stress and distress. Across these four studies, this thesis aids our understanding of the beneficial effects of supportive siblings in the lives of emerging adults and specifically, the influence of sibling support against interpersonal issues with parents and peers, stress, and psychological distress.

Siblings: Why do they matter and what is their impact?

Siblings are generally defined as children in the same family who are related biologically or legally. Although understudied, sibling relationships are quite ubiquitous and they have a pertinent role in the lives of young people (Milevsky, Thudium, & Guldin, 2014). Historically, and even to date, in most research with siblings, siblings are studied as individuals and for their research utility in twin studies, genetics research, and as controls in clinical studies. However, more recently there has been growing interest in sibling research with more focus on the relationships between siblings. This growing interest spans multiple disciplines including family studies, sociology, genetics, psychiatry, and psychology. Recent reviews on various topics related to sibling further highlight the growing breath and complexity of this research area (Dunn, 2011; Feinberg, Solmeyer, & McHale, 2010; Volling, 2012).

Siblings are Unique

Although siblings are like other interpersonal relationships in some respects, there are several unique features motivating the increased research interest in siblings across the lifespan. First, sibling relationships can last a lifetime and are often longer than other close relationships with parents, spouses, and friends. Whether these relationships are positive or negative, the sheer duration of these ties is important to consider and may influence an individual. Second, an individual's status as a sibling is often ascribed, whether by birth or by law, rather than earned or

chosen. Even in situations when the sibling relationship is no longer active, an individual's status as a sibling is rarely dissolved. This sibling status allows for the potential renewal of an estranged relationship later in life to a greater extent than with peers. Third, siblings in childhood and adolescence have substantial direct contact and these interactions contributes to a common history of shared experiences that can facilitate similarity between them. Over time, shared and divergent environments influence the similarities and differences between siblings. Given the longevity of sibling ties, these relationships are influenced not only by shared genetics, but also a shared common history across multiple life stages. These shared experiences can contribute to mutual understanding and trust that can endure despite conflict, ambivalence, and divergent realities (Dunn, 1983; Ainsworth, 1989). These distinctive characteristics, whether they are present in all sibling relationships or not, have led to an effort to emphasize the importance of studying sibling relationships across all life stages, including emerging adulthood.

Theoretical Relevance of Sibling

In addition to the unique features of sibling relationships, multiple developmental theories provide added theoretical justification for the value of siblings in individual development across developmental periods (Whiteman, McHale, & Soli, 2011). The main theories used to study and understand sibling relationships include, family systems theory (Cox & Paley, 1997), attachment theory (Ainsworth, 1989; Mikulincer & Shaver, 2007), ecological systems theory (Bronfenbrenner, 1979), and social learning theory (Bandura, 1977) among others (Whiteman et al., 2011).

According to *family systems theory*, siblings are a relational subsystem of the family unit interdependent and reciprocally influencing other subsystems (Cox & Paley, 1997). This highlights the place of siblings within the family and their capacity for influence on individual

functioning and adjustment (Cox, 2010). *Attachment theory*, as one of the most extensively researched in this literature, outlines the human tendency to develop close relationships characterized by stress-reducing and safety-promoting interactions with familiar significant others (Ainsworth, 1989; Bowlby, 1980; 1982; Cassidy & Shaver, 2008; Mikulincer & Shaver, 2007). As such, attachment theory suggests sibling bonds can also represent attachment relationships (Ainsworth, 1989). These relationships can be complementary and at times comparable to parental bonds, such that a sibling can even (albeit in rare cases) serve as surrogate parental figure in the absence of a primary attachment figure (Ainsworth, 1989).

Consistent with *Bronfenbrenner's ecological systems theory*, siblings represent actors in the microsystem, interacting with and influencing the person individually or collectively with other actors in the microsystem (Bronfenbrenner, 1979). Social learning theory, although not explicitly about siblings, informs social processes (e.g. modeling and imitation) through which we acquire and regulate behaviour by observing others (Bandura, 1977), such as siblings. Consistent with these social processes, the current literature recognizes siblings, independent of parents or other family members, as a source of potential influence through mutual socialization, not only influencing each other's prosocial behaviours such as helping, cooperative activities, and companionship, but also antisocial behaviour and aggression (Dunn, 2007; McHale et al., 2013).

Siblings Matter for Individual Development

In addition to theory, research across the lifespan has also established the influence of siblings on development through multiple positive and negative mechanisms. First, sibling relationships can be a source of direct or indirect influence over short or longer periods of time. For example, evidence from a meta-analysis of childhood and adolescence suggests consistent

links between sibling conflict and internalizing and externalizing problems (Buist, Deković, & Prinzie, 2013). Sibling interactions can influence siblings' skills and socio-emotional learning, as well as current or future behaviour even after accounting for key predictors such as parent-child relationships (Harper, Padilla-Walker, & Jensen, 2014). Furthermore, aspects of sibling relationships quality, such as affection and hostility, has been related longitudinally to adolescent self-regulation, internalizing and externalizing behaviors (Padilla-Walker, Harper, & Jensen, 2010). Lastly, across their lifespans, siblings have been recognized as a source of social support, primarily by providing information, aid, teaching and advice (Kramer, 2010). Supportive sibling relationships, conceptualized as a combination of positive features, are typically associated with positive mental health outcomes, including fewer depressive symptoms, in adolescence (Branje, van Lieshout, van Aken, & Haselager, 2004; East & Rook, 1992; Kim, McHale, Crouter, & Osgood, 2007; Pike, Coldwell, & Dunn, 2005; Stocker, 1994, Tucker et al., 1999; Updegraff et al., 2002) and emerging adulthood (Milevsky, 2005; Sherman et al., 2006).

Sibling Relationships in Emerging Adulthood

Emerging adulthood involves significant shifts in social networks while peer, romantic partners, parents and siblings continue to play important roles (Lindell & Campione-Barr, 2017; Wrzus, Wagner, & Neyer, 2012). During this time, close relationships increase in similarity and begin to complement each other (Collins, Jose, & Causadias, 2012). However, relationships research calls for a focus on not only the dynamics of a relationship, but also on how multiple significant relationships intersect in the lives of young people. In late adolescence and emerging adulthood, a main premise in research on close relationships is that individuals spend more time with people outside of their family, as these relationships come to serve the same functions (Collins & Laursen, 2004). This predominant focus on extra-familial relationships has resulted in

the understudy of siblings during this developmental period.

Sibling research in emerging adulthood is primarily descriptive, focusing on the quality, characteristics, and correlates of sibling relationships (Riggio, 2000; Stocker, Lanthier, & Furman, 1997; Milevsky, 2004; Myers & Bryant, 2008; Van Volkom et al., 2011). As a result, we know less about the link between sibling relationships and psychological distress among emerging adults than in childhood and adolescence. In emerging adulthood, we know that despite reduced communication and contact during this period (White, 2001), siblings spend more time in emotional and personal discussions and gain a more sophisticated perspective on their relationships (Scharf, Shulman, & Avigad-Spitz, 2005). Emerging adults use a variety of commitment behaviour (i.e. expression of feelings and provision of social supports) with their siblings, at rates comparable to romantic relationships (Myers & Bryant, 2008). Siblings were also identified as a source of social support and stability during this time of change and transition (Milevsky, 2005; Myers & Bryant, 2008; Sherman et al., 2006). Therefore, siblings may be particularly meaningful for mental health in the transition to adulthood.

Although research specific to emerging adults is limited, a consideration in the study of siblings and individual development the substantial variability in sibling relationships, in terms of individual characteristics of siblings and the composition of the dyad. Research suggests there are differences in the mental health benefits of siblings based on dyad characteristics. Sister-sister dyads and sibling dyads with a larger age difference report better mental health compared to other sibling dyads (McHale, et al., 2013; Updegraff, McHale, Whiteman, Thayer, & Dalgado, 2005; Van Volkom et al., 2011). Other studies with middle and older adults found that sisters report more emotional support and report turning to sibling more in times of stress than brothers (Van Volkom, 2006; Van Volkom et al., 2011). However, in some cases the gender composition

of the sibling dyad was not predictive of siblings reports of closeness in middle adulthood (Van Volkom et al., 2011). Although there is some evidence in childhood and middle adulthood of gender differences in sibling relationships, my thesis will not examine the influence of dyad characteristics on sibling relationship quality given there is limited evidence that such differences would exist in emerging adulthood.

The study of siblings during this period of change can become increasingly valuable for several reasons. First, sibling ties become more egalitarian. Throughout childhood, peer relationships are seen by scholars as more egalitarian than sibling relationships (Hartup, 1989; Hinde, 1979). However, emerging adult siblings are more able to relate to each other as equals than is possible in childhood due to greater equivalence in physical and mental abilities, such that age differences are less linked with quality of the relationship (Shanahan, Waite, & Boyd, 2012).

Second, these relationships become more voluntary in young adulthood, allowing individuals more autonomy to regulate and manage their interactions with their siblings (Aquilino, 2005; Aquilino, 2006; Stocker et al., 1997). Therefore, during this period, sibling interactions become more dependent on the quality of these exchanges and their perceived benefit. Furthermore, with their shared history and the increasingly positive nature of their relationships, siblings have the potential to inform an individual's life choices during the role transitions in emerging adulthood (Conger & Little, 2010; Milevsky et al., 2014). Third, as young adults move out of their parents' home, move away for post-secondary education, or have more autonomy over how they allocate their time, emerging adulthood can lead to reduced contact between siblings which reduces conflict and can promote more positive relationships (Scharf et al., 2005). Overall, it is expected in our studies that positive sibling relationships,

characterized by indicators of support (e.g., companionship, aid) can be a potential protective factor.

Psychological Distress in Emerging Adulthood

The transition to adulthood involves significant changes, such as the completion of education, career development, marriage or a committed romantic relationship, and the rearing of children. However, many of these significant changes occur later in contemporary society than in previous generations. Given this shift, Arnett (2000; 2004) proposed the developmental period of emerging adulthood, between 18 to 25 years of age, to characterize the instability of this transition. Notably, the developmental stages of late adolescence (ages 17 to 21) and emerging adulthood (ages 18 to 25) are characterized by autonomy, exploration, and change as individual's social networks expand to include new interpersonal relationships and career prospects (Arnett, 2000; 2004). In addition to these new opportunities, the transition into adulthood can also result in new psychological and social challenges that can promote adaptive and maladaptive outcomes (Arnett, 2000; 2004; Hamilton & Hamilton, 2009).

Psychological distress, generally, refers to a non-specific negative psychological state characterized by symptoms of depression and anxiety, two dimensions common to many psychopathologies (Brooks et al., 2006, Kruger, 1999, Stallman, 2010). Using a dimensional approach to psychopathology, this thesis examined levels of symptomology related to depression and anxiety. This approach is more conducive to the study of non-clinical samples allowing for better comparison of severity across a range of normative to more abnormal symptomology (Kessler et al., 2003).

Depression is a valuable indicator of psychological distress in emerging adulthood given it is the most common mental health condition during this period, but also because college

students are also considered to be an at-risk group for depressive experiences (Buchanan, 2012; Kessler & Walters, 1998; Schulenberg & Zarrett, 2006, Stallman, 2010). Depressive experiences, whether depressed mood symptoms or a diagnosed disorder, represents the leading cause of disability and substantially contributes to the global burden of disease (Lepine & Briley, 2011). Like depression, anxiety spans from normality to pathology and refers to a mood characterized by worry, despair and nervousness, a propensity to perceive experiences, whether real or imagined, as threatening, and a sense of impending danger that can vary in specificity and severity (Kessler et al., 2002; VandenBos, 2007). The instability experienced by emerging adults can place them at greater risk of experiencing symptoms of anxiety (Arnett, 2014; Riggs & Han, 2009).

Psychological distress should be studied in emerging adulthood for several reasons. First, although emerging adults report being satisfied with their life, they are also likely to be confronted with stress (Brougham, Zail, Mendoza, & Miller, 2009; Dusselier et al., 2005; Ross, Niebling, & Heckert, 1999; Towbes & Cohen, 1996). Specifically, rates of depression for both males and females were the highest among youth (15 to 24 years) in Canada, with higher rates among girls and women (Statistics Canada, 2013). Although rates of depression are more common than those of anxiety among Canadian youth, depression and anxiety commonly co-occur (Nguyen et al., 2005). Canadian youths describe more days as stressful compared to younger age groups (Health Canada, 2011). Schulenberg and Zarrett (2006), in their review of mental health from the ages of 18 to 26, observed that despite an increase in wellbeing, there is also accrued incidences of psychological distress. The authors suggest these increases are due to the "multiple transitions, the increased individual agency, and the reduced institution structure" that is typical of emerging adulthood (Schulenberg & Zarrett, 2006, p.162).

Second, three fourths of all lifetime cases of mental illness have first onset by the age of 24 years; this illustrates the value of targeted prevention and treatment efforts for this age group (Kessler et al., 2005). Furthermore, these mental health issues are related to subsequent negative individual and social consequences, such as academic, social, and occupational impairment (Eisenberg et al., 2009; Ettner, Frank, & Kessler, 1997; Kessler, Foster, Saunders, & Stang, 1995; Kessler, Walters, & Forthofer, 1998). Together these trends suggest the importance of early, timely and effective interventions as it can prevent later impairment and have considerable benefits for both emerging adults and society as a whole.

General Stress, Interpersonal Stress, and Psychological Distress

A pivotal factor leading to psychological distress is stress (Hammen, 2005; Kessler, 1997; Liu & Alloy, 2010; Paykel, 2003). Stress is a weathered concept used to describe multiple aspects of a stressful experience, such as an external event (i.e. the stressor), an internal response (i.e. stress reaction) or an interaction of the person and the environment in a process (Aldwin, 2007; Hammen, 2005; Lazarus & Folkman, 1984). A stressor can be a negative and undesirable experience that can vary in severity and requires an individual to adjust in response to this experience (Thoits, 1995). Whether this negative experience causes an internal strain depends on an individual's cognitive appraisal (Compas et al., 2001; Lazarus & Folkman, 1984). Given the importance of appraisal in response to a stressor, it can be difficult to distinguish external and internal aspects of stress, such that stress can be considered the quality of an individual's experiences (Aldwin, 2007). Overall, based on the transaction between the person (appraisal) and the environment (stressor), stressful experiences can produce psychological or physiological distress (Aldwin, 2007).

It is well established that stress is linked to an increased risk of depression (Hammen, 2005; 2006) and anxiety (Brown, 1993). Levels of perceived stress, brought on by negative experiences, are linked to depressive symptoms (Compas et al., 2001; Compas & Reeslund, 2009), and specifically, for emerging adults in the transition to university (Hughes, 2007). Multiple sources of stressors can contribute to perceived levels of anxiety (Schulenberg, Bryant, & O'Malley, 2004; Schulenberg, Sameroff, & Cicchetti, 2004). Specifically, stressful circumstance (e.g. interpersonal stressor) experienced in emerging adulthood can trigger anxiety symptoms (Riggs & Han, 2006).

Although general stress is a broad concept, interpersonal stress is specific to interpersonal relationships and social roles. Interpersonal stress refers to demands or challenges that arise from an individual's relationships or interpersonal strain and conflict resulting from social roles (Aldwin, 2007). Interpersonal stress can be in the form of life events (e.g. death of a loved one, divorce), chronic strains (e.g. caregiving for a partner with a chronic illness), or daily hassles (e.g. conflict with friends or family). Although these daily experiences are less dramatic than major life events, they are more persistent and may even be more taxing on an individual's wellbeing (Lazarus & Folkman, 1984). In emerging adulthood, young adults experience higher rates of interpersonal stressors and these interpersonal challenges have a greater and more lasting effect compared to older adults (Birditt, Fingerman, & Almeida, 2005). Furthermore, the life events and role transitions characteristic of this period can lead to changes and disruptions in relationships (Tanner & Arnett, 2009; Schulenberg & Zarrett, 2006). For these reasons, emerging adulthood is a developmental period that is particularly useful for the study of general and interpersonal stresses, specifically from parents and peers, and its impact on psychological distress.

Parent and Peer Alienation as Risk Factors for Psychological Distress

The concept of alienation is commonly used in multiple disciplines including sociology, political science, business management as well as social and organizational psychology. The notion has its conceptual and historical roots in sociology (Dean, 1961; Ludz, 1976). Broadly, alienation refers to a sense of estrangement and detachment in one's close relationships characterized by feelings of dissatisfaction and isolation from others (VandenBos, 2017). This concept is used to examine the relationships across varying contexts, including intimate and family relationships as well as relationships in the workplace, post-secondary education, and community (Case, 2008; Dean, 1961; Ludz, 1976; O'Donohue & Nelson, 2014).

For the purposes of my thesis, alienation is grounded in Armsden and Greenberg's (1987) Inventory of Parent and Peer Attachment (IPPA). This measure was developed to capture positive and negative experiences with parent and peer relationships as was original conceptualized as a measure of internalized attachment models (Armdsen & Greenberg, 1987; Wilkinson, 2004). The three subscales assess affective and cognitive aspects of trust, communication and alienation and these relationship dimensions are linked to self-esteem, emotion regulation, and depressive symptoms (Agerup et al., 2014; Kullik & Petermann, 2013; Liable, 2007). Given the centrality of parents and peers, my thesis focused specifically on perceptions of alienation in these relationships because experiences of alienation are particularly problematic for psychological distress (Agerup et al., 2014; Kullik & Petermann, 2013). In my thesis, alienation will consist of experiences of emotional withdrawal characterized by a sense of anger, feeling misunderstood, not being able to confide one's feelings, and a sense of detachment (Armsden & Greenberg, 1987).

Parent and peer relationships are particularly valuable in emerging adulthood and can have significant implications on mental health (Arnett, 2007). Despite the fewer interactions young people have with their parents, the quality of parental ties continues to be instrumental for mental health (Allen, Moore, Kuperminc, & Bell, 1998; Arnett, 2007; Collins, Raby, & Causadias, 2012). For parental relationships, concurrent and longitudinal evidence illustrates that from late adolescence to the end of emerging adulthood, poor quality parent relationships (e.g. increased feelings of alienation) are related to more psychological distress (i.e. depression and anxiety; Hoeve, Stams, van der Put, Dubas, van der Laan, Gerris, 2012; Laible, 2007; Raudino, Fergusson, & Horwood; 2013; Tambelli, Laghi, & Notari, 2012) and less happiness (Karreman & Vingerhoets, 2012; Wilkinson & Walford, 2001).

Although not as fundamental as parent-child relationships, peer relationships become increasingly prominent by adolescence and emerging adulthood, directly influencing individual functioning (Arnett, 2007; Chow, Roelse, Buhrmester, & Underwood, 2012). In this thesis, the term peers will be used interchangeably with friends to refer to intimate relationships within an emerging adults' peer network. The IPPA uses the term 'friends' in the items of the peer attachment measure. The spare research on friendships in emerging adulthood suggests these relationships grow in emotional depth, complexity, and more personal communication from adolescence into this period (Arnett, 2007; Choukas-Bradley et al., 2014). Friendships contribute to several developmental advantages but are also identified as a source of risk for psychopathology (Choukas-Bradley et al., 2014). Poor quality peer relationships are linked to psychological distress (i.e. symptoms of depression and anxiety; Armdsen & Greenberg, 1987; Laible 2007; Wilkinson, 2004). Furthermore, emerging adults' friends, characterized by more feelings of alienation was related to poor outcomes across multiple adjustment domains (e.g.

academic, social and institutional attachment) over the course of a few weeks (Swenson, Nordstrom, & Hiester, 2008).

Overall, although parent and peer relationships are usually positive (Arnett, 2007; Aquilino, 2006; Steinberg, 2001), when of poor quality, these relationships can generate stress and psychological distress, in terms of depression (Allen et al., 2007; Armsden, McCauley, Greenberg, Burke, & Mitchell, 1990; Eberhart & Hammen, 2006; Raudino et al., 2013; Wong, 2000; Ying, Lee, & Tsai, 2007), and anxiety (Armsden & Greenberg, 1987; Leondari & Kiosseoglou, 2000; Raudino et al., 2013; Safford, Alloy, Crossfield, Morocco, & Wang, 2005).

Social Support, Stress, and Psychological Distress

The primary perspective used in psychology to study the influence of social relationships on physical and mental health, especially to inform interventions, is the stress-buffering mechanism of social relationships (Cohen, 2004). The *Stress-Buffering Hypothesis* proposes social support can reduce the negative effects of a stressor through reinterpretations of the stressful experience as less threatening and promoting effective strategies to cope with the experience (Cohen, 2004; Cohen, Gottlieb, & Underwood, 2000; Cohen & Wills, 1985). Scholars have repeatedly acknowledged the *Stress-Buffering Hypothesis* as a theoretical framework to examine the ways perceived social support can counteract the adverse effects of stress on mental health (Cohen, Gottlieb & Underwood, 2000; Cohen & Wills, 1985). This hypothesis posits that the link between negative experiences and stress and between stress and poor mental health may be weaker for individuals with more social support.

Based on the hypothesis' predictions, social support may have a beneficial effect on mental health for those experiencing an adversity (Cohen, 2004). Consistent with this hypothesis, the protective effect of social support can influence the relations between risk and outcome at

two points (Cohen & McKay, 1984; Cohen, 1988). First, support can influence the link between a negative event (i.e. parent and peer alienation) and a stress response by reducing the stress appraisal of these events. The supportive sibling relationships can provide young people with the necessary resources to re-evaluate the stressor, or their capacity to deal with the stressors and thus reduce the likelihood of negative experiences (i.e. parent and peer alienation) being perceived as stressful. Second, support can influence the link between a stress appraisal and poor mental health by attenuating the effect of perceived stress on mental health. Supportive sibling relationships can provide young people with additional resources in managing the stress response. Examples of such additional resources could include: (a) helping to reduce the effect of stress or the perceived significance of the stressor, (b) providing a distraction or direct attention to more adaptive responses (e.g. exercise, rest, and socializing), or (c) providing suggestions on how to deal with the stressors. Overall, I examined supportive sibling relationships and tested whether siblings, as a source of social support, could protect against two risk factors (i.e. parent and peer alienation) and psychological distress as mediated by stress.

Developmental Psychopathology Approach to Studying Siblings

Research on psychopathology consistently recognizes that even with the presence of multiple risk factors not all individuals who experience these adversities may develop emotional and behavioural problems (Rutters, 1987; Sroufe & Rutters, 1984). Therefore, the study of psychopathology involves identifying not only risk factors associated with negative outcomes, but also the underlying protective and vulnerability processes that can attenuate or augment the effect of a risk factor on individual functioning (Cicchetti & Rogosch, 2002; Compas & Reeslund, 2009; Graber & Sontag, 2009).

Within a developmental psychopathology approach, there are several informative

conceptual models to hypothesize the multiple paths in which siblings can influence psychological distress. I focused specifically on the protective role of siblings because these relationships have the potential to modify and alter how an individual respond to the risk of experiences of alienation in their relationships with parents and peers. As a result, the focus is not necessarily on the direct beneficial effect of siblings, rather the aim is the interactive effect of sibling relationships in the face of some adverse experience, namely experiences of alienation, on the mental health of young people.

In the present thesis, I consider four conceptual models that can be grounded in developmental psychopathology: (a) risk model, (b) promotive model, (c) compensatory model, and (d) protective model. Each of these models is associated with varying assumptions and statistical methods (Baron & Kenny, 1986; Fergusson et al., 2007; Rutter, 1985). Furthermore, the organization of these conceptual models is also informed by previous developmental research on protective factors and adolescent internalizing and externalizing psychopathology (Miranda, Gaudreau, Debrosse, Morizot, & Kirmayer, 2012; Miranda, Gaudreau, Morizot, & Fallu, 2012).

A risk model recognizes the predictive influence of a risk factor on a negative outcome (Rutter, 1985). In this thesis, parent and peer alienation were considered pertinent risk factors for general stress, interpersonal stress, and psychological distress. A promotive model outlines the predictive influence of an independent variable on the absence or decrease of a negative outcome. A compensatory model in which an independent variable has an independent and counteractive effect on a negative outcome in the context of risk exposure (Rutter, 1985; Zimmerman, 2013). Lastly, a protective model in which an independent variable accentuates or attenuates the link between a risk factor and a negative outcome (Rutter, 1985; Zimmerman, 2013). As a protective factor, sibling support may have a buffering effect, in that it alters or

reduces the magnitude of the effect of risk exposure (parent and peer alienation) on a negative outcome (stress and psychological distress; Rutter, 1985; Zimmerman, 2013).

In this thesis, supportive sibling relationships are primarily conceptualized as a protective factor because having supportive siblings might mitigate the negative effects of parent and peer alienation on stress and psychological distress. As alternative models, sibling support, as a promotive factor, would be related to less psychological distress; while as a compensatory factor, sibling support would be related to less psychological distress when accounting for parent and peer alienation. Overall, in the context of supportive sibling relationship, a developmental psychopathology framework can be useful to propose risk, promotive, compensatory, and protective models and processes that may predict the absence or decrease in psychological distress among emerging adults (Rutter, 1985; Zimmerman, 2013).

Supportive Sibling Relationships as a Protective Factor

According to current literature, several aspects of supportive sibling relationships can be a source of resilience when coping with life stressors. Much of this research on siblings and resiliency has focused on children and the effects of major life events (e.g. divorce, entering foster care, parental separation) and other stressors (e.g. parental conflict, a sibling with a developmental disability) on mental health. These findings consistently suggest that sibling relationships characterized by positive supportive features (i.e., comfort, understanding, positivity, or emotional and instrumental support) were protective against the risks associated with life stressors in predicting better mental health (e.g. depressive symptomology; Conger, Stocker, & McGuire, 2009; Jenkins, 1992; Soli et al., 2009). Although the positive indicators of support used in individual studies vary, the overarching focus is still on support and the extent to which sibling relationships are perceived as supportive.

In terms of emerging adulthood, sibling relationship experience a decrease in conflict, an increase in autonomy to manage their interactions, and a more positive view of relationships (Aquilino, 2005; Aquilino, 2006; Scharf et al., 2005; Stocker et al., 1997). Specifically, when sibling relationships are supportive, young adults report less mental illness symptoms (e.g., depression) and better wellbeing (Milevsky, 2005). Furthermore, there is both cross-sectional and longitudinal evidence for the protective role of siblings in childhood and adolescence (Branje et al., 2004; Gass, Jenkins & Dunn, 2007). However, these protective models are quite rare in the literature in emerging adulthood.

Although siblings may not be necessary for the transitions of emerging adulthood, supportive relationships with siblings may still be beneficial during this period of change (Conger & Little, 2010; Conger et al., 2004). Currently, to the best of my knowledge, there are only two studies that examine the protective role of sibling relationships in emerging adulthood, however, their research findings are mixed. For example, one study of emerging adults (mean age = 22) found siblings, characterized by high support, could compensate for (i.e. buffer against) a lack of support from friends and parents (Milevsky, 2005). Specifically, this buffering effect of siblings was related to mental health (e.g., less depression; Milevsky, 2005). These findings suggest that emerging adults relying on siblings for support were doing as well (i.e., less depression) as those who relied on both sibling and peer support (Milevsky, 2005). However, in another study with younger emerging adults (mean age = 18), Sherman and colleagues (2006) found that sibling relationships did not fully compensate for (i.e., completely protect against) poor quality friendships (i.e., characterized by low conflict and low warmth; Sherman et al., 2006).

This thesis can help resolve these mixed findings by improving the research design in at least three important ways. First, both studies used a categorical approach in conceptualizing the quality of relationships for parents, peers, and siblings and in the testing of the moderation effect. For Milevsky (2005), patterns of support were combined for pairs of relationships (i.e. low peer – high sibling; low peer-low sibling, etc.) and mental health outcomes were compared across each of these paired classifications using t-tests for a sample of 305 young adults. For Sherman et al. (2006), a cluster analysis was used to create classifications of relationships based on levels of warmth and conflict identified in each relationship (i.e. parents, peers, siblings) among 105 young adults. These clusters were compared on mental health outcomes using multivariate analyses of covariance. Although there are multiple techniques used to test an interaction effect, categorical variables must only be used if the variables of interest are truly categorical (e.g., gender, intervention vs. control groups). Transforming reasonably continuous variables into a few categories is convenient, but highly discouraged for several reasons. By making a continuous variable categorical researchers reduce the reliability and variance explained by the original variable, which can result in less power for detecting the interaction effect (Marsh, Hau, Wen, Nagengast, & Morin, 2013). Moreover, this technique does not provide an overall estimate of the interaction effect. Given these problems, it is not recommended to dichotomize continuous variables when testing moderation. Thus, this I used continuous variables to represent parent, peer and sibling relationships. Second, I used a more advanced Structural Equation Modelling technique that is statistically and theoretically stronger for the estimation of interaction effects (Marsh et al., 2013).

Finally, the measures used in these studies were quite broad and not specific to the affective and cognitive dimensions of sibling relationships. Milevsky (2005) used a single item

measure of sibling closeness and a general measure of social support that was completed for each parents, friends, and siblings. Sherman et al. (2006) used the Social Provision Questionnaire (i.e., broad positive dimensions of social relationships) that was completed about a sibling and two friends. Thus, my thesis will measure key dimensions of supportive sibling relationships in emerging adulthood using a combination of broad and specific measures. Overall, this literature is limited and research to confirm if these relationships can promote mental health by protecting emerging adults from experiences of alienation with parents and peers is still needed.

Furthermore, my thesis can extend the existing literature in several key ways. First, research on the role of sibling relationships in emerging adulthood is scarce and as a result the role of these relationships in promoting the mental health of young people remains unclear (Conger & Little, 2010; Milevsky, 2004; Milevsky, 2005; Myers & Bryant, 2008; Van Volkom et al., 2011). The empirical studies within this thesis are an interesting contribution to this limited literature in that support of sibling relationships in general and in a dyadic relationship, as well as close relationships (parent and peers), stress, and psychological distress are examined. Second, this thesis contributes to the current knowledge base by focusing on the protective effect of sibling relationships. The study of siblings in childhood and adolescence is quite extensive; however, this literature has been heavily preoccupied with conflict and rivalry in sibling relationships (Edwards, Hadfeild, Lucey, & Mauthner, 2006; Caspi, 2011). As a result, there is growing interest not only on understanding conflict, but also exploring the value of positive interactions between brothers and sisters. This thesis is informed by this increasing research attention on the positive and potentially protective effects of siblings in the lives of young people. Third, this thesis considers the protective role of siblings in the context of other close relationships. The current literature on siblings in emerging adulthood is primarily descriptive,

such that the protective effects of siblings on mental health while incorporating parent and peer relationships has largely not been considered. Fourth, this thesis informs the predictive effects of parent and peer alienation and sibling support on the levels and changes in stress and psychological distress over three months. Overall, this thesis contributes to the growing literature on sibling relationships and mental health in emerging adulthood, as well as specifically informs the value of siblings in promoting the mental health of emerging adults.

Given these overall benefits of siblings, the moderating role of supportive sibling relationships can be examined in two ways: (a) as a general supportive climate across all siblings, and (b) as a supportive relationship with a specific sibling. Sibling relationship climate is a general approach to understanding siblings and it refers to the overall characteristics of sibling climate as experienced across all siblings. The quality of sibling relationships can also be considered in terms of dyadic interactions such that relationship quality is measured for the sibling the individual is closest to (Milevsky, 2004; Myers & Bryant, 2008; Van Volkom et al., 2011). By examining supportive siblings in these two ways, this thesis adds to theory and research on social support as experiences across one or multiple siblings.

Analytical Models: Latent Moderated-Mediation Model and Latent Growth Curve Model

I used structural equation modelling (SEM) to examine two latent models, a latent moderated-mediation model and a latent growth curve model. The first analytical model is used to test the hypothesized moderated-mediation model in Articles 1, and 2, while the second analytical model is used to test the parallel growth curves of both stress and psychological distress in Article 3. SEM refers to a series of techniques used to examine relationships between multiple independent and dependent variables and allows for both factor analysis and multiple regressions to be combined and tested simultaneously (Ullman, 2007).

Modeling of a set of relations using SEM involves testing a measurement model (i.e. relationships between observed indicators and unobserved constructs) and a structural model (i.e. the regression paths between a group of unobserved constructs; Ullman, 2007). The measurement model ran a confirmatory factor analysis to test the measurement structure of each of the latent constructs. For the moderated-mediation model, the measurement model used individual items to create the latent independent (i.e. parent and peer alienation and supportive sibling relationships) and the dependent (i.e. interpersonal and general stress and psychological distress) variables. The structural model tests moderated-mediation model with the latent constructs. For the latent growth curve, the measurement model uses the composite scores of each measure at each time point as individual indicators of the latent intercept and slope of growth over time. The structural model, examines the intercept and the linear slope, their means and variances, as well as the predictive relationships of parent and peer alienation and sibling support on these growth factors.

The latent moderated-mediation model combines hypotheses of both mediation and moderation. A mediation model examines the mechanisms (i.e. mediators) that account for a link between an independent variable and a dependent variable. These models answer questions of *how* or *why* a predictive link exists, for example, the predictive sequence is that the independent variable affects the mediator, which in turn affects the dependent variable (Baron & Kenny, 1986). A moderation model examines whether the link between a predictor and an outcome vary across different individuals or conditions and these models answer questions of *for whom* or *when* a link exists (Baron & Kenny, 1986). When these two distinct models are combined, the focus is on conditional indirect effects and whether a mediation varies as a function of a moderator (Preacher, Rucker, & Hayes, 2007). I focused on the conditional indirect effect, such

that the strength of the indirect effect, from parent and peer alienation to psychological distress through stress, may vary depending on the levels of sibling support.

Latent growth curve modelling (LGM) is a form of SEM used to estimate change over time. Growth curve address hypotheses of individual differences in intra-individual rates of change over time and predict change using explanatory variables (Bollen & Curran, 2006; Curran, 2010). This approach requires the same constructs to be repeatedly measured over time among the same individuals to estimate trajectories of change. These repeated measures are used to estimate linear or non-linear latent factors that capture the unobserved growth trajectory (Curran, 2010). Once fixed and random effects of growth curves are modeled, the intercept and slope of the growth curve can be regressed on time-invariant (one time measures) and time-varying (repeated measures) predictors and covariates (Preacher, Wichman, MacCallum, & Briggs, 2008). In sum, two analytical latent models, a latent moderated-mediation model and a latent growth curve model, will be instrumental in addressing the proposed research questions.

The Current Doctoral Thesis

My thesis is guided by the overarching research question: Can emerging adults rely on their sibling relationships to protect them from psychological distress when faced with stressful experiences of parent and peer alienation? To address this, I used four studies presented in three articles. Each study tested, from a different vantage point, the potential benefits of siblings in reducing psychological distress. This was achieved through incremental adjustments to the research design, measurement, and analytical approaches in each of the four studies.

Study 1 (as presented in Article 1) examined the hypothesized moderated-mediation model across three independent samples of emerging adults (N=310, N=259, and N=416). Examined here, was the protective effect of a supportive sibling climate against experiences of

alienation with parents and peers, stress, and psychological distress. This study proposed sibling climate as a general approach to measure supportive sibling relationships across all siblings. The protective role of sibling climate was examined across the three sample to test replicability.

Studies 2 and 3 (in Article 2), tested the moderated-mediation model to examine if support from one's closest sibling moderated links among parent and peer alienation, stress, and psychological distress among emerging adults (N=789 and N=325). To add to the sibling measure used in Study 1, Study 2 and Study 3 incorporated a different operationalization of supportive sibling relationships to capture support experiences with one's closest sibling. In comparison to the broad approach taken in Study 1, these studies focused on a greater variety of supportive functions as experienced with one sibling. By examining supportive siblings in these two ways (as experienced with one or multiple siblings), this thesis contributes to existing research on social support and siblings. Additionally, unlike Study 1, these studies also examined two key mechanisms in the risk mediation model, namely, interpersonal and general stress, separately. By considering both mechanisms, this thesis outlines the influence of interpersonal challenges on both interpersonal stress (specific to parent and peer relationships) and general stress.

Study 4 (as presented in Article 3), tested a latent growth curve of general stress and psychological distress and their association with sibling support, parent and peer alienation among emerging adults (N =234). To examine this, the predictive effects of parent and peer alienation and sibling support on the trajectory of stress and psychological distress were considered over the course of three months. Although Study 1, 2, and 3 used a different latent modelling approach, Study 4 uses latent growth curve modelling. Latent growth curve modelling, captures longitudinal changes in our outcome variables to model the initial levels and

rates of change among growth factors. This is distinct from the previous studies in this thesis, as it allows us to consider not only levels of stress and distress, but their rate of change over time.

In sum, the studies of this thesis add to existing research and knowledge on the protective effects of supportive siblings, the potential influence of sibling support on stress and psychological distress, as well as the risk associated with parent and peer alienation in the lives of emerging adults. Taken together, the incremental investigation presented in each study explicitly builds on existing sibling literature, addresses research gaps in methodology and analysis, and helps advance our understanding of siblings and their possible influence on psychological distress.

CHAPTER 2: The Protective Role of Sibling Climate

Can Supportive Siblings Protect against the Risk that Stress from Feelings of Alienation with Parents and Peers Poses to Mental Health in Emerging Adulthood?

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Abstract

Feelings of alienation with parents and peers can lead to psychological distress, possibly because such feelings are stressful. Supportive siblings are known to foster mental health in youth, but research in emerging adulthood is limited. We hypothesized supportive sibling climate as a protective factor in the risks that stress from parent and peer alienation poses to psychological distress among emerging adults. A proposed moderated-mediation model was tested across three samples using latent moderated mediation structural equation modeling. Results indicated parental and peer alienation were associated with more psychological distress; and stress partially mediated the link between parental (but not peer) alienation and psychological distress in two samples. However, a supportive sibling climate was not protective as it did not moderate the links among alienation, stress, and psychological distress. In sum, siblings seem beneficial, but perhaps not sufficient to protect emerging adults' mental health against stress from parent and peer alienation.

Can Supportive Siblings Protect against the Risk that Stress from Feelings of Alienation with Parents and Peers Poses to Mental Health in Emerging Adulthood?

Despite the decline in family size over the last 50 years in more economically developed societies, siblings are quite common in most families (McHale, Updegraff, & Whiteman, 2013). In Canada, 80% of children and youth have at least a brother or sister (Statistics Canada, 2011), and this ubiquity of siblings is comparable in the United States (McHale et al., 2013). Emerging adulthood is a time of increased autonomy and independence from family. However, the literature on close relationships in emerging adulthood has focused more on parent and peer relationships, while siblings have been largely understudied (McHale et al., 2013; Milevsky, Thudium, & Guldin, 2014). Although parent and peer relationships are crucial, sibling relationships are also important interpersonal relations at the core of an emerging adult's social network.

Siblings play a variety of roles during development, serving as companions, educators, confidantes, and role models (Cicirelli, 1985). The increased contact among siblings throughout childhood and adolescence can contribute to a history of shared experiences, mutual understanding, and positive adjustment (Branje, van Lieshout, van Aken, & Haselager, 2004; McHale et al., 2013). Specifically, among young adults, sibling relationships display less conflicts, increased autonomy in their interactions, and are described as being more positive relative to earlier stages of development, namely childhood and adolescence (Aquilino, 2006; Scharf, Shulman, & Avigad-Spitz, 2005; Stocker et al., 1997). Where sibling relationships are supportive, young adults report better mental health (e.g., less depression) and greater wellbeing (Guan & Fuligni, 2016; Milevsky, 2005; Sherman, Lansford, & Volling, 2006). This appears to be consistent with developmental evidence for the protective role of siblings in childhood and

adolescence (Branje et al., 2004; Gass, Jenkins, & Dunn, 2007). However, given the improved quality of sibling relationships in emerging adulthood, the mechanisms by which these relationships potentially impact mental health might become even stronger. With no recognized theoretical model specific to sibling relationships, current sibling research is informed by established developmental and social psychological theories. Most relevant to this study, is the concept of social support and its associated theoretical models as an analytical framework to study the value of sibling support for mental health.

Social support from siblings as a protective, compensatory, or promotive factor

Outside of sibling relationships, the relation between the social support from relationships and mental and physical health is well-established (Gariepy et al., 2016; Thoits, 2011). Social support is a multidimensional concept that refers to tangible and intangible resources which are (in fact, or at least perceived to be) available in interpersonal relationships (Cohen, Gottlieb, & Underwood, 2000; Cohen & Wills, 1985). In general, social support is associated with improved mental health through three mechanisms (a) a main effect of support on mental health, regardless of levels of risk or stress, (b) a main effect of support on mental health in the presence of risk, and (c) a buffering effect of support in the presence of risk (Cohen et al., 2000; Cohen & Wills, 1985; Gariepy et al., 2016). These three mechanisms can be further adapted to the study of siblings by using a developmental psychopathology approach, which involves identifying not only risk factors associated with negative outcomes, but also the underlying promotive and protective processes that can attenuate the effect of a risk factor on individual functioning (Cicchetti & Rogosch, 2002). This approach can be informative to identify the multiple paths in which siblings can influence mental health in emerging adulthood.

Hence, in the context of sibling relationships, these three social support mechanisms, within a developmental psychopathology framework, can be organized into three models of how sibling support may impact psychological distress. The first, which is our hypothesized model, is a protective model in which sibling support has a buffering effect, in that it alters or reduces the magnitude of the effect of risk exposure on a negative outcome (Rutter, 1985; Zimmerman, 2013). The second, which is an alternative model, is a compensatory model in which sibling support has an independent and counteractive effect on a negative outcome in the context of risk exposure. The third, which is also an alternative model, is a promotive model, in which sibling support in itself is a promotive factor that directly reduces a negative outcome, namely psychological distress (Zimmerman, 2013).

From these conceptual models, there is evidence of sibling support as either a compensatory factor or promotive factor, however, the protective model has yet to be tested. More specifically, to the best of our knowledge, there is no prior research on the moderating effect of sibling support on stress and psychological distress in emerging adulthood. It is understood that supportive sibling relationships are associated with decreased psychological distress, with and without the presence of risk, among emerging adults (e.g., less depression; Milevsky, 2005; Sherman, Lansford, & Volling, 2006), suggesting both the compensatory and promotive effects of siblings. The protective model of sibling support, although untested, has sound theoretical support from the *Stress-Buffering Hypothesis,* which postulates that social support should be protective by buffering two pathways: (a) by moderating the effect of risk exposure on stress and (b) by moderating the effect of stress on psychological distress (Cohen et al., 2000; Cohen & Wills, 1985).

Parent and peer alienation as risk for psychological distress

Emerging adults can be exposed to multiple sources of stress related to their academics, finances, employment, and relationships, which can all compromise their mental health (Arnett, 2007). In particular, their interpersonal relationships can be disrupted by life events and role transitions (Tanner & Arnett, 2009). Young adults experience more intense and enduring challenges in their interpersonal relationships than older adults (Birditt, Fingerman, & Almeida, 2005).

Specifically, experiences of alienation with parents and peers is particularly problematic because it can consist of emotional withdrawal characterized by a sense of anger, feeling misunderstood, not being able to confide one's feelings, and a sense of detachment (Armsden & Greenberg, 1987). When relationships with parents and peers are affected by feelings of alienation, emerging adults may experience more symptoms of depression and anxiety (Eberhart & Hammen, 2006; Hoeve et al., 2012; Leondari & Kiosseoglou, 2000; Raudino, Fergusson, & Horwood, 2013). In this study, parental and peer alienation will be considered as potential risk factors of psychological distress (depression and anxiety symptoms) in emerging adults. Therefore, we posit a mediation model of risk in which feelings of alienation with parents and peers may increase stress, which in turn, may increase psychological distress (depression and anxiety). Using this mediated risk model, we first examine sibling support as a protective factor that should moderate the links within this model.

The present study: Supportive sibling climate as a protective factor

In this study, sibling climate is a general approach to understanding the overall quality of interactions as experienced across all siblings. We will use this approach to measure supportive sibling relationships for three reasons. First, sibling relationships exist in a broader network and

the climate describes the varying positive (i.e. support) and negative (i.e. conflict) experiences across multiple siblings. Second, according to family systems theory, siblings are a relational subsystem that influences (and is influenced by) other sibling dyads (Cox & Paley, 1997). As such, the study of sibling climate can consider the overall dynamics of sibling interactions in the same family. Third, research on siblings has often focused on specific dyads, however, the study of sibling climate allows for a more inclusive look at support as experienced across all siblings.

Our main objective is to test a hypothesized protective model in which a supportive sibling climate is a protective factor against the risk that stress from feelings of alienation with parents and peers poses for increasing psychological distress in emerging adults. As depicted in Figure 1, the moderated-mediation model first posits that stress will mediate the links from parental and peer alienation to psychological distress. Furthermore, grounded in the stress-*buffering hypothesis*, the model also posits that a supportive sibling climate will moderate the links between parental and peer alienation and stress, between stress and psychological distress, as well as between parental and peer alienation and psychological distress. We tested this moderated-mediation model across three independent samples, for the sake of replication. It is important to note that unlike most prior studies, this study relies on a more advanced latent moderated structural equation modelling technique that is very rigorous for the estimation of interaction effects (Marsh et al., 2013). Furthermore, the results from our study can also inform two alternative models of supportive sibling climate. In the compensatory model, siblings contribute additively to less psychological distress when accounting for risk. While in the promotive model, siblings are simply linked with less psychological distress when not accounting for risk factors.

Method

This cross-sectional study consists of three independent samples collected from the fall 2013 to winter 2015. Participants were recruited using a participant pool of undergraduate students at a Canadian university. Data collection was conducted through an online survey on PsychData.com. Ethical approval was granted by the research ethics board at the authors' university. Participants provided informed consent and were compensated with a point towards their final grade in an undergraduate course.

In terms of data preparation, three steps were taken to prepare the raw data for analysis across the three independent samples. These steps were to identify and exclude: (a) survey entries with duplicate and invalid participant identifiers; (b) entries that were missing over 40% of the online survey and the stress measure (mediator); and (c) entries that did not meet the inclusion criteria of having a sibling and being under the age of 25. Missing values (less than 5%) were replaced using Full Information Maximum Likelihood (FIML) with Mplus. Multivariate outliers were identified using Mahalanobis distances.

Participants

Sample 1. The raw data consisted of 470 entries, 61 entries were removed due to duplicates and invalid participant identifiers and nine entries were missing almost half the survey and were excluded. Due to a technical issue an additional 76 entries did not report their age and were excluded. After these preliminary steps, the first sample consisted of 324 undergraduate students. Based on the inclusion criteria, seven entries were excluded because they had no siblings and four because they were over the age of 25. The resulting sample was 313 students (87% women). Due to a technical issue, the exact age was recorded for 250 participants (Mean age=18.9 years), while an age range of 18-25 was recorded for the other 60 participants. Three multivariate outliers were identified and excluded (N=310). In terms of ethnic diversity, this

sample consisted of 65% Whites, 11% Blacks, 14% East and South Asians, and 13% with other ethnic identities. In terms of siblings, 46% had only one sibling, while 31% had two siblings, and 23% had three or more siblings.

Sample 2. The raw data consisted of 383 entries, 94 entries were removed due to duplicates and invalid participant identifiers and 10 entries due to missing almost half the online questionnaire. These initial steps resulted in a second sample of 279 undergraduate students. Based on the inclusion criteria, 8 participants were excluded because they had no siblings and 10 because they were older than 25 years. The resulting sample was 261 undergraduate students (Mean age=18.5 years; 94% women). Two multivariate outliers were identified and excluded (N=259). In terms of ethnic diversity, this sample consists of 69% Whites, 6% Blacks, 18% East and South Asians, 12% with other ethnic identities. In terms of siblings, 55% had only one sibling, 27% had two siblings, and 18% had three or more siblings.

Sample 3. The raw data consisted of 519 entries, 77 entries were removed due to duplicates and invalid participant identifiers and 5 entries were missing almost half the survey. These initial steps resulted in a third sample of 437 undergraduate students. Based on the inclusion criteria, nine participants were excluded because they had no siblings and 11 because they were over the age of 25. The resulting sample was 417 students (Mean age= 19 years; 88% women). One multivariate outlier was identified and excluded (N=416). In terms of ethnic diversity, this sample consists of 62% Whites, 10% Blacks, 19% East and South Asians, 15% with other ethnic identities. In terms of siblings, 49% had only one sibling, 31% had two siblings, and 20% had three or more siblings.

Measures

Parental and peer alienation. Feelings of alienation with parents and peers was assessed by the alienation subscale of the Inventory of Parent and Peer Attachment (IPPA; Armsden & Greenberg, 1987). The IPPA assesses young peoples' positive and negative affective and cognitive perceptions of parent and peer relationships with three subscales: trust, communication, and alienation. Participants rated the degree to which each statement was true of each relationship using a 5-point scale (1 = Never true; 5 = Always true). Although participants completed the IPPA, given the objective of this study, we used only items from the alienation subscale. Specifically, we selected four respective items for both parental and peer alienation. These items were selected because (a) they captured the presence feelings of detachment and anger as opposed to the absence of these feeling, and (b) they specifically mentioned parents or peers rather than general experiences of alienation. The selected four items were comparable in wording and content in both the parent and peer measures. The internal consistency for the parental alienation items were acceptable across Samples 1 (α =.77), 2 (α =.78), and 3 (α =.77), as were the peer alienation items across Samples 1 (α =.68), 2 (α =.64), and 3 (α =.67).

Supportive sibling climate. Supportive sibling relationships were measured at a general level (i.e. across all siblings for each participant) using an adaptation of the Network Relationship Inventory – Short Form (NRI; Furman & Buhrmester, 2009). Only 5-items of this 13-item inventory was used to assess a range of supportive relationship characteristics. We selected these five items because they capture support and closeness in the sibling relationship rather than general relationship quality or negative characteristics of the sibling climate. Participants rated on a 4-point scale (0=Never; 3=Always) how often a series of characteristics

reflect their relationships with their siblings in general. The internal consistency was very good across Samples 1 (α =.81), 2 (α =.78), and 3 (α =.82).

Stress. The stress thermometer was used to assess perceived levels of stress (Kowalski & Crocker, 2001). Participants were asked to report how much stress they have experienced in the last 6 months with a scale from 0 (no stress) to 100 (most stress ever experienced). This measure has been used in studies with emerging adults (Gaudreau, Nicholls, Levy, 2010; Kaiseler, Polman, Nicholls, 2009).

Psychological distress. The Kessler Psychological Distress Scale (K10+; Kessler et al., 2003) provided a measure of depression and anxiety symptoms. This measure asks participants to rate how often they experienced a list of depressive and anxiety symptoms in the last 6 months using a 5-point Likert-type scale. Participants completed the 10-item version of the scale. However, only the shorter 6-item version was used to test the model for this study because the 4 other items are known to be potentially redundant. This shorter 6-item version is well-established with good reliability and validity as a measure of psychological distress (Brooks, Beard, & Steel, 2006; Kessler et al., 2003). The internal consistency for this measure was comparably good across Samples 1 (α =.85), 2 (α =.85), and 3 (α =.87).

Plan of Analysis

We tested the hypothesized moderated-mediation model with Mplus Version 8 (Muthen & Muthen, 2017) using latent moderated mediation structural equation modelling (LMMS; Klein & Moosbrugger, 2000), which is a strong technique for the estimation and interpretation of indirect and interaction effects (Marsh et al., 2013) and a robust maximum likelihood estimator (MLR) to ensure the standard errors are robust. The main effect mediation and separate moderation models were tested and compared as nested models to assess which one better fitted

the data. Standard fit indices were used to compare alternative null and main effect models that did not include a moderation. These include the chi-square (χ^2) difference test, the root mean square error of approximation (RMSEA < .08), Comparative Fit Index (CFI > 0.90), and Standardized Root Mean Square Residual (SRMR < .08; Kline, 2010). Given these fit indices are not available for the LMMS approach, alternative models that include moderation effects were compared using the scaled loglikelihood and a robust chi-square (χ^2) difference test using the loglikelihood, and the scaling correction values for the nested, more restrictive, and comparison, less restrictive with the interaction term, models.

The moderated-mediation model posits that parental and peer alienation (X) increases psychological distress (Y) through an indirect effect via stress (M). The model also posits that supportive sibling climate moderates (attenuates) the links between parental and peer alienations and stress, between stress and psychological distress, as well as between parental and peer alienation and psychological distress. In other words, there can be a moderation of the path from X to M, referred to as a first-stage moderation and/or the path from M to Y, referred to as a second-stage, as well as a moderation of the path from X to Y, referred to as a direct effect moderation. A moderated-mediation occurs when the conditional indirect effect significantly varies depending on the levels of the moderator (Marsh et al., 2013).

Results

Preliminary Analyses. The measurement model tested the factorial structure of the 20 items of this study using a confirmatory factor analysis (CFA) with robust maximum likelihood estimator (MLR). Across the three samples, parent alienation (PA), peer alienation (PE), sibling climate (SC), and psychological distress (PD) were latent variables and stress (ST) an observed variable. As we will detail below, CFA models provided acceptable fit and all indicator loadings

were significant for the four latent variables and the factors loadings ranged from .50 to .80. In Sample 1, the measurement model had reasonable fit to the data, (MLR) χ^2= 322.59, p < .001, comparative fit index (CFI) = .914, standardized root mean square residual (SRMR) = .054, root mean square error of approximation (RMSEA) = .057, RMSEA 90% confidence interval (CI) = [.048, .066]. In Sample 2, the measurement model had good fit to the data, (MLR) χ^2= 270.93, p < .001, CFI = .925, SRMR = .053, RMSEA = .051, RMSEA 90% (CI) = [.041, .062]. In Sample 3, the measurement model also had good fit to the data, (MLR) χ^2= 350.09, p < .001, CFI = .927, SRMR = .046, RMSEA = .053, RMSEA 90% (CI) = [.046, .061].

Bivariate Correlations among the Latent Variables and Stress

Table 1 presents the correlations, means, and standard deviations of all study variables across the 3 samples. Both parental alienation (PA) and peer alienation (PE) were associated with more psychological distress (PD) (mostly large effect sizes), and more stress (ST) across all samples (small to medium effect sizes). A supportive sibling climate (SC) was negatively related to both parental alienation and peer alienation across all samples (small to medium effect sizes). Supportive sibling climate (SC) was consistently unrelated to stress across all samples, while it was related to less psychological distress (PD) in samples 1 and 3 (small effect sizes). As expected, stress and psychological distress were linked across all samples (medium to large effect sizes).

Testing the Latent Mediation Models

Table 2 presents the fit indices and the parameter estimates for the mediation models. In Sample 1, the mediation model had acceptable fit. In this model stress mediated the association between parental alienation and psychological distress (indirect effect=0.043, p=0.008) suggesting a partial mediation as both the indirect effect and the direct effect (0.135, p=0.027)

were significant. However, stress did not mediate the path between peer alienation and psychological distress (indirect effect=0.033, p=0.076), while there was a direct effect of peer alienation on psychological distress (direct effect=0.212, p=0.001).

In Sample 2, the mediation model also had acceptable fit. In this model, stress did not mediate the association between parental alienation and psychological distress (indirect effect =0.034, p=0.070) nor between peer alienation and psychological distress (indirect effect=0.041, p=0.142). Nonetheless, the direct effects for parental alienation (0.182, p=0.004) and for peer alienation (0.216, p=0.041) on psychological distress were significant.

In Sample 3, the mediation model also had acceptable fit. In this model stress partially mediated the association between parental alienation and psychological distress as both the indirect effect (0.036, p =0.013) and the direct effect (0.228, p< 0.001) were significant. However, stress did not mediate the path between peer alienation and psychological distress (indirect effect = 0.015, p=0.316), as there was only a direct effect (0.154, p=0.032).

Testing the Latent Moderated-Mediation Models

To evaluate the presence of a moderation and the fit of the interactive latent models, several nested models were tested and compared. The first model is a null model where the effect between the predictors (PE, PA, SC, ST) and the outcome (PD) are constraint to 0. The second model is the main effect mediation model where the effect of the predictors (PE, PA, SC, ST) on the outcome (PD) are estimated but not the interaction term. The last three models incorporate the interaction terms, the first-stage (PA x SC and PE x SC), second-stage (ST x SC), and direct effect (PA x SC and PE x SC) moderation, to test whether the addition of these parameters will improve the model fit. The chi-square difference test will be used to evaluate the change in the scaled loglikelihood between the nested model with fewer degrees of freedom and the

comparison model (Satorra & Bentler, 2010). A significant change in chi-square implies there is an interaction and additional parameter (the interaction terms) improves the fit. In this case, further simple slope calculations are necessary to identify the specific conditional effects at varying levels of the moderator.

In Sample 1, the null model (PA PE SC ST ON PD @0) with 65 estimated parameters had a loglikelihood of -7418.26 and a scaling correction of 1.050. The residual variance for PD was 0.193. The main effect mediation model (69 estimated parameters) illustrated a loglikelihood of -7343.46 (scaling correction 1.057). For this model, the residual variance for PD is 0.104 suggesting the addition of the main effects of parental alienation, peer alienation, and stress explains 49% of the variance in PD. The addition of the main effects resulted in a significant change in χ^2 = 127.78, df =4, p<0.001. Therefore, the mediation model with four additional parameters better fits the data than the null model. The first stage moderation model (71 estimated parameters) had a log likelihood of -7343.13 (scaling correction 1.050), the second stage model (70 estimated parameters) had a log likelihood of -7342.48 (scaling correction 1.054), and the direct moderation model (71 estimated parameters) had a log likelihood of -7340.73 (scaling correction 1.066). Using the robust chi-square difference test, the addition of the interaction term in the first stage (χ^2=0.816, df =2), second stage (χ^2 = 2.31, df =1), and direct effect (χ^2=3.966, df =2) models resulted in a non-significant change.

In Sample 2, the null model (65 estimated parameters) had a log likelihood of -6153.43 (scaling correction 1.1429). The residual variance for PD was 0.205. The main effect mediation model (69 estimated parameters) illustrated a loglikelihood of -6112.82 (scaling correction 1.135). The residual variance for PD is 0.138 in the mediation model suggesting the addition of the main effects of parental alienation, peer alienation, and stress explains 35% of the variance in

PD. In comparison to the null model, the addition of the main effects resulted in a significant change in χ^2=80.543, *df* =4, p<0.001 confirming that the mediation model better fits the data. The first stage moderation model (71 estimated parameters) had a log likelihood of -6112.37 (scaling correction 1.050), the second stage model (70 estimated parameters) had a log likelihood of -6112.80 (scaling correction 1.137), and the direct moderation model (71 estimated parameters) had a log likelihood of -6112.43 (scaling correction 1.138). In comparison to the main effect mediation model using the robust chi-square difference test, the addition of the interaction term in the first stage (χ^2=0.54, *df* =2), second stage (χ^2=0.03, *df* =1), and direct effect (χ^2=0.63, *df* =2) models resulted in a non-significant change.

In Sample 3, the null model (65 estimated parameters) had a log likelihood of -10143.15 (scaling correction 1.1144). The residual variance for PD was 0.291. The main effect mediation model (69 estimated parameters) illustrated a log likelihood of -10072.22 (scaling correction 1.1394). The residual variance for PD is 0.188 suggesting the addition of parental alienation, peer alienation, and stress explains 34% of the variance in PD. The addition of these main effects resulted in a significant change in χ^2=91.771, *df* =4, p<0.001. The first stage moderation model (71 estimated parameters) had a log likelihood of -10071.53 (scaling correction 1.040), the second stage model (70 estimated parameters) had a log likelihood of -10072.22 (scaling correction 1.142), and the direct moderation model (71 estimated parameters) had a log likelihood of -10071.09 (scaling correction 1.146). The addition of the interaction term in the first stage (χ^2=1.19, *df* =2), second stage (χ^2=0.00, *df* =1), and direct effect (χ^2=1.65, *df* =2) models resulted in a non-significant change in comparison to the mediation model.

In sum, there are two key results across the three sample. First, the change in chi-square between the null model and the mediation model consistently illustrates the mediation model,

with less degrees of freedom, is a better fit to the data. Second, the change in chi-square between the mediation models and moderated-mediation models were not significant. This consistently implies that sibling climate yielded no moderation effects on the mediation model. Hence, the mediation model was a better fit to the data and was the most parsimonious model.

Discussion

Research suggests sibling interactions have developmental, clinical, and cultural implications on development and mental health (McHale et al., 2013). The main objective of this study was to test a hypothesized moderated-mediation model in which a supportive sibling climate is a protective factor against the risk that stress from feelings of alienation with parents and peers poses to psychological distress in emerging adults. Furthermore, our analyses also allowed to examine two alternative models: a compensatory and promotive factor model.

A supportive sibling climate may not be sufficiently protective

First, in terms of potential risk factors, we found that parental and peer alienation were associated with more psychological distress across all samples. This was expected and in accordance with previous empirical findings indicating that feelings of alienation in relationships with parents and peers may represent risk factors that are linked to an increase in psychological distress (Raudino et al., 2013). This is also in line with interpersonal theories according to which relational issues can contribute to depression (Eberhart & Hammen, 2006; Hames, Hagan, & Joiner, 2013). That being said, conversely, it is also possible that for some individuals, pre-existing levels of psychological distress may have also contributed to feelings of alienation in their relationships. Indeed, research suggest that depression and anxiety symptoms can gradually disrupt and erode the quality of relationships despite close ones trying to be supportive, at least initially (Hames et al., 2013; Pettit et al., 2011).

Second, although cross-sectional, findings in two samples bring preliminary evidence that stress can partially mediate the link between feelings of alienation with parents and psychological distress. This was expected and supports the theorized mediating role of stress in the link between impaired interpersonal relationships and psychological distress (Eberhart & Hammen, 2006). This finding is interesting as it teases out that stress may be a mechanism that explains how feelings of alienation vis-à-vis parents may lead to depression and anxiety symptoms. This finding is compatible with work indicating that interpersonal problems are stressful (Darling, McWey, Howard, & Olmstead, 2007), as well as with research showing that perceived stress can lead to more depression and anxiety symptoms in general (Hammen, 2005; Liu & Alloy, 2010; Schulenberg et al., 2004; Riggs & Han, 2006).

Third, contrary to our expectation, results across all samples have also shown that stress did not mediate the link between peer alienation and psychological distress. This is intriguing because peers are still very important in emerging adulthood (Arnett, 2007; Chow, Roelse, Buhrmester, & Underwood, 2012). In fact, it is during emerging adulthood that social networks become the largest during human development (Wrzus, Hänel, Wagner, & Neyer, 2012). As such, feelings of alienation with peers was related to stress at a bivariate level, however, in the mediation model of two of our samples, feelings of alienation with peers was not related to stress once feelings of alienation with parents was accounted for. Two possible explanations can be proposed for future research. First, peer alienation may not be as consequential as parent alienation because emerging adults have more independence from and flexibility with their friendships. For instance, young adults can make new friends but they cannot (or rarely) find new parents. After all, the significance of attachment between people and their parents can last a life time (Mikulincer & Shaver, 2007), which is why difficulties in this relationship might be

cumulative, lingering, and thereby particularly problematic. Second, the association between peer alienation and psychological distress might be better explained by other mediators. For example, it is possible that peer alienation could lower self-esteem, which in turn would increase psychological distress. Indeed, peer alienation has been found to be associated with lower self-esteem (Laible, Carlo, & Roesch, 2004), while lower self-esteem is known to be related to more depression and anxiety (Sowislo & Orth, 2013).

Lastly, contrary to our hypothesized protective model, results across the three samples indicated that supportive sibling climate did not moderate the links among parental and peer alienation, stress, and psychological distress. Hence, support from siblings did not buffer the two hypothesized pathways based on the *stress-buffering hypothesis*, namely (a) the negative effect of stressful experiences (parent and peer alienation) on stress, nor (b) the negative effect of stress on psychological distress. Prior studies with emerging adults have shown that social support from family can have a stress-buffering effect against depression (Lee & Dik, 2017; Raffaelli et al., 2013), however, this is not the case for supportive siblings in our three samples. There could be two reasons for this. First, rather than an overall climate of support from siblings, it might be that receiving support from one sibling in particular might be protective against parental alienation, peer alienation, or stress. Second, perhaps this study did not find a protective effect of supportive sibling climate because - unlike previous studies - it used LMMS which is a much more sophisticated and rigorous statistical technique (Marsh et al., 2013). In sum, if siblings do provide support during emerging adulthood, then our study suggests that it is not sufficiently protective against the risks that parent and peer alienation poses to psychological distress.

Can a supportive sibling climate still compensate for risks to mental health?

A supportive sibling climate is probably not a compensatory factor vis-à-vis the risks of feelings of alienation, as our findings across all samples indicated that once parental and peer alienation were considered, a supportive sibling climate did not predict less psychological distress. That said, the compensatory effect of sibling support has generated mixed-findings across previous studies. Some studies suggest that siblings probably have some beneficial and compensatory effects for mental health (less depression) in the context of low support from parents and peers (Milevsky, 2005). On the other hand, a study of 102 young adults failed to find a compensatory effect of harmonious (high warmth, low conflict) sibling relationships when considering low-involved friendships (low warmth, low conflict; Sherman et al., 2006).

Nevertheless, looking back at those prior mixed-findings, the feelings of alienation examined in our study may be more deleterious than the perceived lack of social support in prior studies. As such, in our study, siblings might have been ineffective to compensate for feelings of alienation from parents and peers because it is too severe of a risk, whereas in prior studies, siblings may sometimes be efficacious to compensate for the risk incumbent to lack of support or warmth from parents and peers. In sum, future studies on the role of siblings for mental health should routinely control for other family and interpersonal relationships – notably with parents and friends – to avoid overestimating the potential role of siblings in emerging adulthood.

Can a supportive sibling climate still promote mental health?

A supportive sibling climate is probably beneficial in itself and is perhaps even a promotive factor for mental health. Our findings indicated that – at least *as per* the simple bivariate interrelations in two out of three samples – experiencing a supportive sibling climate is related to less psychological distress in emerging adulthood. Of course, given the cross-sectional

nature of our data, it is not possible to exclude that perhaps it is mental health (less psychological distress) that predicts more sibling support. Nevertheless, our promotive interpretation is consistent with prior longitudinal evidence suggesting that yearly increases in sibling support are related to decreases in depressive symptoms in emerging adulthood (Guan & Fuligni, 2016).

However, our findings also revealed complexities in understanding support from siblings as a promotive factor in emerging adulthood. Although sibling climate was not related to stress at a bivariate level, notably, in the mediation model of one of our samples, participants who reported experiencing a more supportive sibling climate also reported being more stressed. Rather than indicating that supportive siblings can also be stressful, this finding may suggest that these young people who were more stressed actually solicited and in turn perceived more support from their siblings. Of course, longitudinal data would be necessary to examine the directionality of this link conclusively. In all cases, it is important to reiterate that although bivariate relationships suggest that supportive sibling climate might be a promotive factor, this possible promotive effect disappears when risk factors (parent and peer alienation) are considered.

Limitations

There are methodological limitations that must be considered when appraising the implications of our findings. First, the cross-sectional design did not allow to test a longitudinal sequence for the moderated-mediation model. Second, our conceptualization of risk in parental and peer relationships was specific to feelings of alienation, which of course, does not capture other possible sources of difficulties (e.g., conflicts) that can be experienced in these relationships. Third, the data was entirely based on self-report measures that provide only the subjective perspective of one actor in the family system and peer social network. Fourth, as previously mentioned, our measure of supportive sibling climate might have been too broad to

capture some potential protective effects from a given supportive sibling relationship. Fifth, the measure of stress was also general and could have been more specific to stress experienced from parental and peer relationships.

Conclusion

In sum, our main results indicate that although experiencing a supportive sibling climate is probably beneficial, it does not seem to be sufficient to act as a potential protective factor against stress from parental alienation and peer alienation in emerging adulthood. In particular, this study underscores that emerging adults who feel parental alienation also experience more psychological distress and that the co-occurrence between both issues could be partially explained by an increase in stress. As it turns, this study also highlights that parental relationships probably maintain an enduring impact during emerging adulthood. This observation is in line with the notion that although young adults are increasingly autonomous, the quality of relationships with their parents still matters (Guan & Fuligni, 2016; Mattanah, Lopez, & Govern, 2011).

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Table 1. Means, standard deviations, and correlations between the latent variables, parent alienation (PA), peer alienation (PE), sibling climate (SC), stress (ST), and psychological distress (PD) in the CFA model for each sample.

Sample	Variables	1. PA	2. PE	3. SC	4. ST	5. PD
Sample 1 (N=310)	1	2.47 (0.82)				
	2	.574**	2.30 (0.68)			
	3	-.384**	-.168*	2.59 (0.53)		
	4	.333**	.306**	-.065	0.71 (0.20)	
	5	.566**	.567**	-.269**	.482**	2.41 (0.45)
Sample 2 (N=259)	1	2.42 (0.77)				
	2	.540**	2.17 (0.54)			
	3	-.391 **	-.272 **	2.63 (0.46)		
	4	.269**	.272**	.024	0.66 (0.20)	
	5	.469**	.457**	-.082	.402**	2.25 (0.46)
Sample 3 (N=416)	1	2.31 (0.87)				
	2	.545**	2.18 (0.69)			
	3	-.401 **	-.173*	2.62 (0.55)		
	4	.241**	.189**	-.022	0.70(0.19)	
	5	.526**	.438**	-.176**	.370**	2.29 (0.54)

Note. The means are reported in the diagonal and the standard deviation in the parentheses. The means are based on the observed items and were calculated in SPSS. The standard deviation was calculated as the square root of the variance of the latent variable.
*p < .05. **p < .01.

Table 2. Fit Indices for Null, Main, and Interaction models across the three samples.

Sample	Model	X^2	df	p-value	L.L	S.C	E.P.	CFI	RMSEA	SRMR	AIC	BIC
Sample 1 (N=310)	Null	459.96	165	< .001	-7418.26	1.050	65	.842	.076	.148	14966.53	15209.40
	Main	322.59	161	< .001	-7343.46	1.057	69	.914	.057	.054	14824.92	15082.74
	1st stage	--	--	--	-7343.13	1.050	71	--	--	--	14828.26	15093.56
	2nd stage	--	--	--	-7342.48	1.054	70	--	--	--	14824.97	15086.53
	Direct	--	--	--	-7340.73	1.066	71	--	--	--	14823.47	15088.77
Sample 2 (N=259)	Null	348.73	165	< .001	-6153.43	1.143	65	.875	.066	.120	12436.86	12668.05
	Main	270.93	161	< .001	-6112.82	1.135	69	.925	.051	.053	12363.64	12609.06
	1st stage	--	--	--	-6112.37	1.150	71	--	--	--	12366.74	12619.27
	2nd stage	--	--	--	-6112.80	1.137	70	--	--	--	12365.60	12614.58
	Direct	--	--	--	-6112.43	1.138	71	--	--	--	12366.85	12619.38
Sample 3 (N=416)	Null	476.73	165	< .001	-10143.15	1.1144	65	.879	.067	.129	20416.29	20678.29
	Main	350.09	161	< .001	-10072.22	1.1394	69	.927	.053	.046	20282.45	20560.57
	1st stage	--	--	--	-10071.53	1.140	71	--	--	--	20285.06	20571.24
	2nd stage	--	--	--	-10072.22	1.142	70	--	--	--	20284.45	20566.60
	Direct	--	--	--	-10071.09	1.146	71	--	--	--	20284.17	20570.35

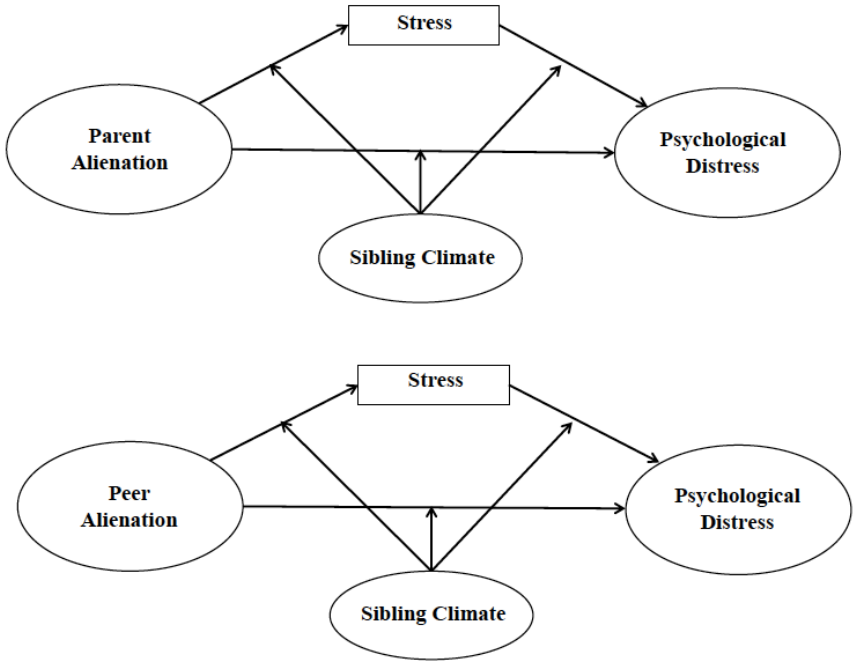
Note. Standard fit indices are not available for interaction models using the LMS approach. LL refers to the loglikelihood, SC refers to the scaling correction for the loglikelihood, and EP refers to the number of estimated parameters for each model. In terms of models, Null refers to the model with no direct effects between the predictors and the outcome, Main refers to the main effect mediation model, 1st stage refers to the first-stage moderation model, 2nd stage refers to the second-stage moderation model, and Direct refers to the moderation of the direct effect model.

Table 3. The standardized coefficients for the main effect model of the predictors parent alienation (PA), peer alienation (PE), and sibling climate (SC) on the stress (ST) and psychological distress (PD) as well as the unstandardized coefficients for the first-stage and direct interaction effects (PAxSC and PExSC) on stress and psychological distress as well as the second-stage interaction effect (STxSC) on psychological distress (PD). These coefficients are provided for each sample.

		Outcome: ST (Mediator)					Outcome: PD (Y)						
Sample	Model	PA	PE	SC	PAxSC	PExSC	PA	PE	SC	ST	PAxSC	PExSC	STxSC
Sample 1 (N=310)	Main	0.263**	0.166*	0.064	--	--	0.244*	0.319**	-0.103	0.297**	--	--	--
	1st stage	0.062**	0.051*	0.027	-0.028	0.031	0.136*	0.211**	-0.089	0.673**	--	--	--
	2nd stage	0.064**	0.049	0.023	--	--	0.132*	0.216**	-0.090	0.666**	--	--	-0.324
	Direct	0.064**	0.050	0.024	--	--	0.126	0.226**	-0.100	0.664**	-0.061	-0.106	--
Sample 2 (N=259)	Main	0.230*	0.193	0.167**	--	--	0.306**	0.252*	0.101	0.248**	--	--	--
	1st stage	0.060**	0.077	0.070*	0.018	0.035	0.182**	0.217*	0.102	0.562**	--	--	--
	2nd stage	0.060*	0.073	0.073*	--	--	0.182**	0.216*	0.102	0.565**	--	--	0.067
	Direct	0.061*	0.073	0.073**	--	--	0.185**	0.204*	0.099	0.571**	0.046	-0.161	--
Sample 3 (N=416)	Main	0.233**	0.077	0.085	--	--	0.365**	0.195*	0.010	0.245**	--	--	--
	1st stage	0.051**	0.023	0.029	0.028	-0.047	0.229**	0.154*	0.011	0.684**	--	--	--
	2nd stage	0.052**	0.022	0.030	--	--	0.228**	0.153*	0.009	0.682**	--	--	-0.016
	Direct	0.052**	0.022	0.030	--	--	0.223**	0.158*	0.009	0.694**	-0.113	0.143	--

Note *p < .05. **p < .01. In terms of models, Main refers to the main effect mediation model, 1st stage refers to the first-stage moderation model, 2nd stage refers to the second-stage moderation model, and Direct refers to the moderation of the direct effect model.

Figure 1. The hypothesized moderated-mediation model



CHAPTER 3: The Protective Role of One's Closest Sibling Against Psychological Distress

Can Siblings Protect Against Parent and Peer Alienation, Stress, and Psychological Distress?

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Abstract

Supportive siblings promote mental health in childhood and adolescence, but their protective effect is less known in emerging adulthood. In two studies with emerging adults (N = 789 and N = 325), we conducted latent moderated-mediation structural equation modeling to examine if support from one's closest sibling moderated links among parent and peer alienation, stress, and psychological distress. Overall, parent and peer alienation were associated with more distress through general stress. However, having a supportive sibling accentuated the link between peer alienation and stress, while attenuating the link between stress and distress. Sibling support also attenuated the direct effect of parent alienation on distress. In sum, sibling support only partially and inconsistently protected against alienation and stress in emerging adulthood.

Can Siblings Protect Against Parent and Peer Alienation, Stress, and Psychological Distress?

Siblings are one of the most common and longest-lasting relationships in people's lives. In fact, the majority of young people have at least one sibling (McHale, Updegraff, & Whiteman, 2013; Statistics Canada, 2011) suggesting these relationships are ubiquitous. Of course, sibling relationships are complex as they can be characterized by a flux of often intense positive and negative interactions (Dunn, 1988; Dunn & Kendrick, 1982; Kramer, 2010). Nonetheless, research has shown that sibling relationships improve in quality as adolescents enter emerging adulthood, when these relationships have more autonomy, and are less conflictual and more positive (Scharf, Shulman, & Avigad-Spitz, 2005). As such, there is growing scientific interest for siblings and mental health in emerging adulthood (Shanahan, Waite, & Boyd, 2012). While there are some mental health benefits of supportive siblings, researchers have rarely tested the potential protective role of supportive siblings for mental health during emerging adulthood. Recently, the present authors (2020) conducted a study using latent moderated structural equation modeling, which found that stress may partially mediate the link between parental (but not peer) alienation and psychological distress among emerging adults. However, experiencing a supportive sibling climate (i.e., average support across all siblings) was not protective as it did not moderate the links among alienation, stress, and psychological distress. To build on and extend this initial study, the present article reports on two more fine-grained studies that examined if support from one's closest sibling could moderate (attenuate) the links among parent and peer alienation, stress (general or interpersonal), and psychological distress among emerging adults.

Siblings, Social Support, and Mental health

Two theories, namely family and ecological systems theory, can highlight the significance of siblings in development, and have informed the extensive sibling research in childhood and adolescence (Brody, 1998; McHale et al., 2013). *Family Systems Theory* recognizes siblings as a relational and interdependent subsystem of the family. This underlines the capacity of siblings within the family to influence individual development and adjustment while also reciprocally influencing other subsystems (Cox, 2010; Cox & Paley, 1997). Similarly, Bronfenbrenner's *Ecological Systems Theory*, presents siblings as actors in the microsystem; such that siblings, both independently and with other actors, influence an individual (Bronfenbrenner, 1979). Conceptually, family and ecological systems theories provide grounding for the study of siblings and their potential roles at different periods of development, including emerging adulthood (Whiteman, McHale, & Soli, 2011). Although, these theories provide a general justification for developmental research on siblings, there is a lack of theories on the specific justification for mental health research on siblings, especially their potentially protective role against symptoms of psychological distress (depression and anxiety). The well-known concept of social support can provide an analytical framework to posit a protective role of sibling support in the maintenance of mental health in youth.

Theoretically, social support refers to the support individuals receive or perceive to be available in interpersonal relationships (Cohen et al., 2000; House & Kahn, 1985). This concept is commonly studied in diverse disciplines including epidemiology, sociology, psychology, and public health, and as such can be conceptualized and measured differently across studies and fields. However, from this array of conceptualizations, we can distill four broad features of social support (Cohen et al., 2000; Turner, 1983). First, it involves closeness and intimacy in a

relationship such that if support was needed the relationship partner would be available. Second, it entails expressions of care, affection, and concern broadly referred to as emotional or affectionate support (Cohen et al., 2000). Third, it includes informational and instrumental support by providing advice, help, and material resources (Cohen et al., 2000). Fourth, it includes appraisal, esteem, and positive social interactions that generates a sense of acceptance and belonging through shared activities, affirmations of self-worth, and the presence of others (Cohen et al., 2000). Overall, social support provides individuals with a sense that they are admired, cared for, and that they belong to a caring and reciprocal relationship (Cohen et al., 2000; House & Kahn, 1985).

Supportive Siblings as a Protective Factor against alienation, stress, and psychological distress

In emerging adulthood, siblings are recognized as a source of social support, especially when these relationships are characterized by eight qualities: intimacy, affection, knowledge, acceptance, emotional support, instrumental support, similarity, and admiration (Stocker, Lanthier, & Furman, 1997). These eight qualities can also represent a broad dimension of sibling warmth (Stocker et al., 1997); but nonetheless encompass the concept of social support that is of interest for the present research. Supportive sibling relationships are associated with fewer depressive symptoms in adolescence and emerging adulthood (Branje, van Lieshout, van Aken, & Haselager, 2004; Milevsky, 2005; Sherman et al., 2006; Updegraff et al., 2002).

A developmental psychopathology framework can inform risk research by proposing promotive, compensatory, and protective factors that may predict the absence or decrease in psychological distress (Rutter, 1985). As a promotive factor, sibling support would be related to less psychological distress; as a compensatory factor sibling support would be related to less

psychological distress in the context of risk exposure. The present research focuses on a supportive sibling relationship as a protective factor that can attenuate the links between risk factors (parental and peer alienation) and a negative outcome (stress and psychological distress). While there is evidence for the promotive effects of sibling support (Guan & Fuligni, 2016), evidence of the compensatory nature of these relationship is mixed (Milevsky, 2005; Sherman et al., 2006). Notably, to our knowledge, the protective role of sibling support has only been tested in one study on emerging adults, which found that a supportive sibling climate did not moderate (buffer against) the links among parental or peer alienation, stress, and psychological distress (authors, 2020). That said, as we will further explain, that previous study used a very broad measure of support across all siblings (not one's closest sibling) and measured stress experienced in general (not stress from interpersonal relationships).

In this study, we draw on research in the areas of social support and mental health, and specifically the *Stress-Buffering Hypothesis*. Scholars have repeatedly acknowledged the *Stress-Buffering Hypothesis* as a theoretical framework to examine the ways perceived social support can counteract the adverse effects of stress on mental health (Cohen, Gottlieb & Underwood, 2000; Cohen & Wills, 1985). This hypothesis posits that the link between negative experiences and stress and between stress and poor mental health will be weaker for individuals with more social support.

Parent and Peer alienation as stressful risk factors that can lead to psychological distress

Parent and peer relationships are valuable in emerging adulthood and particularly for mental health (Arnett, 2007; Mattanah, Lopez, & Govern, 2011; Raudino et al., 2013). Despite the fewer interactions young adults have with their parents, the quality of parental ties continues to be instrumental for their mental health (Agerup et al., 2014; Arnett, 2007; Collins, Raby, &

Causadias, 2012). Although parent-child relationships are fundamental, peer relationships are increasingly prominent by adolescence into emerging adulthood and have significant impact on mental health (Arnett, 2007; Chow, Roelse, Buhrmester, & Underwood, 2012). Specifically, alienation in parent and peer relationships is characterized by feelings of emotional withdrawal, anger and being misunderstood, as well as perceived inability to confide one's feelings and emotional detachment (Armsden & Greenberg, 1987). Parent and peer alienation is associated with psychological distress in terms of increased symptoms of depression and anxiety (Allen et al., 2007; Eberhart & Hammen, 2006; Hoeve, Stams, van der Put, Dubas, van der Laan, Gerris, 2012; Leondari & Kiosseoglou, 2000; Raudino et al., 2013; Tambelli, Laghi, & Notari, 2012).

In the present research, we focus on parent and peer relationships characterized by feelings of alienation as risk factors that lead to psychological distress through the mediating effects of stress, either general stress or stress from parent and peer relationships. Although emerging adulthood is generally considered a period of improved mental health, stress associated with interpersonal relationships can pose a risk for experiencing psychological distress through symptoms of depression and anxiety (Rudolph, 2009; Schulenberg et al., 2004). Specifically, difficulties in relationships can increase stress (Aldwin, 2007), which in turn can lead to more psychological distress (Compas et al., 2001; Compas & Reeslund, 2009). Also, young adults experience higher rates of interpersonal stress, which have a greater and more lasting effect on this age group compared to older age groups (Birditt, Fingerman, & Almeida, 2005).

The Present Research: Moderated-Mediation Model for the Protective Role of Siblings

There is both cross-sectional and longitudinal evidence for the protective role of siblings in childhood and adolescence (Branje et al., 2004; Gass, Jenkins & Dunn, 2007). However, these protective models are quite rare in the literature on emerging adulthood. To fill this caveat, we

conducted two studies that propose a moderated-mediation model – grounded in the *Stress-Buffering Hypothesis*, systems theories, and prior empirical research on siblings – in which a supportive relationship with one's closest sibling can be a protective factor against the risks that stress from alienated relationships with parents and peers can pose to psychological distress in emerging adulthood. As illustrated in Figure 1, this proposed model integrates both hypotheses of mediation and moderation to examine both the indirect effect of a mediator and the conditional effects of this moderator. A moderated-mediation occurs when a given level of a given moderator significantly alters the indirect effect of the mediation model (Marsh et al., 2013). The proposed model hypothesizes that support from one's closest sibling can potentially moderate all paths in the mediation model: the path from feelings of alienation to general and interpersonal stress (path a1 and a2), the path from general and interpersonal stress to poor psychological distress (path b1 and b2) and the path from feelings of alienation to psychological distress (path c). More precisely, Study 1 tests the mediating role of general stress, while Study 2 test the mediating role of both general stress and interpersonal stress. Overall, in both studies, the proposed moderated-mediation model is tested separately for parent and peer alienation.

Plan of Analysis

These studies rely on the latent moderated mediation structural equation modelling technique (LMMS; Klein & Moosbrugger, 2000) in Mplus Version 8 (Muthen & Muthen, 2017) using the robust maximum likelihood estimator (MLR). LMMS is a recommended technique for the estimation and interpretation of latent moderation and mediation effects (Marsh et al., 2013). Using the LMMS technique, the mediation and moderation models are tested separately as nested models and compared across fit indices using a 3-step process. First, step 1 is to test and compare the latent mediation models to a null model using conventional fit indices. In the null

model, the effect of the independent variables on the outcome is restricted to 0 and in the main effects model, the main mediation effect with the direct and indirect effects are estimated. These models are compared using indices' thresholds from the Root Mean Square Error of Approximation (RMSEA < .08), Comparative Fit Index (CFI > 0.90), and Standardized Root Mean Square Residual (SRMR < .08), as well as the chi-square difference test (Kline, 2010).

Second, step 2 is to test and compare the latent moderated-mediation models with the latent mediation models. Alternative models that include moderation effects will rely on the scaled loglikelihood and a robust chi-square (χ^{22}) difference test to compare models. This approach compared the more restrictive model without a moderation effect to the less restrictive model with a moderation effect using the loglikelihood and the scaling correction values (Satorra & Bentler, 2010). A significant interaction effect and a significant change in the chi-square difference test implies the addition of the interaction term improves the fit of the model. The final step, step 3, is to test the simple slope effects of the moderator to identify the conditional effects of the predictor on the outcome at high and low levels of moderator and their associated statistical significance. Although any conditional values of the moderator can be used, in keeping with common practice, we will test one standard deviation above and below the mean.

STUDY 1

The purpose of study 1 is to test a moderated-mediation model in which support from one's closest sibling can moderate the links among parent and peer alienation, general stress, and psychological distress.

Method

Participants

Participants consist of undergraduate students recruited using an online research participant pool at a Canadian university in the spring and fall of 2015. Upon providing informed consents, participants completed an online survey located on PsychData.com. The participants were compensated for their participation with a credit towards their grade in a course. The research ethics board at the authors' university provided ethical approval for this study.

The raw data was prepared for analysis by removing invalid/duplicate entries, incomplete entries and entries that did not meet inclusion criteria. From the raw data of 1057 entries, entries were excluded for one or more of the following reasons: duplicates and invalid participant identifiers (n=211), missing 40% of measures (n=12), not meeting inclusion criteria of having a sibling (n=15) and being under 25 years old (n=26). The final sample was 792 undergraduate students (mean age=18.8 years; 88% women). Mahalanobis distances were used to identify multivariate outliers, this sample had three multivariate outliers that were excluded (N=789). Full Information Maximum Likelihood (FIML) was used to replace missing values in Mplus. The ethnic diversity of this sample consisted of Whites (65%), Blacks (10%), East and South Asians (14%), and participants of other ethnic groups (11%). The sibling distribution of this sample consisted of participants with one sibling (47%), two siblings (28%), and three or more siblings (25%).

Measures

Relationships with Parents and Peers. The Inventory of Parent and Peer Attachment (IPPA; Armsden & Greenberg, 1987) consists of three subscales (trust, communication and alienation) and was used to assess positive and negative experiences in parent and peer relationships. Using a 5-point scale (1 = Never True; 5 = Always true) participants rate the extent

to which a series of statements, specific to parent and peer relationships, are true. For the purposes of this study, only four items of the alienation subscale were used and these items were parallel in both wording and content for both parent and peer relationships. To best reflect experiences of alienation, these items explicitly mentioned parents or peers and referred directly to the presence of detachment and anger. The internal consistency for the parent items (α =0.77) and the peer items (α =0.67) were acceptable.

Supportive Sibling Relationships. Sibling relationships were measured with the Adult Sibling Relationships Questionnaire (ASRQ; Stocker, Lanthier, & Furman, 1997), an 81-item scale used to assess sibling relationship qualities across three broad dimensions of warmth, conflict, and rivalry. Participants identified their 'closest' sibling and rated statements about their sibling relationship with a 5-point scale (1= Hardly at all; 5 = Extremely Much). For this study, the warmth dimension was used to capture supportive characteristics of sibling relationships. This psychometrically validated dimension, and its subscales, was selected because it has considerable conceptual breadth within the 8 subscales which best corresponded to this study's conceptualization a supportive sibling relationship and the main theoretical features of social support. For sake of parsimony and to represent the different facets of social support, a single indicator (one item) was selected from each subscale based on: (a) the simplest and most general wording, (b) the absence of references to a sibling's personality or other relationships and (c) most closely match in wording to the support characteristic of each subscale (e.g., accept, similar, close, support). The selected items illustrated good internal consistency (α=0.84).

Stress in General. General stress was measured using a single-item stress thermometer (Kowalski & Crocker, 2001). This item asked participants with a scale ranging from 0 (no stress) to 100 (most stress ever experienced) to indicate the amount of stress they experienced in

general. Studies on stress with emerging adults have used this stress thermometer on a regular basis (Gaudreau, Nicholls, Levy, 2010; Hadd & Crocker, 2007).

Psychological Distress. Psychological distress was assessed by symptoms of depression and anxiety as measured by the Kessler Psychological Distress Scale (K10+; Kessler, Barker, Colpe, Epstein, Gfroerer, Hiripi, Howes, Normand, Manderscheid, Walters, & Zaslavsky, 2003). Using a 5-point Likert-type scale, participants report how often they experienced psychological symptoms. Although participants completed the 10 items, only six items were used for this study because fewer items were more parsimonious and have good reliability and validity (Brooks, Beard, & Steel, 2006; Kessler et al., 2003), also the additional items were possibly redundant (Kessler et al., 2003). The internal consistency for this measure was good (α=0.85).

Results and Discussion

Preliminary Analyses. A confirmatory factor analysis (CFA) tested the factorial structure (23 items) of the study variables using a robust maximum likelihood estimator (MLR). This measurement model indicated an acceptable fit with (MLR) χ^2=659.84, p<0.001, CFI=0.924, SRMR=0.041, RMSEA= .050, RMSEA 90% confidence interval (CI)=[.046, .055], p=0.453. All item loadings were significant and were between .50 to .90 for the five latent variables: Parent alienation, peer alienation, sibling support, stress and psychological distress. Table 1 presents the correlations, means, and standard deviations of these variables.

Standardized Bivariate Correlations among the Latent Variables. Parent and peer alienation were related (r=0.578, p<0.01) and both related to more general stress (r=0.279, p<0.01 and r=0.192, p<0.01, respectively) and more psychological distress (r=0.477, p<0.01 and r=0.484, p<0.01, respectively). A supportive sibling relationship was negatively associated with parental and peer alienation (r=-0.446, p<0.01 and r=-0.251, p<0.01, respectively), and

psychological distress (r=-0.253, p<0.01), yet unrelated to general stress (r=-0.074, p=0.07). Lastly, general stress was linked to more psychological distress (r=0.380, p<0.01).

Step 1: Testing the Latent Mediation Models. This study tested parent and peer alienation models separately. In the parent alienation mediation model, stress partially mediated the association between parental alienation and psychological distress with both an indirect effect (0.083, p<0.001) and direct effect (0.369, p<0.001). This model had 62 estimated parameters (EP) and acceptable fit, MLR χ^2=492.27, p<0.001, CFI=0.933, SRMR=0.041, RMSEA=0.055, and RMSEA 90% CI=[0.049, 0.060], p=0.073. Similarly, in the peer alienation mediation model, stress partially mediates the path between peer alienation and psychological distress with evidence of both an indirect effect (0.054, p< 0.001) and direct effect (0.393, p<0.001). This mediation model (62 EP) had comparable fit, MLR χ^{22}= 484.70, p<0.001, CFI=0.929, SRMR=0.041, RMSEA=0.054, and RMSEA 90% CI=[.049, .059], p=0.102.

Step 2: Testing the Latent Moderated-Mediation Models. For the parent alienation models, the null model with 59 estimated parameters (EP) had a log-likelihood (LL) of -18661.44 and the main effect mediation model (62 EP) illustrated a LL of -18556.04. The residual variance for PD in the null model was 0.183, in the mediation model it was 0.138 suggesting the mediation model explains 30% of the variance in PD. The chi-square difference test resulted in a significant change, $\chi^2(3) = 172.36$, p<0.05 which implies the mediation model had better fit.

The first interactive model tested whether parent alienation interacts with sibling support to predict stress (first stage) and psychological distress (direct effect moderations) and this model (64 EP) had a LL of -18554.78. The second interactive model estimated whether sibling support and stress interact to predict psychological distress (second-stage interaction) and this model (63

EP) has a LL of -18554.76. Both the first and second interactive models resulted in a non-significant change in the robust chi-square difference test ($\chi^{22}(2) = 2.21$; $\chi^{2}(1)^{2} = 2.31$, respectively) and did not significantly improve in fit compared to the mediation model. Therefore, the mediation model, in which stress partially mediates the path between parent alienation and psychological distress, was the most parsimonious and best fit the data.

For the peer alienation models, the null model with 59 estimated parameters (EP) had a loglikelihood (LL) of -18604.31and the main effect mediation model (62 EP) had a LL of -18491.17. In comparison to the residual variance of PD in the null model (0.183) and the mediation model (0.131), the addition of the main effects of peer alienation and stress explains 34% of the variance in PD. The chi-square difference test resulted in a significant change in $\chi^{2}(3)^{2} = 177.75$, $p<0.05$, therefore, the mediation model with additional parameters better fits the data.

Similar to the parent alienation models, there were two interactive models tested. The first interactive model (64 EP) had a LL of -18486.29. The addition of the first-stage and direct effect moderation in the first interactive model resulted in a significant change in $\chi^{2}(2) = 6.708$, $p<0.05$. The first stage moderation was significant (B=0.049 p=0.022), while the direct effect moderation was not (B=-0.066, p=0.183). The second-stage moderation was tested in the second interactive model (63 EP) which had a LL of -18487.86. The second interactive model had a significant change in $\chi^{2}(1)=10.52$, $p<0.05$, when compared to the mediation model. The second-stage moderation was significant (B=-0.223, p=0.046), which suggest general stress and sibling support interact to predict psychological distress.

Overall, there is first-stage and second-stage moderation of sibling support in the mediation model of peer alienation and psychological distress through general stress. The

presence of a significant indirect effect and significant interaction is not sufficient to evaluate whether there is a moderated-mediation effect of sibling support. Simple slopes calculations are necessary to identify the conditional effects of the mediation model at varying levels of the moderator and the statistical significance of these paths.

Step 3: Testing the Simple Slopes at Conditional values of Moderator. Additional calculations are needed to examine each simple slope: (a) first-stage moderation, peer alienation on stress at high and low levels of sibling support, (b) second-stage moderation, stress on psychological distress at high and low levels of sibling support, as well as (c) the indirect effect of peer alienation on psychological distress via stress at high and low levels of sibling support. High and low levels of sibling support is set to the conditional values of +/- 1 standard deviation from the mean. For the first stage moderation, peer alienation predicts stress only at high levels of sibling support (B=0.097, p<0.001) and not low (B=0.021, p=0.330). For the second-stage moderation, stress has a smaller predictive effect on psychological distress at high levels (B=0.508, p<0.001) compared to low levels (B=0.852, p<0.001) of sibling support. For the moderated indirect effect as the combination of the first and second-stage moderations at high and low levels of support, we found that only at high levels of sibling support did stress mediates the path between peer alienation and psychological distress (indirect effect=0.046, *p*=0.007), while the indirect effect at low levels of sibling support is not significant (indirect effect=0.004, *p*=0.829).

These results of Study 1 illustrate several key findings. First, consistent with the proposition that parent and peer alienation are stressful risk factors for psychological distress, the findings show parent and peer alienation were related to increased stress and psychological distress. Furthermore, the partially mediating role of general stress in the link between alienation

and psychological distress were evidenced in both parent and peer alienation models. Second, there were several intriguing findings of the moderating influence of sibling support, however, these were only found for peer alienation and not parent alienation. In the peer models, there was a first- and second-stage moderation of sibling support. Unexpectedly, a supportive sibling accentuated the positive link between peer alienation and stress but attenuated the link between stress and psychological distress. Indeed, in the first-stage moderation, peer alienation was related to increased stress only for individuals who reported more sibling support. In the second-stage moderation, however, the link between stress and psychological distress remained positive, although, weakened for those who report more support from a sibling.

Third, these findings can also inform alternative models, namely promotive and compensatory models of sibling support. In terms of promotive effects, a supportive sibling relationship was negatively associated with the risk factors of parent and peer alienation and the negative outcome of psychological distress. As a compensatory influence, sibling support was related to less psychological distress even after accounting for risk exposure, specifically for peer alienation and not parent alienation. In sum, these findings illustrate the heightened association between peer alienation and general stress for those with more sibling support, a protective effect of sibling support in the relationships between stress and psychological distress, as well as some promotive and compensatory influences of sibling support in the relationship between experiences of alienation, stress, and psychological distress.

STUDY 2

The purpose of study 2 is to test a moderated-mediation model in which support from one's closest sibling can moderate the links among parent and peer alienation, general or interpersonal stress, and psychological distress. In other words, Study 2 attempts to improve

Study 1 by adding a measure of stress that is more specific to relationships with parents and peers.

Method

Participants

Participants were undergraduate students recruited from a research pool at their campus in the fall 2016. Participants provided informed consent, completed an online survey on PsychData.com, and were compensated with a credit towards a course. The ethical elements of this study were reviewed and approved by an ethics board at the authors' university. The data preparation steps were the following: from the 474 entries in the raw data, entries were excluded if they were duplicate or invalid (n=125), missing over 40% of the survey (n=3), not meeting inclusion criteria (i.e. having a sibling (n=4), being under 25 years of age (n=13). The remaining sample was 329 (mean age=18.8 years; 88% women). Using Mahalanobis distances, four multivariate outliers were excluded (N= 325). Missing values were replaced using Full Information Maximum Likelihood (FIML). The ethnic composition was Whites (65%), Blacks (10%), East and South Asians (12%), and other ethnic groups (13%). From the sample, 49% had only one sibling, 27% had two siblings, and 24% had three or more siblings.

Measures

Stress (General and Interpersonal). Perceived stress was nuanced in Study 2 using the stress thermometer (Kowalski & Crocker, 2001) but in three different versions: (a) stress in general, (b) stress specific to relationship with parents, and (c) stress specific to relationship with peers.

The other measures were the same as in Study 1. The internal consistency ranged from acceptable to very good for the parent (α=0.760) and peer (α=0.627) alienation measure, sibling support measure (α=0.839), and psychological distress measure (α=0.823).

Results and Discussion

Preliminary Analyses. The factorial structure of the seven latent study variables (25 items) was tested with a CFA. The CFA revealed an adequate model, (MLR) χ^2=430.65, p<0.001, CFI=0.921, SRMR=0.051, RMSEA=0.046, RMSEA 90% confidence interval (CI)= [0.038,0.053] p=0.822. The significant factor loading for the latent variables ranged between .50 and .80. Table 1 outlines the correlations, means, and standard deviations of the study variables.

Standardized Bivariate Correlations among the Latent Variables. As expected, parent and peer alienation were associated (r=0.526, p<0.01) as well as more general stress (r=0.338, p<0.01; r=0.282, p<0.01 respectively), more psychological distress (r=0.626, p<0.01; r=0.473, p<0.01 respectively), more stress from parents (r=0.713, p<0.01; r=0.325, p<0.01 respectively), and more stress from peers (r=0.196, p<0.01; r=0.553, p<0.01 respectively). A supportive sibling relationship was negatively related to parental alienation (r=-0.255, p<0.01), peer alienation (r=-0.284, p<0.01), psychological distress (r=-0.216, p<0.01), stress from parents (r=-.190, p < 0.01), and stress from peers (r=-0.171, p<0.01), yet unrelated to general stress (r=-0.072, p=0.275). Psychological distress was associated with general stress (r=0.427, p<0.01), stress from parents (r=0.451, p<0.01), and stress from peers (r=0.306, p<0.01). General stress was related to stress from parents and stress from peers (r=0.403, p<0.01; r=0.313, p<0.01 respectively).

Step 1: Testing the Latent Mediation Models. The mediation models for parent and peer alienation were tested individually and each model tested the mediating role of general stress and interpersonal stress. For parent alienation, the mediation model (67 EP) had acceptable fit,

(MLR) χ^2=317.72, p<0.001, CFI=0.920, SRMR=0.053, RMSEA=0.054, and RMSEA 90% CI= [.045, .063], p=0.211. General stress partially mediates the association between parent alienation and psychological distress with both an indirect effect (0.06, p<0.001) and direct effect (0.422, p<0.001). In this mediation model, stress from parents was not related to psychological distress once general stress was accounted for. For peer alienation, the mediation model (67 EP) had comparable fit, (MLR) χ^2= 287.74, p<0.001, CFI=0.924, SRMR=0.052, RMSEA=0.049, and RMSEA 90% CI=[.039, .058], p=0.582. General stress partially mediates the path between alienation and psychological distress with both an indirect (0.104, p<0.001) and direct effect (0.385, p<0.001). Given general stress was accounted for in the mediation model, stress from peers was no longer predictive of psychological distress.

Step 2: Testing the Latent Moderated-Mediation Models. Two interactive models were tested for each parent and peer alienation. Based on the results of the mediation model, only general stress rather than interpersonal stress was used as the mediator and was used to create the interaction terms in the interactive models.

For the parent alienation models, the null model with 59 estimated parameters (EP) had a log-likelihood (LL) of -7702.08 and the main effect mediation model (62 EP) had a LL of -7639.97. The residual variance for PD in the null model was 0.207, while in the mediation model it was 0.133, therefore, the addition of the main effects explains 36% of the outcome. The chi-square difference test resulted in a significant change in $\chi^2(3) = 103.52$, p<0.001, therefore, the better model was the mediation model.

The first interactive model included the first stage and direct effect moderations; this model (65 EP) had a LL of -7636.00. The interactive model resulted in a significant change in chi-square, $\chi^2(3) = 9.90$, p<0.05. The direct effect moderation was significant (B=-0.158,

p=0.020), while the first stage moderation was not (B=0.024, p= 0.439), which suggest parent alienation and sibling support interact to predict psychological distress. The residual variance for PD is 0.125, therefore, this model explains 6% more of the outcome. The second interactive model included the second-stage moderation, and this model (64 EP) had a LL of -7689.93. This model has poorer fit given its log likelihood is greater than the mediation model.

For the peer alienation, the null model (59 EP) had a LL of -7683.42 and the mediation model (62 EP) had a LL of -7640.92. The addition of the main effects resulted in a significant change in $\chi^2(3)= 80.26$, $p<0.001$, therefore, the mediation model better fits the data. Based on the residual variance of PD, the mediation model explains 22% more of the outcome. The first interactive model with peer alienation (65 EP) had a LL of 7639.99. The addition of the interaction terms resulted in a non-significant change in chi-square $\chi^2(3)=2.47$. The second interactive model (64 EP) had a log likelihood of -7691.25, given this log likelihood is more than the mediation model, we can conclude the mediation model better fits the data.

Overall, there was a moderation of sibling support in the direct effect of parent alienation on psychological distress and not for peer alienation. Simple slope analysis is needed to identify the conditional direct effects and the statistical significance of these effects.

Step 3: Testing the Simple Slopes at Conditional values of Moderator. The simple slope analysis illustrates that parent alienation has a weaker association with psychological distress at high levels (B=0.232, p=0.001) than at low levels (B=0.432, p<0.001) of sibling support. These analyses suggest sibling support may partially buffer the direct effect of parent alienation on psychological distress.

Several key findings can be drawn from the results of Study 2. First, consistent with the proposed risk mediation model, in which the link between parent and peer alienation and

psychological distress was mediated by stress, Study 2 found cross-sectional evidence for the partial mediation of general stress for both parent and peer alienation models. However, this mediating role did not extend to stress from parents and peers, as interpersonal stress did not predict psychological distress once general stress was accounted for. These findings further replicate the cross-sectional mediation models identified in Study 1. Second, there was evidence of the buffering effect of sibling support only for the parent alienation and not peer alienation. Specifically, there was only a moderation of a direct effect of parental alienation and no first- or second-stage moderation. A supportive sibling relationship seemed to mitigate the direct effect of parent alienation on psychological distress, such that the effect was weaker for those who had high sibling support. These findings did not replicate the results of the peer alienation models of Study 1, however, there was novel evidence of the buffering effect of sibling support for the parent alienation.

Lastly, in terms of alternative models, the findings support a promotive model of sibling support, however, there was not sufficient evidence for a compensatory influence of sibling support. As a promotive factor, having a supportive sibling was negatively related to general stress, interpersonal stress from parents and peers, and psychological distress. Unlike Study 1, sibling support was not related to psychological distress after accounting for parent and peer alienation, and therefore, sibling support was not a compensatory factor.

General Discussion

Parent and peer relationships are significant for emerging adults, as such, difficulties in these relationships can be a source of stress that leads to experiences of psychological distress, such as depression and anxiety (Allen et al., 2007; Raudino et al., 2013). In a previous study with emerging adults, we found that general stress partially mediated the path from parental alienation

to psychological distress (authors, 2020). However, that same study also concluded that supportive sibling climate (i.e., support experiences across all siblings) was not protective against alienation, stress, and psychological distress. Consequently, this article uses two studies to improve this initial study by investigating more specifically whether support from one's closest sibling is a protective factor that can moderate (i.e., attenuate) the links among parent and peer alienation, stress (general and interpersonal), and psychological distress among emerging adults.

Mediated risk model: Can stress mediate the links between alienation and psychological distress?

Consistent with our theoretical predictions, feelings of alienation in parent and peer relationships were related to increased experiences of stress, which in turn, was associated with increased psychological distress. The risk parent and peer alienation poses to stress and psychological distress is consistent with existing theory on the pertinence of parent and peer relationships for mental health (Mattanah, Lopez, & Govern, 2011) and specifically, research on experiences of alienation with parents and peers as risk factors for psychological distress (Raudino et al., 2013). These findings further underscore the primacy of these relationships and their effects on mental health in the lives of emerging adults (Arnett, 2007).

An important consideration of this finding is that, although our theory-driven premise is that parent and peer alienation predicts psychological distress, interpersonal theories of depression also suggest that the reverse can be true as well (Hammen, 2005). For instance, longitudinal research on the romantic relationships of emerging adults provides support for a transactional interpersonal model of depression, such that experiences of depression contribute to experiences of interpersonal stress (Eberhart & Hammen, 2006).

The mediation models in Study 1 and 2 were in line with our hypotheses of the mediating role of general stress. In particular, the hypothesized model of the partial mediation of general stress in the link between alienation, as experienced with parents and peers, and psychological distress extends past evidence of the risk interpersonal challenges poses to stress and the robustness of stress as a predictor of psychological distress, specifically depression symptoms (Grant et al., 2004). That said, in our prior study (authors, 2020), general stress partially mediated the link between parental alienation and distress, but not between peer alienation and distress. Hence, although our mediated risk model received partial support in our previous work (authors, 2020), the present work supports this mediated risk model more substantially.

While Study 2 examined two stress mediators (general and interpersonal stress), interestingly, there was only evidence of a mediation model for general stress, and not interpersonal stress. Although interpersonal stress was related to alienation, general stress, and psychological distress, in the mediation model it did not predict psychological distress after accounting for general stress. Coupled with the mediating role of general stress, these results suggest general stress better accounted for the negative effect of alienation on psychological distress than did interpersonal stress. To better account for interpersonal stress in this risk mediated model, future studies could possibly explore a sequential mediation process, from alienation to interpersonal stress, to general stress, and then to psychological distress.

Overall, the mediating role of general stress found in these studies further supports theoretical work on the links between stress, interpersonal relationships, and psychological distress (Eberhart & Hammen, 2006). Given it is known that interpersonal challenges cause stress (Darling, McWey, Howard, & Olmstead, 2007) and that general stress can impact psychological distress (Hammen, 2006; Liu & Alloy, 2010; Riggs & Han, 2006), this finding

underscores general stress as a key mechanism for understanding the effect of experiences of alienation from parents and peers on psychological distress in emerging adulthood.

Moderated-mediation models: Can having a supportive sibling relationship be protective?

The focus of the present Studies 1 and 2 was to test a moderated-mediation model of the protective influence of a supportive sibling relationship. Evidence from the moderated-mediation models offered but limited support to our hypothesized protective effects. Study 1 found interaction effects for the peer alienation risk models and not for the parent alienation risk models. More specifically, we found evidence for a moderated-mediation model in which sibling support moderated both paths of the indirect effect such that alienation and sibling support interacted to predict stress (first-stage moderation) and stress and sibling support interacted to predict psychological distress (second-stage moderation). This moderated indirect effect was present only at high levels of sibling support.

Intriguingly, sibling support had an accentuating vulnerability effect that is followed by an attenuating effect. In the first-stage moderation, the accentuating effect of sibling support suggests peer alienation may generate more stress in the context of more sibling support. This finding is not consistent with our proposed theoretical framework. Furthermore, this finding is even more unexpected given sibling support was also negatively related to peer alienation and unrelated to stress at a bivariate level. One possible interpretation is that individuals who experience more feelings of alienation from peers may also ruminate over these feelings with their closest sibling. In turn, ruminating over feelings of alienation may increase stress. Co-rumination as an interpersonal form of rumination is associated with feelings of closeness and support, increased psychological distress, and an amplified stress response to stressful experiences (Byrd-Craven, Geary, Rose, & Ponzi, 2008). Indeed, the accentuating effect of

sibling support may capture the maladaptive qualities of social support as promoting co-rumination and possibly greater levels of stress. Of course, longitudinal data are needed to delineate the direction of these links.

In the second-stage moderation, however, the attenuating effect of sibling support in the link between stress and psychological distress is consistent with the propositions of the *stress-buffering hypothesis* and illustrates how support may counteract the adverse effects of stress on psychological distress (Cohen et al., 2000). In this case, support from a sibling buffered only one of the hypothesized pathways, specifically, the negative effect of stress on psychological distress. This finding is in accordance with previous empirical evidence of the stress-buffering effect of social support from family against depression among emerging adults (Lee & Dik, 2017; Raffaelli et al., 2013) and prior evidence of the protective role of sibling support in the link between stressful life events and adjustment (Gass et al., 2007). Our previous study (authors, 2020) had found that a supportive sibling climate did not moderate (protect against) any of the risky paths among alienation, stress, and psychological distress. The present research highlights that support from a closest sibling may - at times - provide some partial protection against stress.

Contrary to Study 1, Study 2 found that parent alienation and sibling support interacted to predict psychological distress (direct effect moderation) and no interactive effects for the peer alienation models. In this case, the attenuating effect of sibling support on the link between parent alienation and psychological distress is consistent with our hypothesized protective effects and provides some evidence for the buffering effect of social support in the path between risk factors and psychological distress (Lee & Dik, 2017; Lee & Goldstein, 2016; Parra, Bell, Bengibgui, 2017; Raffaelli et al., 2013). Given the centrality of parent-child relationships and the important risk associated with experiences of alienation (Collins, Raby, & Causadias, 2012;

Hoeve et al., 2012; Leondari & Kiosseoglou, 2000), the present buffering effect of sibling support may be interesting to continue studying, even if it is inconsistent.

Overall, some evidence of sibling support in studies 1 and 2 were in line with empirical evidence of the stress-buffering function of social support across multiple sources of support (family, friends, and romantic partners) in the transition to adulthood (Lee & Goldstein, 2016). At the same time, however, Study 2 did not replicate the interactive effects in the peer alienation mediation model found in Study 1. Inconsistencies in the present research findings may be due to several reasons. First, a key reason for this discrepancy could be the dynamic nature of perceived social support and the fluctuations of social relationships among emerging adults. Trajectories of perceived social support from family, friends, and romantic partners during the period of emerging adulthood, from 18 to 25 years of age, suggest several factors such as personal characteristics, diverse features of relationships, and life transitions, can contribute the changing nature and quality of perceived support across these multiple sources (Galambos, Fang, Horne, Johnson, & Krahn, 2018).

Second, the operational definition and the measurement of social support used in the present studies may lack sufficient specificity. In particular, the presence or strength of the protective effect of sibling support may be dependent on the type or nature of the social support or the differential support across siblings. Therefore, it is possible that sibling support can be protective under some conditions but not others, future research can explore circumstances in which the influences of sibling support (type, nature, and source of support) may be more present. Lastly, a methodological consideration for the fact that the interactive effects were not replicated across Studies 1 and 2 is that such interaction effects are often difficult to identify, although this is less the case with latent constructs and statistical techniques that better account

for measurement error. Even in cases with theoretically justified moderators and psychometrically sound measures, interactions effects are small in magnitude, can more easily be non-significant, and are more difficult to replicate (Marsh et al., 2012; Kline, 2010).

Alternative models: Can having a supportive sibling relationship be promotive or compensatory?

The findings of the present two studies can add to our understanding of alternative models, explicitly promotive and compensatory models of sibling support. In line with cross-sectional and longitudinal evidence of the positive influence of siblings in childhood and adolescence and emerging adulthood (Branje et al., 2004; Gass et al., 2007; Milevsky, 2005; Myers & Bryant, 2008; Sherman et al., 2006), the present studies found sibling support was related to less experiences of parent and peer alienation, stress, and psychological distress. This is consistent with theoretical propositions about the positive nature of social support, the recognition of siblings as a source of support, and the value of siblings particularly in emerging adulthood (Kramer, 2010; Stocker et al., 1997; Scharf et al., 2005).

Study 1 indicated a compensatory influence of sibling support, such that sibling support was related to less psychological distress even after accounting for risk exposure to peer alienation. This study found a sibling support predicted less psychological distress in the context of risk exposure. Therefore, support from one's closest sibling could be considered compensatory in that sibling support may compensate or reduce the negative effect of alienation on psychological distress. This is akin to past evidence with children, adolescents, and emerging adults of the beneficial and compensatory effects of siblings for mental health (Branje et al., 2004; Buist et al., 2013; Milevsky, 2005). The lack of compensatory influences in the parent

alienation models might be due to the significance of parents and the possibility that alienation from parents can be more deleterious for psychological distress (Agerup et al., 2014).

Study 2 indicated a promotive influence of siblings in both peer and parent alienation models, such that sibling support was related to less general stress, interpersonal stress, and psychological distress. However, there was not sufficient evidence for a compensatory influence as these promotive effects were no present after accounting for alienation. Hence, while the promotive role of siblings was a consistent finding in both studies, there was only evidence for a compensatory influence in Study 1. In line with these findings, in a previous study, we found that a supportive sibling climate (i.e., experiences of support across all siblings), was promotive of mental health as it was associated to less psychological distress but only in the absence of risk exposure (authors, 2020). While, in this same earlier study, sibling climate was not a compensatory factor for psychological distress in the context of parent and peer alienation (authors, 2020); the present Study 1 extends these findings with evidence of a compensatory effect in that sibling support was related to less psychological distress after accounting for peer alienation. Overall, future studies on the benefits of siblings should consistently consider the influence of risk exposure to accurately capture the promotive and compensatory influences of supportive siblings.

Limitations. There are limitations in this present studies worth noting. First, although research questions were limited to the period of emerging adulthood, we used samples of primarily White, female, emerging adults attending university, which limits the generalizability of our findings to other youth populations. Future research would need more ethnically diverse samples that are gender balanced, and that include emerging adults who are pursuing or not university education. An additional methodological limitation is the cross-sectional nature of the

data, which cannot test or control for the temporal sequence of the variables in the mediation model. Despite the limitations of cross-sectional designs in risk research, in reality, identifying risk factors often begins with preliminary cross-sectional studies as these are more cost-effective (e.g. time, money, and resources) in the identification of potential risk and protective factors that merit further attention (Compas & Reeslund, 2009).

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Table 1. Means, standard deviations, and standardized correlations between the latent variables in the CFA for Study 1 and 2.

Study	Variables	1. PTA	2. PEA	3. SIB	4. PD	5. Stress-G	6. Stress-PA	7. Stress-PE
Study 1 N=789	1	2.35 (0.799)					---	---
	2	0.578**	2.24 (0.651)				---	---
	3	-0.446**	-0.251**	3.71 (0.772)			---	---
	4	0.477**	0.484**	-0.253**	2.29 (0.445)		---	---
	5	0.279**	0.192 **	-0.074	0.380**	0.69 (0.195)	---	---
Study 2 N=325	1	2.35 (0.732)						
	2	0.526**	2.26 (0.524)					
	3	-0.255**	-0.284**	3.58 (0.625)				
	4	0.626**	0.473**	-0.216**	2.28 (0.491)			
	5	0.338**	0.282**	-0.072	0.427**	0.66 (0.210)		
	6	0.713**	0.325**	-0.190**	0.451**	0.403**	0.37 (0.281)	
	7	0.196**	0.553**	-0.171**	0.306**	0.313**	0.300**	0.29 (0.235)

Note. The latent variables include parent alienation (PTA), peer alienation (PEA), supportive sibling relationship (SIB), psychological distress (PD), general stress (Stress-G; Study 1 and 2) and interpersonal stress (only in Study 2) with parents (Stress-PA) and peers (Stress-PE). The means are reported in the diagonal and the standard deviation in the parentheses. The means are based on the observed items and were calculated in SPSS. The standard deviation was calculated as the square root of the variance of the latent variable.

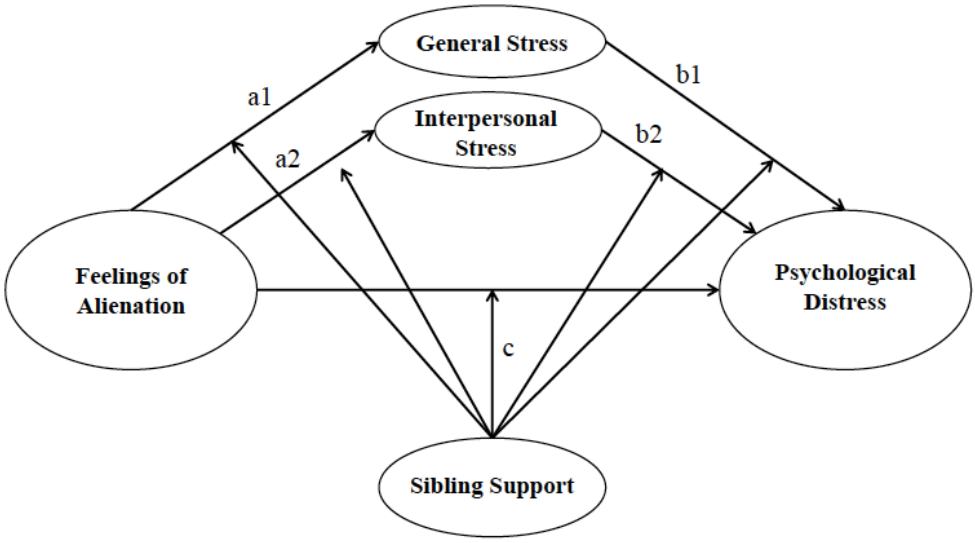
*p < .05. **p < .01

Table 2. The standardized coefficients for the main effect mediation model and the of the predictors and the unstandardized coefficients for interactive models for parent and peer models in Study 1 and 2.

Study	Model	Outcome	Alienation	SIB	Stress	Inter Stress	PAxSIB	PExSIB	STxSIB
Study1: Parent Models	Main	Stress-G	0.305**	0.062	--	--	--	--	--
		PD	0.369**	-0.68	0.272**	--	--	--	--
	1st INT	Stress- G	0.077**	0.012	--	--	0.018		--
		PD	0.206**	-0.037	0.613**	--	-0.009		
	2nd INT	Stress-G	0.075**	0.015		--	--	--	--
		PD	0.204**	-0.040	0.636**	--			-0.159
Study1: Peer Models	Main	Stress-G	0.056**	-0.007		--	--	--	--
		PD	0.274**	-0.077**	0.671**	--	--	--	--
	1st INT	Stress- G	0.059**	-0.010		--		0.049*	--
		PD	0.275**	-0.075**	0.679**	--		-0.065	
	2nd INT	Stress-G	0.056**	-0.008		--	--	--	--
		PD	0.278**	-0.077**	0.697	--	--	--	-0.255*
Study 2: Parent Models	Main	Stress-G	0.411**	0.034			--	--	--
		Stress-PA	0.742**	0.002			--	--	--
		PD	0.621**	-0.059	0.215**	0.109	--	--	--
	1st INT	Stress-G	0.093**	0.001			0.024	--	--
		PD	0.332**	-0.050	0.576		-0.158*	--	--
	2nd INT	Stress-G	0.097**	0.011			--	--	--
		PD	0.335**	-0.072	0.510		--	--	-0.197
Study 2: Peer Models	Main	Stress-G	0.354**	0.033			--	--	--
		Stress-PE	0.588**	0.000			--	--	--
		PD	0.385	-0.089	0.293**	-0.025	--	--	--
	1st INT	Stress-G	0.105**	0.002			--	0.023	--
		PD	0.281**	-0.062	0.739		--	-0.103	--
	2nd INT	Stress-G	0.101	0.010			--	--	--
		PD	0.295**	-0.086	0.691**		--	--	-0.187

Note *p < .05. **p < .01. In terms of models, Main refers to the main effect mediation model, 1st INT refers to the first interactive model with the first-stage and direct effect moderation model, 2nd INT refers to the second interactive model with the second-stage moderation model. Alienation refers to either parent or peer alienation depending on the model tested. PA refers to parent alienation, PE to peer alienation, SIB to sibling support, Stress-G to general stress, and Inter Stress to interpersonal stress from parents (Stress-PA) or peers (Stress-PE) depending on the model tested. PAxSIB and PExSIB refer to the first-stage and direct effect interactions and STxSIB refers to the second-stage moderation.

Figure 1. The hypothesized moderated-mediation model



CHAPTER 4: Sibling Support and the Development of Stress and Psychological Distress

Can Sibling Support Compensate for Parent and Peer Alienation in Emerging Adults? A Latent Growth Curve Longitudinal Analysis of Stress and Psychological Distress during a Semester

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Abstract

Emerging adults often face stress and psychological distress from multiple sources during a university semester. Within their relationships, experiences of alienation with parents and peers may be a source of such stress and psychological distress. Although sibling support may compensate when relationship issues arise with parents and peers, to our knowledge, this putative effect has never been tested. Hence, this 3-month longitudinal study examined if sibling support is a compensatory factor that can predict less stress and psychological distress in the presence of parent and peer alienation as risk factors. Findings revealed that psychological distress and stress both decrease over the course of three academic months. However, both outcome may not be related in their trajectory of decrease over the course of a university semester. Specifically, the intercept and trajectory of stress were related such that emerging adults with higher levels of stress at the beginning of the semester, decrease more slowly in stress throughout the semester. Alternatively, psychological distress decreased similarly for individuals over the semester regardless of different in baseline levels. Surprisingly, parent and peer alienation did not predict stress or psychological distress. In particular, sibling support did not predict stress or psychological distress, which refuted our expectation that sibling support could represent a compensatory factor and parent and peer alienation as a risk factor in emerging adulthood. Research directions are discussed in terms of substantive and methodological implications.

Can Sibling Support Compensate for Parent and Peer Alienation in Emerging Adults? A Latent Growth Curve Longitudinal Analysis of Stress and Psychological Distress during a Semester

Siblings are highly diversified relationships that are present in most contemporary families. These sibling relationships are also characterized by important common features, notably their longevity, emotional intensity, and impact on individual development (Conger & Little, 2010; Milevsky et al., 2014). That said, these significant relationships are actually understudied in emerging adulthood, as though siblings would not matter as much after childhood and adolescence. Nevertheless, sibling research has recently received increased interest from researchers (Shanahan, Waite, & Boyd, 2012). As a result, there is growing evidence that when sibling relationships are positive, affectionate, and supportive, young adults are doing well, reporting better mental health (e.g., less depression) and greater wellbeing (Guan & Fuligni, 2016; Milevsky, 2005; Sherman, Lansford, & Volling, 2006). The bulk of the evidence is consistent with the known benefit of siblings in childhood and adolescence (Branje et al., 2004; Gass, Jenkins, & Dunn, 2007).

In emerging adulthood, undergraduate students can experience stress and psychological distress due to multiple risk factors during a university semester. Within their relationships, experiences of alienation with parents and peers may be risk factors of such stress and psychological distress. Although sibling support may compensate when relationship issues arise with parents and peers, this putative effect has probably never been tested. To this end, this 3-month longitudinal study examines the potentially compensating role of sibling support *vis-à-vis* the risks that parent and peer alienation may pose for the development of stress and psychological distress during a university semester.

Sibling Support: What do we Know?

Social support is the received or perceived support available in close relationships (Cohen et al., 2000; House & Kahn, 1985). Supportive relationships provide individuals with a sense that they belong to a caring relationship in which they are admired and cared for (Cohen et al., 2000; House & Kahn, 1985). Supportive sibling relationships are supposed to be particularly valuable in emerging adulthood, notably because they are associated with fewer depressive symptoms (Branje, van Lieshout, van Aken, & Haselager, 2004; Milevsky, 2005; Sherman et al., 2006; Updegraff et al., 2002).

To date, however, the links among sibling support, stress, and psychological distress have been rarely examined in emerging adults, which also means that they are poorly understood. As we will expose, some of the known benefits of having siblings may not always be significant in emerging adults. Specifically, recent advances in this area of research have shown that sibling support is not a significant protective factor; or at best, sibling support yields inconsistent mixed effects that are at times positive and negative. Notably, the authors (2020ab) conducted three prior cross-sectional studies using Latent Moderated Structural Equation Modeling (LMSEM), and tested the protective effects of siblings against the risk that parent and peer alienation pose to stress and psychological distress. The first of these cross-sectional studies (authors, 2020a) did not find a protective effect of having a supportive sibling climate across all siblings, and this finding was replicated across three independent samples. In two subsequent cross-sectional studies (authors, 2020b), there was only an inconsistent and partial protective effects of sibling support from one's closest sibling. In fact, surprisingly, one of those two subsequent studies even found a worsening effect of siblings, such that peer alienation was related to more stress but only in the presence of sibling support (authors, 2020b).

On two occasions, I found in the cross-sectional studies only partially protective effects of sibling support, which have yet to be replicated by the other studies (authors, 2020b). Although partial and inconsistent, these findings may suggest that at times, sibling support: (a) buffered the link between stress and psychological distress in the context of peer alienation, and (b) buffered the direct link between parent alienation and psychological distress. In both results, sibling support was related to less psychological distress.

Nevertheless, even in the possible absence of a protective effect (i.e., moderation effect) from sibling support in many models, authors (2020ab) also considered two alternative models that would involve the main effect of sibling support (i.e., rather than its interactive effect) on stress and psychological distress. As such, within a developmental psychopathology framework, a promotive factor in sibling support would exist if it is related to less of a negative outcome in the absence of risk exposure, whereas a compensatory factor in sibling support would exist if it is related to less of a negative outcome while accounting for exposure to other risk factors (Rutter, 1985; Zimmerman, 2013). That said, we found only one compensatory effect of sibling support against psychological distress when considering the risk of peer alienation (authors, 2020b). There were also two promotive effects of siblings against interpersonal stress and psychological distress when not accounting for risk factors (authors, 2020b).

The findings from these previous cross-sectional studies inform the current longitudinal study on sibling support in three ways (authors, 2020ab). First, results consistently suggested a potential risk mediation model in which experiences of alienation from parents (and occasionally from peers) was related to more psychological distress through the mediation effect of stress. As such, our present longitudinal study posits that parental and peer alienation are risk factors that should predict the co-development of more stress and more psychological distress over three

months. Second, given that there was consistently no evidence of a protective (or compensatory) effect of a supportive sibling climate, the present longitudinal study will focus on support from one's closest sibling. Third, given the lack of evidence of a protective effect of sibling support with one's closest sibling, this current longitudinal study will examine if there could still be a compensatory effect of sibling support in the risky context of parent and peer alienation.

Parent and Peer Alienation, Stress, and Psychological Distress in Emerging Adulthood

Much research on emerging adults has focused on college students because most emerging adults are actually college students (Arnett, 2000). The mental health of college students is a growing concern due to the increased prevalence of depression and anxiety-related symptoms (Hunt & Eisenberg, 2010; Zivin, Eisenberg, Gollust, & Golberstein, 2009), which prevalence is higher compared to that in the general population (Blanco et al., 2008; Stallman, 2010). A meta-analysis of mostly western countries suggests that the prevalence rate of depression among college students is about 30% (Ibrahim, Kelly, Adams, & Glazebrook, 2013), which almost doubles national rates (Kessler et al., 2003). Stress is supposed to be a key risk factor for developing psychological distress, including depression and anxiety (Compas et al., 2001; Compas & Reeslund, 2009). More specifically, students who experience relationship stressors and low social support report poor mental health (Blanco et al., 2008). Despite these concerning trends, on average, emerging adults actually experience an increase in perceived social support and a decrease in depressive symptoms over the course of seven or eight years (Galambos, Baker, & Krahn, 2006; Pettit, Roberts, Lewinsohn, Seeley, & Yaroslavsky, 2011; Schulenberg, O'Malley, Bachman, & Johnston, 2005). While this evidence of the decrease in depressive symptoms during emerging adult is reassuring in the long term, the extent to which

similar decreases would also be present in the short term (over a few months or an academic semester) deserves more short-term longitudinal research.

Among longitudinal studies that examined the progression of depression and anxiety in college, some have found intricate fluctuations in mental health across semesters and college years (Bewick, Koutsopouloub, Miles, Slaa & Barkham, 2010). For instance, psychological distress was found to be higher at the beginning of the first semester of each academic year, then after a peak at the end of the first semester, and a decrease onto the second semester of the year (Baker et al., 2018; Bewick et al., 2010). Also, while mental health fluctuates in a predictable trend throughout an academic year, there were additional patterns of mental health changes across university years, for instance, the first and third years showed the most increases in distress and decrease in wellbeing (Bewick et al., 2010).

It is also crucial to understand what may determine these mental health changes across time. In understanding the course of psychological distress, researchers often utilize notions of risk and compensatory factors (Cicchetti & Rogosch, 2002; Compas & Reeslund, 2009; Graber & Sontag, 2009). Risk factors are experiences associated with a greater likelihood of developing a negative outcome (Rutter, 1985; Compas & Reeslund, 2009). Interpersonal relationships can vary in their risk and compensatory influences on psychological distress. For example, parent and peer relationships are consequential for mental health (Agerup et al., 2014; Arnett, 2007; Chow, Roelse, Buhrmester, & Underwood, 2012; Mattanah, Lopez, & Govern, 2011; Raudino et al., 2013). In emerging adulthood, these relationships are particularly valuable, such that when characterized by feelings of alienation they may be risk factors for stress and psychological distress (Allen et al., 2007; Eberhart & Hammen, 2006; Hoeve, Stams, van der Put, Dubas, van der Laan, Gerris, 2012; Leondari & Kiosseoglou, 2000; Raudino et al., 2013; Tambelli, Laghi, &

Notari, 2012). Therefore, parent and peer alienation are proposed as two risk factors that could predict more stress and psychological distress over the course of three months.

Objectives of the Current Study

This study examines the trajectories of stress and psychological distress over the course of three months during a university semester, while also considering the predictive effects of two risk factors (parent and peer alienation) and the potential compensatory effect of sibling support. More specifically, we proposed four hypotheses.

Hypothesis 1: It is known that psychological distress tends to decrease over the course of emerging adulthood (Pettit et al., 2011). That said, we nevertheless propose a "*Vulnerability Model*" that posits that during an academic semester, students are perceiving that their resources are depleted by an accumulation of tasks, challenges, and issues. Indeed, studies suggest that college students are often overwhelmed (Murphy, Blustein, Bohlig & Platt, 2010; Terriquez & Guarantz, 2014). In turn, the typical result would be a gradual increase in both stress and psychological distress unfolding over a given academic semester. However, an alternative "*Resilience Model*" could also predict that during an academic semester, students are perceiving a silver lining as they are successfully learning how to manage tasks, challenges, and issues. As such, studies also suggest that college studies are often able to maintain resilience through various self-regulation strategies (e.g., coping, self-efficacy, Brougham, Zail, Mendoza, & Miller, 2009; Hartley, 2011). In turn, the typical outcome would be a gradual decrease in stress and psychological distress over the course of a given academic semester. In sum, notwithstanding the plausibility of both models, our favored hypothesis is that the *Vulnerability Model* should better fit the longitudinal data given the high prevalence of mental health issues in many college students.

Hypothesis 2: It is well-established that stress is associated with psychological distress (Hammen, 2005). In fact, stress is a risk factor that can predict psychological distress (Liu, & Alloy, 2010). As such, we hypothesize that stress and psychological distress should present a trend of co-development in that the intercept and slope of stress and psychological distress should have an ongoing positive relationship across the three months. By the longitudinal notion of 'co-development', we mean a prospective covariation between stress and psychological distress throughout the duration of the semester. In other words, rising stress should be synchronized with rising psychological distress throughout the semester.

Hypothesis 3: We hypothesize that sibling support, as a compensatory factor, should predict less stress and less psychological distress over the course of the three academic months, while statistically accounting for parent and peer alienation as risk factors.

Hypothesis 4: We hypothesize that parent and peer alienation, as risk factors, should predict the 3-month development of stress and psychological distress during an academic semester.

Methods

Longitudinal Design

A longitudinal design was needed to test our model because of two reasons. First, longitudinal designs provide more accurate conclusions about processes of change than cross-sectional designs (Little, Card, Preacher, & McConnell, 2009). Second, longitudinal designs can answer complex questions of both stability and change within and between individuals (Wu, Selig, & Little, 2013). As such, risk research recommends prospective longitudinal studies to establish the actual presence of a risk factor that can predict the initial levels and changes in a negative outcome (Kraemer et al., 1997). Therefore, a latent growth curve model (LGM) was

used to examine the co-development of stress and psychological distress, more specifically the rate of change and individual differences in these patterns of change (Bollen & Curran, 2006; Curran, Obeidat, & Losardo, 2010). The LGM is among the most recommended approaches to assess differences in patterns of change within and between individuals (Curran et al., 2010). Overall, this study aims to extend previous work by (a) examining individual differences in within-person variation of stress and psychological distress, (b) assessing the mutual development of - i.e., prospective covariation between - stress and psychological distress, and (c) assessing the predictive effects of a possible compensatory factor of sibling support *vis-à-vis* two plausible risk factors that are parent and peer alienation.

Participants

This 3-month longitudinal study consists of three waves over the course of an academic semester (Winter 2018). An online research participant pool was used to recruit undergraduate students for the baseline survey at a Canadian university located in the province of Ontario. For the two follow-ups, the participants were then sent an invitation by email through that participant pool to complete a survey located on psychdata.com, once a month for three months. A university research ethics board provided ethical approval for the ethical elements pertaining to this research project. Participants provided online informed consent and were compensated via the research pool for their participation with a point contributing towards their grade in a course.

The raw data for each time point was prepared for analysis by removing duplicates and invalid entries and entries that did not meet the inclusion criteria (i.e. having a sibling, being under 25 years). The specific data preparation steps for each time point are described below.

Time 1. The raw data for the baseline consisted of 278 entries. Entries were identified and excluded from the final sample for one or more of the following reasons: duplicates and

invalid participant identifiers (n=38), not meeting inclusion criteria of having a sibling (n=2), and being over 25 years old (n=1).

Time 2. The raw data for the second wave consisted of 130 entries. Entries were identified and excluded from the final sample for one or more of the following reasons: duplicates and invalid participant identifiers (n=22), not meeting inclusion criteria of having a sibling (n=1), and being over 25 years old (n=1). The final second wave consists of 100 participants.

Time 3. The raw data for the third wave consisted of 58 entries. Entries were identified and excluded from the final sample for one or more of the following reasons: duplicates and invalid participant identifiers (n=4), not meeting inclusion criteria of having a sibling (n=1), and being over 25 years old (n=0). The final third wave consists of 48 participants.

In sum, the final baseline sample for this study consists of 234 undergraduate students (Mean age=18.9 years; 88% women). In terms of ethnicity, this sample consists of 63% Whites, 8% Blacks, 18% East and South Asians, 11% who identified with other ethnic groups. In terms of siblings, 47% had only one sibling, 28% had two siblings, and 25% had three or more siblings. Based on the final sample for each wave, retention rates range from 50% at wave 2 to 20% at wave 3. Given this large amount of attrition, missing data analysis is used to evaluate the correlates of missing and whether attrition is systematically related to the dependent variables (i.e. complete cases compared to cases with missing; Enders, 2010; Nicholson, Deboeck, & Howard, 2017).

Patterns of Attrition. A key challenge in longitudinal data is participant attrition across waves. We scrutinized the pattern of missing data to determine if they were missing at random, or systematically. Systematic differences (between those who participated in the follow-up

waves and those who did not) can produce biased results and can compromise both validity and generalizability of the study results. Methodologists recommend reporting attrition rates as well as identifying correlates of missing values and attrition (Enders, 2010; Nicholson et al., 2017).

The pattern of missingness, whether systematic or random, is often more important than the number of missing values (Enders, 2010; Enders, 2006). For instance, Enders (2010) describes three missing data mechanisms - based on Rubin's (1976) theory - that can explain the patterns of missing values identified in the data. First, missing completely at random (MCAR) refers to haphazard missingness where likelihood of missing values is not related to any study variables. Second, the missing at random (MAR) mechanism describes when the likelihood of missing data is systematically related to one or several measured variables, but not the variable with missing values. Third, missing not at random (MNAR) describes systematically missing values where the likelihood of missing is dependent on the level of that variable.

These three mechanisms can be identified by separating the complete cases from those with missing values, then a series of tests are used to compare cases across both groups on specific variables of interest. An independent samples t-test is used to make univariate comparisons on the dependent variables (i.e. psychological distress and stress) across participants with complete cases for the follow-up waves and those with missing. For psychological distress, there was a non-significant difference between the complete cases and the cases with missing values: $t(229)= -1.12$, $p=0.27$. Similarly, for stress, there was a non-significant difference between complete and missing cases: $t(230)=-0.18$, $p=0.86$. Similar to the univariate t-test comparisons, Little's MCAR test, is a multivariate comparison on mean differences on the entire dataset using all the study variables. A Little's MCAR test of all study variables at baseline was not significant: $\chi^2(24)=18.02$, $p=0.80$; while a test of all study variables

across the three waves was significant: $\chi^2(155)=365.24$, $p<0.01$. This result suggests that our data were not missing completely at random (MCAR). Although both univariate and multivariate mean comparisons come with their limitations, these tests can be informative in understanding mechanisms of missingness (Enders, 2010). Based on the independent t-tests and the Little's test of MCAR, we can conclude that the missingness in our sample was not related to our dependent variables, yet it could be related to other study variables implying the data were missing at random (MAR; Enders, 2010; Nicholson et al., 2017).

Auxiliary Variables to Improve Estimation of Missing Data

The estimation of missing values uses the data for which there are answers to replace the missing data, which includes all variables in the posited model. In addition, it is also possible to use auxiliary variables that are not part of the posited model but that can improve the estimation of missing data because of substantive reasons that are explained below. For the present longitudinal study, auxiliary variables include, basic personality traits (Big five), as well as interpersonal stress with parents and peers. People who score higher on each trait of the Big 5 of personality (extraversion, agreeableness, conscientiousness, emotional stability, and openness) are known to have a more adaptive psychological profile overall (Jerant, Chapman, Duberstein, & Franks, 2009), which may increase the likelihood that they will reliably participate in a longitudinal design. For instance, those who score lower on agreeableness may be less collaborative with a demanding longitudinal design, those who are less conscientious may be less committed to thoroughly completing the research tasks, and those who are less open may be more likely to have a fading interest in our scientific endeavor. Interpersonal stress from parents and peers was related to parent and peer alienation, sibling support as well as general stress in a previous study (Authors, 2020b). Therefore, to use as much information as possible to estimate

the model parameters, interpersonal stress scores across the three waves were also included as auxiliary variables.

Measures

Parents and Peers Alienation (Wave 1; 4 items). The Inventory of Parent and Peer Attachment (IPPA; Armsden & Greenberg, 1987) was used to capture parent and peer alienation. While participants completed the entire measure (i.e. trust, communication, and alienation subscales), only four items were selected because they were comparable in wording and content in both the parent and peer measures and were specific to experiences of alienation. These include 'I feel silly or ashamed when I talk about my problems with my parents/friends', I get upset a lot more than my parents/friends know about', 'I feel angry with my parents/friends', and 'My parents/friends don't understand my problems'. Using a 5-point scale (1 = never true; 5 = always true) participants rate the extent to which the statements are true of their relationships.

Supportive Sibling Relationships (Wave 1; 8 items). A supportive relationship with one's closest sibling was measured using the Adult Sibling Relationships Questionnaire (ASRQ; Stocker, Lanthier, & Furman, 1997). Once participants listed their 'closest' sibling, they were asked to respond to a series of statements about that specific relationship quality using a 5-point scale (1= hardly at all; 5 = extremely much). From the 8 subscales of the warmth dimension, a single explanatory item was selected to capture the conceptual breath of social support: *Intimacy* (how much do you discuss your feelings or personal issues with this sibling?), *Affection* (how close do you feel to this sibling?), *Knowledge* (how much does this sibling know about you?), *Acceptance* (how much does this sibling accept your lifestyle?), *Similarity* (how much do you and this sibling lead similar lifestyles?), *Admiration* (how much does this sibling feel proud of you?), *Emotional support* (how much can you count on this sibling to be supportive when you

are feeling stressed?), and *Instrumental support* (how much does this sibling give you practical advice?). These 8 items were used to create composite score for supportive sibling relationships.

Stress (Wave 1, 2, and 3; 1 item). A single-item measure was used to capture levels of stress in general using a stress thermometer from a scale of 0 to 100 (Kowalski & Crocker, 2001). At baseline participants were asked about their experiences of stress in general 'in the last 6 months' and at each follow-up they were asked specifically 'in the past few weeks'. Responses were coded from 0 to 1.0 to facilitate interpretation.

Psychological Distress (Wave 1, 2, and 3; 6 items). Psychological distress was captured by symptoms of depression and anxiety as measured by the Kessler Psychological Distress Scale (K10+; Kessler, Barker, Colpe, Epstein, Gfroerer, Hiripi, Howes, Normand, Manderscheid, Walters, & Zaslavsky, 2003). The shorter and reliable six-item version was used for this study. At each wave participants were asked 'during the last month, how often did you feel' a list of psychological symptoms.

Personality Traits (Wave 1, 10 items). The Ten-Item Personality Inventory (TIPI; Gosling, Rentfrow, & Swann, 2003) is a very brief scale that was developed and concurrently validated with longer scales to accurately assess the five basic personality traits of the Five Factor Model of personality (i.e. extraversion, agreeableness, conscientiousness, emotional stability, and openness). Each trait is measured with two items, while each item consists of two adjective-descriptors rated on a 7- point Likert-type scale (1= strongly disagree, 7= strongly agree). Personality will be used as an auxiliary variable in the FIML analysis.

Interpersonal *Stress (Waves 1, 2, and 3; 1 item).* Levels of interpersonal stress was measured using a single-item stress thermometer (Kowalski & Crocker, 2001), specifically with parents (please indicate the amount of stress that you generally experience in your relationship

with your parents), as well as with friends (please indicate the amount of stress that you generally experience in your relationship with your friends). Participants were asked to write their score, from 0 to 100, in the space provided. For both questions to distinguish experiences of stress across the waves, participants were asked at wave 1 'in the last 6 months' and at waves 2 and 3 'in the past few weeks'. In the LGM analysis, interpersonal stress was used as an auxiliary variable.

Analytical Approach

Latent growth curves models (LGM) were estimated using Mplus Version 8 (Muthén & Muthén, 2017). In order to take into account potential deviation from multivariate normality in the data, a robust maximum likelihood estimator was used (MLR). Moreover, we used Full Information Maximum Likelihood (FIML) in Mplus. This method allows to include every participant that has at least one data point on the LGM indicators. We used FIML instead of alternative methods to handle missing data (e.g., multiple imputation) for several reasons. First, this methodological technique is considered 'state of the art' and is one of the recommended approaches in the missing data literature (Enders, 2010). Second, there is growing research evidence of its effectiveness in addressing missing data biases (Enders, 2010). Lastly, it is easily accessible in structural equation modelling software such as Mplus (Muthén & Muthén, 2017).

In order to increase the quality of replaced missing values when using FIML, it is recommended to include a number of auxiliary variables that may contribute to explain why some participants had missing answers, why they stopped participating, and can help inform the imputation of their missing values (Enders, 2010). Auxiliary variables are variables that are not substantive to the study hypotheses but could be informative correlates of missingness (Enders,

2010). This inclusive strategy has two main advantages: (a) it increases power by using as much information to estimate the model parameters, and (b) it reduces bias (Enders, 2010).

We tested univariate models for stress and psychological distress separately, and parallel-process growth models with both stress and distress covarying together. In LGM, the starting point is to estimate individual growth curve for each single participant. After, a mean structure and latent variances are estimated. The means are considered fixed effect that represent an average intercept or slope across the sample (Curran et al., 2010). The mean structure consists of (a) an average initial level (mean intercept), and (b) an average rate of change (mean slope) across time. The variances represent the distribution of values around the average fixed effect (Curran et al., 2010). The latent variances inform: (a) individual variability around the initial levels (intercept variance), (b) individual variability around the rate of change (slope variance) across time, and (c) the correlation between the initial levels and the rate of change (intercept-slope covariance) across time (Bollen & Curran, 2006).

Preachers et al. (2008) recommend identifying the best LGM using a step-wise approach that is described in what follows. First, unconditional no-growth models are tested by estimating the mean of the intercept and fixing its variance (Model 0), then a random intercept (mean and variance) is freely estimated (Model 1; Preacher, Wichman, MacCallum, & Briggs, 2008). Next, additional growth models are estimated and compared. The linear slope factor is estimated with a fixed slope variance (Model 2), then with a random slope (mean and variance) is freely estimated (Model 3). After these initial four models, two key assumptions should be tested, namely, homoscedasticity (equal indicator variances across time points; Model 4) and auto-correlated residuals (Model 5; Preacher et al., 2008). The last model is the conditional model that considers the predictive effects of the three time-invariant predictors (i.e. parent and peer alienation and

sibling support) on the intercept and slope growth factors (Model 6).

In order to identify the best model for the data, the fit was compared at each step using statistical tests. This step-wise approach was used to test and compare model fit for the six models within three groups: univariate growth curves with stress and psychological distress separately and a parallel-process growth curve of both stress and psychological distress covarying together across time (i.e., mutual development).

Model fit was evaluated using four fit indices (see Kline, 2010). These include: (a) the chi-square goodness of fit test (χ^2), (b) the Comparative Fit Index (CFI > 0.90), (c) the Standardized Root Mean Square Residual (SRMR < .08 indicates adequate fit), and (d) the Root Mean Square Error of Approximation ((RMSEA < .08 indicates adequate fit). Once models were tested using MLR, nested models were compared to assess which one better fits the data using an adjusted chi-square (χ^2) difference test. In addition, difference in CFI, TLI, and RMSEA were also used to inform on the difference in fit between pair of models; a value of .02 or more in the CFI and TLI indicates a possibly significant difference (Cheung & Rensvold, 2002), while for the RMSEA, a value of 0.015 or more indicates a possibly significant difference (Chen, 2007).

Results

Univariate Unconditional Latent Growth Curve Models

Means and standard deviations for the observed measures, including parent and peer alienation, sibling support, stress, and psychological distress are presented in Table 1. Model fit indices are presented in Table 2 for the univariate latent growth models for stress, psychological distress in Table 3, and the multivariate parallel growth model of stress and psychological distress in Table 4.

From the six models tested for psychological distress, the linear growth curve that captures change over time (a random intercept and random slope; Model 3) was retained as this model better fits the data than the no-growth model (only a random intercept; Model 1) and a fixed slope model which assumes no individual variability in change over time (a random intercept and a fixed slope; Model 2). More specifically, there was a significant change in chi-square suggesting Model 3 better fits the data compared to Model 2 ($\chi^2(2) = 6.54$, $p<0.05$) and Model 1 ($\chi^2(3) = 9.65$, $p<0.05$). Both assumptions of homoscedasticity (equality constraints across time) and auto-correlated residuals did not improve model fit and therefore were not retained.

From the six models tested for stress, a random intercept and fixed slope model (Model 2) better fits the data than a no-growth model with only a random intercept (Model 1; $\chi^2(1) = 13.02$, $p<0.001$) and the linear growth model (a random intercept and random slope; Model 3; $\chi^2(2) = 5.41$, $p>0.05$). Specifically, a non-significant change in chi-square suggests Model 2 captures the data better than a random slope model which considers inter-individual variability. Similar to psychological distress, the addition of two key assumptions, homoscedasticity and auto-correlated residuals, did not improve model fit and therefore were not retained as part of the final model (presented in Table 3).

Overall, these latent growth curve models indicated that both stress and psychological distress can be modelled by a random intercept and a random slope. The slope of psychological distress had a significant mean (average level of change), but a non-significant variance (inter-individual variability in the average change). While the slope of stress had a significant mean (average level of change), the slope variance was not significant which suggests there is no significant differences among individuals in their decrease in stress.

Latent Growth Curve for Psychological Distress. The linear growth curve model for psychological distress had excellent fit (Table 2), $\chi^2(1) = 0.05$; CFI = 1.00; TLI = 1.02; RMSEA= 0.00; RMSEA 90% CI=[0.00, 0.10], p=0.87; SRMR=0.00. Growth in psychological distress was characterized by an initial level intercept (b=2.43, $p < 0.01$) and significant variability among individuals (b=0.57, $p < 0.01$). The slope of psychological distress had a significant negative linear slope over the three waves (b=-0.11, p=0.045). The variability between individuals on the slope was non-significant as well (b=0.13, p= 0.08). The intercept and slope covariance for psychological distress was also not significant (r = -0.08, $p> 0.05$). Individuals seem to decrease in their levels of psychological distress over the three waves, and there are no significant individual differences in this decrease. Further, initial levels of psychological distress at the beginning of the semester were not related to their decrease over time (b=-0.08, p=0.40).

Latent Growth Curve for Stress. The linear growth curve model for stress had excellent fit (Table 3), $\chi^2(3) = 6.27$; CFI = 0.89; TLI = 0.89; RMSEA= 0.07; RMSEA 90% CI=[0.00, 0.14], p=0.27; SRMR=0.11. Growth in stress was characterized by a significant initial level intercept (b=0.69, $p < 0.01$) and significant variability among individuals (b=0.02, $p< 0.01$). Changes in stress were characterized by a significant linear decrease over the three waves (-0.04, $p< 0.01$). In the retained model (Model 2), the variability between individuals on this slope was not estimated, and thus, the intercept and slope covariance for stress was also not estimated. When estimated, in Model 3 the slope variance was not significant (0.01, p=0.14). Overall, these findings suggest individuals decreased in their levels of stress over the three waves, and there were no significant individual differences on this decrease.

Multivariate Parallel Latent Growth Curve for Stress and Psychological Distress. Given the excellent fit of both univariate growth curve models, a series of multivariate models were tested and compared. In the comparison of Models 1 and 2, a random intercept and fixed slope (Model 2) better fit the data than a no-growth (only random intercept model; Model 1; $\chi^2(2) = 10.16$, $p<0.01$). However, a linear growth curve model (a random intercept and random slope; Model 3) fit the data better than the fixed slope model (Model 2; $\chi^2(5) = 14.31$, $p<0.01$). This suggests a random slope (mean and variance) and a random intercept (mean and variance) captures the data best.

Next, we included the predictive effects of the three time-invariant predictors (i.e., parent and peer alienation and sibling support). The conditional model with the predictive links (Model 6) was compared to the random intercept and slope model (Model 3) and Model 3 illustrated better fit ($\chi^2(5) = 2.25$, $p>0.05$). This parallel-process linear growth model estimated, (a) intercept and slope for each outcome, (b) a covariance between the two intercepts and slopes, and (c) a regression path from the intercept on the slope of each outcome. This model, however, did not estimate the predictive links of the time-invariant on stress and psychological distress. This parallel-process model illustrated excellent fit (Model 3), $\chi^2(9)= 12.91$; CFI = 0.98; TLI = 0.96; RMSEA= .04; RMSEA 90% CI=[0.00, 0.09], p=0.53.; SRMR=0.09 (as presented in Table 4).

Estimates of Intercept. In this preferred model (Model 3), the intercept mean (2.43, $p<0.01$) and variance (0.54, $p<0.01$) for psychological distress as well as the intercept mean (0.69, $p<0.01$) and variance (0.02, $p<0.01$) for stress were significant. The intercept for stress and psychological distress were correlated ($r=0.06$, $p<0.01$).

Estimates of Slopes. These estimates are consistent with the univariate growth model for psychological distress. Alternatively, in this model, there were some changes in the parameter

estimates for the slope mean and variance of stress and psychological distress compared to the univariate model. This could be due to the estimation of the regression from the intercept on the slope in this model, and the fact that these values represent the intercept and residual (unexplained) variance of the slope after adjusting for the regression of the intercept on the slope. Therefore, for stress, the slope mean (0.14, $p=0.09$) for stress were no longer significant in this model, while the slope variance (0.01, $p<0.05$) was now significant. The slopes for stress and psychological were not correlated ($r=0.01$, $p=0.05$). Also, for psychological distress, the slope mean was no longer significant (0.10, $p=0.7$) and the variance (0.11, $p=0.05$) was not significant.

Estimates of the intercept-slope regression. The regression path from intercept on the slope was not significant for psychological distress ($b=-0.08$, $p>0.05$), such that the initial levels of psychological distress did not predict its decrease over time. This finding is similar to the univariate models as the intercept and slope covariance for psychological distress was not significant. For stress, the intercept of stress predicted its slope ($b=-0.025$, $p<0.05$), such that the initial levels predicted the rate of decrease over time. This finding is different from the univariate model for stress because in the univariate model the intercept-slope covariance was not significant. For stress, there was a significant and negative regression path of the intercept on slope, while quite small this suggest that with a higher intercept (starting level) there is a slightly slower decrease in the slope of stress.

In the model with predictive links many of the paths were non-significant suggesting this model did not add substantially to the parallel growth model (without any predictors). In particular, in terms of the predictive links, this model illustrates that sibling support did not predict the intercept nor slope of either psychological distress or stress. Also, parent and peer alienation predicted the initial levels (i.e. intercept) of psychological distress ($b=0.38$, $p<0.001$;

b=0.25, p<0.01, respectively). However, parent and peer alienation did not predict the intercept of stress nor the slope of psychological distress and stress.

Discussion

Research suggests emerging adults experience fluctuations in their mental health over the course of a semester (Baker et al., 2018; Bewick et al., 2010). This 3-month longitudinal study examined the growth curves of stress and psychological distress during a university semester. Furthermore, we considered the predictive effects of two risk factors (parent and peer alienation) and the potential compensatory effect of sibling support. In this study, the main findings were did not support our proposed *Vulnerability Model*. Furthermore, there were several unexpected findings, which were also contrary to our hypotheses of the predictive links of sibling, parent, and peer relationships to stress and distress. Hence, considering the predictive effects of relationships, there was no evidence to support our hypotheses.

Growth Curves of Stress and Psychological Distress

Our proposed *Vulnerability Model* hypothesized that stress and psychological distress would increase over three months, as opposed to an alternative *Resilience Model* which would suggest that stress and distress would decrease. The findings of this study suggest emerging adults decrease in their levels of psychological distress and stress over the course of three months. The decrease in both outcomes over a semester is in line with our *Resilience Model* and consistent research indicating long term changes (i.e. decreases) in depressive symptoms throughout emerging adulthood (Galambos et al., 2006; Pettit et al., 2011; Schulenberg et al., 2005) as well as research indicating short-term decreases of psychological distress during an academic semester (Baker et al., 2018; Bewick et al., 2010).

Specifically, stress decreased over the semester, although minimally by about 4%. The negative relationship between the intercept and slope of stress implying those with higher baseline levels of stress had a slightly slower decreases in the slope of stress. At the same time, decreases in psychological distress are not related to baseline levels, suggesting regardless of an emerging adults initial levels of distress, individuals would decrease at a similar rate. These patterns of decrease in stress and distress suggest that while emerging adult face multiple stressors during their college experience (Murphy, Blustein, Bohlig & Platt, 2010; Terriquez & Guarantz, 2014), consistent with an alternative *Resilience Model* that we did not favor for this study, emerging adults may find ways to successfully learn to manage their tasks, challenges, and issues. This appears to be the case even for those who start the semester with higher levels of stress. In terms of baseline levels, this study found significant variability among individuals in their starting (baseline) levels of stress and psychological distress.

Universities are working to address the growing levels of stress and mental health problems among students through increase wellness programs (Hunt & Eisenberg, 2010). This is based on evidence that university students are more at-risk of symptoms of psychological distress compared to the general population (Stallman, 2010). However, our finding suggests that despite this higher prevalence there a decrease in both stress and psychological distress over a semester. Our finding is consistent with other studies that examine variability of anxiety and depression symptoms over multiple academic semesters (Baker et al., 2018). Although both mental health challenges, stress and psychological, distress decrease over a few months, their trajectories were not related. This suggests their pattern of decrease is variable and could be influenced by demographic characteristics, or situational and contextual factors.

The short-term decreases in stress and psychological distress is also well grounded in the theoretical premise and research on psychopathology that recognizes that even with the presence of substantial risk exposure not all individuals who experience these adversities will develop emotional problems (Rutters, 1987; Sroufe & Rutters, 1984). Therefore, the study of changes in stress will need to identify risk factors associated to negative outcomes (e.g., academic workload, relationship challenges, low social support; Baker et al., 2018) and any underlying protective and vulnerability processes (e.g., coping, emotion regulation; Compas, 2009) that impact the link between risks and experiences of stress over a semester.

Co-Development of Stress and Distress

Our proposed co-development notion hypothesized that the intercept and slope of stress and distress would have a positive relationship to reflect their co-development over a semester. Surprisingly, the relations between the intercept and slope of stress and psychological distress suggest the starting levels of these outcomes are related, and not their patterns of change over time. For example, the intercept for stress and psychological distress were correlated ($r=0.06$, $p<0.01$), while their slopes were not related ($r=0.01$, $p=0.05$). This is contrary to the fact that stress and psychological distress decrease over the course of the semester.

The lack of a co-development could be due to several reasons. First, there could be unexamined variables that might explain the absence of a link between stress and distress (e.g. coping). At such, the longitudinal relation between stress and psychological distress may be buffered by coping strategies that students have developed or successfully utilized over the course of the semester. Second, our analysis was specifically interested in relationships between the two trajectories of stress and psychological distress, rather than the links between stress and distress at each wave (i.e. time-varying latent growth curves) or across different waves (i.e. auto-

regressive or cross-lagged latent growth curves). Finally, our measure of stress, although commonly used, might not have sufficiently captured the variety of stressful experiences that could be differentially related to psychological distress over time.

Sibling Support: Compensatory Predictive Effects

We hypothesized sibling support would be a compensatory factor and should predict less stress and less psychological distress over the three months, while statistically accounting for the risks of parent and peer alienation. Contrary to our hypotheses, sibling support was not related to the initial levels nor the changing rates of stress and psychological distress. Although the value of siblings for mental health is evidenced in research on childhood and earlier stages of adolescence (East, 2009; McHale et al., 2012), there does not appear to be any cross-sectional relation nor longitudinal prediction from supportive siblings in the development of stress and psychological distress over the course of an academic semester in emerging adulthood.

There are three reasons why perhaps siblings may not be a significant compensatory influence in emerging adulthood. For instance, support in sibling relationships might not be related specifically to psychological distress, but rather other aspects of mental health, such as wellbeing (Sherman et al., 2006). This explanation is in line with *safe haven* hypothesis of social support, which suggests that support from relationships, while not buffering a negative outcome, can promote positive functioning and thriving (Feeney & Collins, 2015). Second, in the context of parent and peer alienation, sibling might not mitigate psychological distress because these relationships are important in the lives of many emerging adults (Galambos & Kotylak, 2012). Lastly, another plausible explanation is that the supportive influences of siblings might not be well captured within the short period of 3 months. For instance, the study that found a protective

effect of sibling affection in the link between stressful life events and psychological distress among children examined test this model over a longer period of two years (Gass et al., 2007).

Risk Predictive Effects: Parent and Peer Alienation

We hypothesized parent and peer alienation would be potential risk factors and should predict more stress and more psychological distress over the course of the three months. Contrary to our expectations, there were no predictive risks associated with parent and peer alienation in the development of stress and psychological distress. While experiences of alienation were related to baseline levels of psychological distress, these experiences were not predictive of psychological distress suggests alienation with parents and peers is not a risk factor for psychological distress. Surprisingly, parent and peer alienation were not related to stress, as hypothesized. This finding is consistent with cross-sectional evidence of the impacts of experiences of alienation on psychological distress (Allen, Porter, McFarland, McElhaney, & Marsh, 2007; Raudino, Fergusson, & Horwood, 2013), as well as previous findings by the authors (2020ab).

There are two plausible explanations for these findings. First, alienation in these relationships was only measured at baseline, and while these experiences are potential risk factors for psychological distress, research can explore whether experiences of alienation co-vary with psychological distress over time to suggest some predictive risk influences. Second, this study might not have found predictive links, because psychological distress, in this study, was measured as both symptoms of depression and anxiety. However, it is known interpersonal challenges might be more related to depression than anxiety (Hammen, 2005) and that among college students, when anxiety and depression levels are examined separately, depression scores

are lower than anxiety levels suggesting over the course of a semester college experiences might be riskier for anxiety than depression (Bewick et al., 2010).

Third, while interpersonal stressors from parents are harmful, these experiences might not be as relevant in the lives of emerging adults over the short period of a semester. As such, emerging adults could be exposed to more pertinent predictive risk factors of stress and psychological stress related to the challenges of college life (Beiter et al., 2015; Eisenberg, Hunt, & Speer, 2013). For example, research has identified several potential risk factors specific to college student experiences, college transition, and adjustment including demographic characteristics (e.g. socioeconomic status, minority status; Eisenberg et al., 2013), social connectedness (Allen, Robbins, Casillas, & Oh, 2008; Hefner & Eisenberg, 2009), experiences of discrimination (Donovan et al., 2013), academic challenges (Hurst, Baranik, & Daniel, 2013). These potential risk factors might be more related to psychological distress than interpersonal challenges with parents and perhaps even peers. Other important risk factors may also include acute or chronic stressors that are particularly related to depression in emerging adulthood (Vrshek-Schallhorn et al., 2015). Future longitudinal studies would need to identify the predictive influences of these risk factors on stress and psychological over shorter (e.g., 3-month semester), and longer (e.g., multiple semesters or academic years) periods of time.

Limitations

There are a number of substantive and methodological limitations to this longitudinal study that are worth mentioning. First, although this study had a longitudinal design, only stress and psychological distress were measured across three waves, while the predictors (parent and peer alienation, as well as sibling support) were time-invariant as they were only measured at baseline. Time varying predictors would be more informative to model gradual prediction effects

at each repeated measure. Additionally, despite the longitudinal design modelling the evolution of stress and psychological distress over three months, the causality of any of those links cannot be demonstrated as this study remains entirely correlational. Second, the latent growth curves models for this study consisted of observed measures and composite scores rather than higher-order latent indictors. A second-order latent growth curve could better account for measurement error and test the factorial invariance of our measures across time. Furthermore, stress was measured as a single item at each wave. Although this was a commonly used and valid measure for stress (Hadd & Crocker, 2007; Kaiseler, Polman, Nicholls, 2009), a longer measure may better represent the complexity of this construct.

Third, the sample consisted primarily of white (63%), female (88%) undergraduate students, which compromises the generalization of our results given that these demographic proportions are not representative of many populations. An added issue related to our sample is the high attrition. The lack of retention of participants is a persistent challenge confronted in longitudinal research. Retention rates for this study ranged from 50% at wave 2 and as low as 20% at wave 3. Although several of the retention strategies recommended for longitudinal studies were implemented in this study (e.g. study reminders, study description and benefits; Abshire et al., 2017), the retention rate was still quite low. Finally, we only had one longitudinal sample, which means that these findings require replication across other samples to evaluate their accuracy and robustness across different populations of emerging adults.

Conclusion

Stress and psychological distress, including depression and anxiety, are a common and concerning experience among emerging adults (Hunt & Eisenberg, 2010); therefore, this study examined baseline levels and growth curves of stress and psychological distress over a university

semester and how these trends can be predicted by parent and peer alienation and sibling support. Overall, the main finding of this study is that experiencing a supportive sibling relationship is not compensatory against the risk associated parent alienation and peer alienation in emerging adulthood. Furthermore, the results of this longitudinal study indicate that both experiences of stress and psychological distress decrease over time, although the slopes of these outcomes are not statistically related over time. Surprisingly, parent and peer alienation were not predictive risk factors of stress and distress. Overall, despite the growing scientific interest and research on the benefits of siblings for mental health in emerging adulthood (Shanahan, Waite, & Boyd, 2012), our longitudinal study suggests that these benefits might not always be evident during an academic semester.

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Table 1. Means and standard deviations of the observed measures of parent and peer alienation, sibling support, stress, and psychological distress.

Wave	n	Variable	Mean (SD)
1	233	Parent Alienation	2.34 (0.89)
1	232	Peer Alienation	2.23 (0.75)
1	234	Sibling Support	3.62 (0.80)
1	232	Stress	0.69 (0.20)
1	231	Psychological Distress	2.43 (0.88)
2	100	Stress	0.63 (0.21)
2	100	Psychological Distress	2.27 (0.80)
3	48	Stress	0.61 (0.22)
3	46	Psychological Distress	2.11 (0.84)

Note. Standard deviation are in parentheses. The means are for the composite scores of the observed items at each wave. The standard deviation was calculated as the square root of the variance of the composite scores.

Table 2. Fit Indices for Latent Growth Curve Models for Psychological Distress

	X^2	*c*	*df*	*CFI*	*TLI*	*RMSEA*	*90 % IC*	*SRMR*
Model 0	168.24	0.56	5	0.00	0.184	.37	[.33; .42]	.70
Model 1	10.44	0.99	4	0.95	0.96	.08	[.02; .15]	.16
Model 2	6.59	0.76	3	0.97	0.97	.07	[.00; .15]	.12
Model 3	0.05	0.76	1	1.00	1.02	.00	[.00; .10]	.00
Model 4	1.32	0.68	3	1.00	1.01	.00	[.00; .08]	.06
Model 5	1.06	0.76	3	1.00	1.03	.00	[.00; .07]	.06
Model 6	3.52	1.10	6	1.00	1.03	.00	[.00; .06]	.08

Note. Model 0: Fixed intercept (Null Model); Model 1: Random intercept; Model 2: Random intercept and fixed linear slope; Model 3: Random intercept and linear slope; Model 4: Random Intercept/Slope and homoscedasticity assumption; Model 5: Random Intercept/Slope and auto-correlated residuals; Model 6: Conditional Model with predictive links.

Table 3. Fit Indices for Latent Growth Curve Models for Stress

	X^2	*c*	*df*	*CFI*	*TLI*	*RMSEA*	*90 % IC*	*SRMR*
Model 0	173.87	0.23	5	0.00	-2.44	.38	[.33; .43]	.35
Model 1	17.29	0.84	4	0.55	0.66	.11	[.07; .18]	.18
Model 2	6.27	0.90	3	0.89	0.89	.07	[.00; .14]	.11
Model 3	1.08	1.02	1	0.99	0.99	.02	[.00; .18]	.03
Model 4	3.06	0.74	3	0.99	0.99	.01	[.00; .11]	.11
Model 5	3.06	0.74	3	0.99	0.99	.01	[.00; .11]	.11
Model 6	2.54	1.01	6	1.00	1.10	.00	[.00; .04]	.06

Note. Model 0: Fixed intercept (Null Model); Model 1: Random intercept; Model 2: Random intercept and fixed linear slope; Model 3: Random intercept and linear slope; Model 4: Random Intercept/Slope and homoscedasticity assumption; Model 5: Random Intercept/Slope and auto-correlated residuals; Model 6: Conditional Model with predictive links.

Table 4. Fit Indices for the Parallel Latent Growth Curve Models

	X^2	*c*	*df*	*CFI*	*TLI*	*RMSEA*	*90 % IC*	*SRMR*
Model 0	204.02	0.92	19	0.00	0.11	0.20	[.18; .23]	.44
Model 1	39.25	1.02	16	0.86	0.87	0.08	[.05; .11]	.16
Model 2	28.25	1.00	14	0.91	0.91	.06	[.03; .10]	.14
Model 3	12.91	0.92	9	0.98	0.96	.04	[.00; .09]	.09
Model 4	125.39	0.68	14	0.32	0.27	.18	[.15; .22]	.33
Model 5	12.91	0.92	9	0.98	0.96	.04	[.00; .09]	.09
Model 6	14.70	0.97	14	1.00	1.00	.00	[.00; .06]	.05

Note. Model 0: Fixed intercept (Null Model); Model 1: Random intercept; Model 2: Random intercept and fixed linear slope; Model 3: Random intercept and linear slope; Model 4: Random Intercept/Slope and homoscedasticity assumption; Model 5: Random Intercept/Slope and auto-correlated residuals; Model 6: Conditional Model with predictive links.

Table 5. Parameter Estimates for the Parallel-Process Growth Curve Model (Model 3)

Variable	Parameter	Coefficient	Standard Error	Significance
Psychological Distress (PD)	Intercept	2.43	0.06	$p<0.001$
	Slope	0.10	0.29	$p=0.72$
	Intercept Variance	0.54	0.10	$p<0.001$
	Slope Variance	0.11	0.05	$p=0.05$
	Intercept-Slope Regression	-0.09	0.12	$p=0.45$
Stress (ST)	Intercept	0.69	0.01	$p<0.001$
	Slope	0.14	0.08	$p=0.09$
	Intercept Variance	0.02	0.01	$p<0.001$
	Slope Variance	0.01	0.00	$p<0.05$
	Intercept-Slope Regression	-0.25	0.12	$p<0.05$
	PD-ST Intercept Covariance	0.064	0.01	$p<0.01$
	PD-ST Slope Covariance	0.01	0.01	$p=0.05$

Note. Coefficient refers to the unstandardized coefficient. The average slope and slope variance for both stress and distress represents the intercept and residual variance of the slope after adjusting for the regression of the intercept on the slope.

CHAPTER 5: General Discussion

To date, the role of siblings in promoting mental health of emerging adults remains scarcely examined (Conger & Little, 2010; Milevsky, 2004; Milevsky, 2005; Myers & Bryant, 2008; Van Volkom et al., 2011). The main goal of this thesis was to assess the protective role of supportive sibling relationships in the links between experiences of alienation, stress, and psychological distress in emerging adults. Previous work has suggested both compensatory and promotive effects of supportive sibling relationships (Milevsky, 2005; Sherman, Lansford, & Volling, 2006), yet there has been no examination of the protective effects of supportive siblings. Specifically, across three articles, this thesis contributes to fill this research gap by examining experiences of alienation with parents and peers as risk factors for stress and psychological distress, and the role of sibling relationships in mitigating or compensating these negative outcomes.

To examine the protective role of siblings, Studies 1, 2, and 3 used latent moderated mediation modeling, the recommended technique for estimating and interpreting interaction effects (Marsh et al., 2013). Study 4 used latent growth curve modeling to examine the compensatory role of sibling support in the development of stress and psychological distress across three months. The protective (moderating) role of supportive siblings was examined at two levels: as perceived across all siblings (Study 1) and with one's closest sibling (Studies 2 and 3). Additionally, in the risk mediation model, the mediating role of general stress (Studies 1 and 2) and interpersonal stress (Study 3) were also considered. To extend on these studies, the final study examined between and within person change in stress and psychological distress in a 3-month longitudinal design (Study 4). Overall, the key findings of these studies are discussed in detail below.

Summary and Contribution of the Articles

Key Findings of Article 1

Although having only one sibling is quite common, there are still many emerging adults with multiple siblings. Thus, this first study proposed a measure of the quality of sibling relationships across the entire network of siblings and examined the aggregated impact of this collective support on psychological distress. Essentially, Study 1 tested the proposed moderated-mediation model to examine the protective effect of a supportive sibling climate (as perceived across all siblings) and replicated the findings across three independent samples.

This study underscored two main findings. First, contrary to our hypothesis and the proposed moderated-mediation model, the main findings of this study indicated that a supportive sibling climate (i.e., average support across all siblings) was not a protective or compensatory factor. Consistently, across the three independent samples, a supportive sibling climate did not moderate the paths of the mediation model. Additionally, when alienation was accounted for, sibling climate did not continue to have a negative main effect on psychological distress. Alternatively, a supportive sibling climate was associated with less psychological distress, but only, when not consider the effects of alienation. Thus, there are no protective or compensatory effects of sibling climates across three samples, yet a supportive sibling climate may be promotive for mental health for emerging adulthood.

Second, this study demonstrated reliable cross-sectional evidence of a risk mediation model, in which experiences of alienation may increase the risk of stress and psychological distress. In two of the three samples, general stress partially accounted for the relationship between parent alienation and psychological distress, however, this risk path was not evident for peer alienation.

Study 1 adds to research on siblings in three ways. First, the use of sibling climate as a measure of supportive sibling relationships represents a distinct and informative approach. Sibling climate is a way to capture the positive and cumulative experience of support across multiple siblings. This approach recognizes that any sibling relationship exists in a broader network of other sibling relationships (Cox & Paley, 1997). Thus, each sibling dyad is organized as a subsystem that impacts, and is impacted, by other sibling dyads (Cox & Paley, 1997). A measure of climate is also a more inclusive approach to the study of siblings because it considers support independent of the number of siblings, and can thus somewhat account for family size as well.

Second, a key strength of this study is the use of replication across three independent samples. Replication is necessary to ensure the validity and credibility of research conclusions, and to further establish the generalizability of findings across multiple studies and samples (Duncan, Engel, Claessens, & Dowsett, 2014; Earp & Trafimow, 2015). An important note about replication is that while results can be replicated or not, replicated findings are often not sufficient to falsify a theory, rather replications can provide evidence for or against a theoretical perspective (Earp & Trafimow, 2015). In the case of this study, the replicated findings provide a lack of evidence to support our hypothesized moderated-mediation model.

Third, the hypothesized protective effect of sibling climate was non-significant across the three samples. These replicated findings establish with appreciable validity and credibility that sibling climate is not protective in emerging adulthood in the context of alienation. Replication is particularly vital for new or emerging research areas where divergent results can be verified and reproduced (Duncan et al., 2014). Given the limited research on siblings in emerging adulthood, a single sample would have not been sufficient to inform this research area. To address this, this

study conducted a direct replication of the same moderated-mediation model using identical measures across different samples. Although direct and exact replication is important, future research can consider conceptual replications conducted using different theoretical models, estimation methods, measurement tools, and demographically diverse samples (Earp & Trafimow, 2015).

Fourth, this study was the first to examine multiple alternative models of sibling support, namely, protective, compensatory, and promotive effects. However, only a promotive effect was identified in two of the three samples. This promotive influence is in line with cross-sectional and longitudinal evidence of the negative link between sibling support and depressive symptoms in emerging adulthood (Guan & Fuligni, 2016).

In sum, Study 1 (Article 1), of this thesis, used a distinct measure of sibling climate, conducted a direct replication across several samples, and examined alternative conceptual models of risk grounded in developmental psychopathology. This study concludes there is no protective role of a supportive sibling climate against the risks associated with parent and peer alienation, stress and psychological distress.

Key Findings of Article 2

We incorporated two key revisions based on the findings of Study 1. First, a supportive sibling relationship was measured with one's closest sibling rather than as a sibling climate, using a more comprehensive measure of support. Second, the risk mediation model was examined using general and interpersonal stress as two distinct mediators.

Findings of sibling support. First and foremost, the main findings were inconsistent with the hypothesized moderated-mediation model. In Study 2, contrary to our hypotheses, there was no evidence of a protective effect for sibling support against the risks of parent alienation.

For peer alienation, there was a significant moderated-mediation model, however, the paths were partly inconsistent with our hypotheses. This study found the links between peer alienation, stress, and psychological distress varied depending on levels of sibling support. First, a moderation of the path from peer alienation to general stress suggested a supportive sibling accentuated the link between peer alienation and stress. Peer alienation was related to more stress in the context of high sibling support. Second, a moderation of the path from stress to psychological distress suggested a supportive sibling attenuated this link. Stress from peer alienation was related to less psychological distress in the context of high sibling support.

An intriguing finding of Study 2 is the worsening effect of sibling support in the moderation of the path between alienation from peers and stress, suggesting peer alienation may generate more stress in the context of more sibling support. As discussed in Article 2, this effect could be due to the increase risk of co-rumination in supportive relationships (Byrd-Craven, Geary, Rose, & Ponzi, 2008). Future studies should measure tendencies to co-ruminate with siblings in order to further explore this possibility.

Unexpectedly, Study 3 did not replicate the findings of Study 2, specifically sibling support had no protective effects against the links among peer alienation, stress, and psychological distress. Instead, there was a moderation of the direct effect of parent alienation on psychological distress, such that in the context of high sibling support, parent alienation was related to less psychological distress.

Finally, in terms of alternative models, these studies also found evidence of promotive and compensatory effects of sibling support. Study 2 demonstrated a compensatory influence, such that sibling support was related to less psychological distress even after accounting for risk exposure to peer alienation. In Study 3 sibling support was a promotive factor, such that sibling

support was related to less general stress, interpersonal stress, and psychological distress in both peer and parent alienation models, while there was no evidence of a compensatory influence.

Findings of the risk mediation model. Studies 2 and 3 found support for the proposed risk mediation model that were in line with our hypotheses of the mediating role of general stress. While Study 1 did not find a risk mediation model for peer alienation, the cross-sectional evidence from studies 2 and 3 suggest parent and peer alienation may both be potential risk factors for stress and psychological distress.

Study 3 also examined the mediating role of interpersonal stress. Interestingly, even though parent and peer alienation were related to interpersonal stress, interpersonal stress did not account for more psychological distress after considering the role of general stress. It appears general non-specific stress might be a more potent risk factor for psychological distress, than interpersonal stress from parent or peer relationships. This finding is particularly relevant for emerging adults and would need to be further explored; given this period is characterized by multiple diverse stressors (Arnett, 2007), emerging adults might be at an increased risk of general stress and in turn, possibly, psychological distress.

Taken together, these findings show three trends. First, supportive siblings were consistently not protective against stress and psychological distress in the context of parent and peer alienation. Second, although inconsistent, these studies found some protective effects of siblings for psychological distress against parent and peer alienation. Third, there was an unexpected and intriguing worsening effects of supportive siblings on stress in the context of peer alienation (Study 2). Fourth, there was evidence of compensatory (Study 2) and promotive (Study 3) effects of siblings against general stress, interpersonal stress and psychological distress. Overall, there are several plausible reasons for this inconsistency and the lack of

protective findings that will be discussed in the next section. Overall, even if the protective role of sibling support is less probable, there could still be promotive and compensatory effects of siblings that warrants more research.

Key Findings of Article 3

Study 4 is an longitudinal follow-up to the first three cross-sectional studies, in that this study examined the predictive effects of siblings, parent, and peer relationships in the trajectory of stress and psychological distress in a 3-month prospective design. The three previous cross-sectional studies provide little evidence for our proposed moderated-mediation model, in which supportive siblings (i.e. climate and closest sibling) could buffer against stress and psychological distress. The replicated findings illustrate that sibling support was not protective in the context of parent and peer alienation, as most of the model estimates were not significant. Therefore, Study 4 did not test the moderated-mediation model again, but rather focused on (a) potentially compensatory impact of siblings, (b) longitudinal assessment of stress and distress, and (c) the predictive effects of parent and peer alienation on the development of stress and psychological distress over a semester.

Development of stress and psychological distress. First, the main findings of Study 4 were partly consistent with our proposed hypotheses of the trajectories of stress and psychological distress over a semester. Stress and psychological distress both decrease over the course of an academic semester. This is consistent with our alternative hypothesis of the *Resilience Model* which suggests these negative outcomes will decrease as students successfully manage the challenges and tasks of the semester. While both stress and psychological distress decrease over the course of the semester, their trajectories were not related suggest their pattern of decrease may not be similar. Furthermore, for stress, baseline levels and its slope were related,

such that emerging adults who began the semester with higher levels of stress would decrease at a slower rate. Thus, those who start the semester at higher levels are more vulnerable to experiencing a slower decrease in their experiences of stress. These patterns were not evident for psychological distress. Most emerging adults share a similar decreasing trend in their experiences of psychological distress.

At baseline levels, there was substantial individual differences among emerging adults on their starting levels of stress and psychological distress. Also, baseline levels of these outcomes had a positive relationship, such that higher levels of one was associated with higher levels of the other. In terms of slope, the findings illustrated that stress and psychological distress both decrease over the course of a semester. Interestingly, both slopes were related negatively to their intercepts, suggesting higher baseline levels were related to a marginally slower decrease in the slope of stress and psychological distress over the semester. Furthermore, individual differences in these slopes were not substantial suggesting emerging adults have similar decreases of stress and psychological distress over the three time points. This finding is consistent with the hypothesized notion of co-development, as stress and psychological distress have similar decreasing trajectories.

Predictive effects of sibling, parent, and peer relationships. This study had several unexpectedly findings that were contrary to our hypotheses of the predictive links of relationships to stress and distress. First, sibling support was not related to baseline levels and the slopes of stress and psychological distress suggesting sibling support was not a compensatory factor in the context of parent and peer alienation. Second, there were no predictive risks associated with parent and peer alienation on how stress and psychological distress develop over

a semester. While not predictive, experiences of alienation were still associated with baseline levels of psychological distress.

In sum, this study tracked the development of stress and psychological distress over a semester and found sibling, parent, and peer relationships did not have any predictive risk or compensatory influences. Furthermore, emerging adults vary in their starting levels of stress and distress at the beginning of the semester, yet remain more similar in the development of these outcomes over the course of the semester.

Research and Theoretical Implications

Collectively, the four studies of this thesis make some useful and some unexpected contributions to the scarce literature on emerging adult siblings. First, this thesis consistently indicated that sibling support is more likely promotive rather than protective or compensatory. There are several analytical, methodological, and theoretical considerations related to this finding. Second, this thesis provided robust cross-sectional evidence of our risk mediation model, however, our longitudinal study found no evidence of the predictive risks associated with parent and peer alienation. Lastly, this thesis demonstrated that experiences of stress and psychological distress decrease over the course of a semester. The implications of these findings for the study of emerging adults are further discussed.

Siblings: Can they matter even if they might not be protective?

To date, research conducted on the protective role of siblings has focused almost exclusively on children and adolescents. As such, Articles 1 and 2 offered a novel opportunity to examine the protective role of siblings in emerging adulthood at two levels of support, as experienced across all siblings and with one's closest sibling. I did not find any consistent support that siblings are protective against stress and psychological distress in the context of

parent and peer alienation. There were occasional protective effects found in two studies, however, these mechanisms were inconsistent and were not conceptually or empirically replicated in the other samples. There are analytical, theoretical, and methodological considerations in understanding the reasons for these inconsistent findings of the protective role of sibling support.

Analytical consideration. This consideration is related, generally, to the difficulty of identifying and replicating interaction effects (Marsh et al., 2012). Interaction effects are often small, and even when theoretically justified and assessed with psychometrically valid measures, are difficult to estimate and replicate (Marsh et al., 2012; Kline, 2010). Additionally, researchers also acknowledge inconsistent findings of interactive effect can be partly due to the amount of measurement error in models (Marsh et al., 2012). This thesis addressed these challenges by using thorough theoretical justifications for the hypothesized models, a structural equation modeling approach to mitigate the statistical limitations related to measurement error, and relying on established measures for study constructs. Therefore, while this thesis took several steps to mitigate these challenges, the studies found limited evidence of an interactive effect of sibling support. Given the methodological and analytical advantages of our studies, this thesis provides evidence that while siblings may matter for development in other ways, when supportive, these relationships do not protect against experiences of stress and psychological distress in the context of parent and peer alienation in emerging adulthood.

Methodological consideration. This consideration is related specifically to the conceptualization and measurement of the study constructs of this thesis. First, the concept of social support, as measured in Studies 2, 3, and 4 of this thesis, might be too broad to capture the mechanisms that may protect against parent and peer alienation. The concept of social support

consists of many facets (e.g., informational, emotional, affectionate, instrumental), which are characterized as perceived or received support (Cohen et al., 2000). For example, consistently perceived support has a stronger relationship with depression than received support among children, adolescents, and adults (Chu et al., 2010; Haber, Cohen, Lucas, & Baltes, 2007; Rueger et al., 2016). Although our measure of sibling support captured eight qualities related to both perceived and received support (i.e., intimacy, affection, knowledge, acceptance, emotional support, instrumental support, similarity, and admiration; Stocker, Lanthier, & Furman, 1997), it is plausible that in the context of parent and peer alienation only some of those aspects might be relevant. For example, alienation consists of feelings of detachment, anger, and an inability to confide one's feelings with parents and peers, therefore, perceived support qualities of intimacy, acceptance, emotional support, and admiration may be more pertinent. To explicitly examine the differential effects of support features of sibling relationship, future studies can compare the promotive, compensatory, and protective effects of these qualities, whether separately or in theoretically-informed groupings.

Second, experiences of alienation in parent and peer relationships may be more impactful of psychological distress than sibling support, given the centrality of parents and peers in emerging adulthood (Agerup et al., 2014; Arnett, 2007; Chow, Roelse, Buhrmester, & Underwood, 2012; Mattanah, Lopez, & Govern, 2011; Raudino et al., 2013). For example, research in psychology has exemplified that often the bad is stronger than the good in many aspects of close relationships (Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001). In this case, parent and peer alienation may have a stronger or more durable effect than the cumulative positive and supportive experiences with siblings. Thus, a possible explanation for the lack of a protective effect for sibling support is that support from siblings might not be sufficient to offset

the negative effect of experiences of alienation with parents. Furthermore, even in cases of high support, it more plausible that negative experiences of alienation might undo the positive effects of that support, rather than the reverse (Baumeister et al., 2001). Even though siblings were consistently not protective against parent and peer alienation, it is plausible that siblings support may be protective or compensatory against other risks in emerging adulthood, such as low social support in other relationships (Murphy, Blustein, Bohlig & Platt, 2010) and financial stress factors (Blanco et al., 2008; Terriquez & Guarantz, 2014).

Theoretical consideration. This consideration is related to the theoretical value of the stress-buffering hypothesis to examine the impact of siblings in emerging adulthood. While the moderating role of social support is well-evidenced, there are occasional studies that find no protective effects (Rueger et al., 2016). There are three alternative theoretical justifications for the study of siblings beyond the stress-buffering justification used for this thesis. A proposed alternative to the stress-buffering hypothesis is the main effects (or general benefits; Rueger et al., 2016) hypothesis which suggests the value of social support is more in the positive direct effect on mental health and wellbeing regardless of stress or risk exposure (Cohen, 2004). This is more line with the findings of this thesis, given that siblings illustrated a promotive effect for mental health in half of our samples, while compensatory and protective effects were rare. Based on the main effect hypothesis, future studies on sibling support could focus more on the main effect of siblings on a vary of mental health outcomes while considering varying levels of risk exposure.

An alternative understanding of the stress-buffering hypothesis is also that the beneficial effects of social support are specific to at-risk groups (Auerbach et al., 2011; Rueger et al., 2016). Consistent with this approach, a recent meta-analysis found evidence of stress-buffering

effects of social support for mentally-ill adolescents (Rueger et al., 2016). As an extension to the studies of this thesis, this approach would propose that siblings may have protective effects among high risk emerging adults. Future studies may examine the stress-buffering effects of social support for clinical samples of emerging adults for several reasons. First, in some cases, maladaptive sibling dynamics can require clinical interventions, which are shown to help improve parents and sibling relationships (Caspi, 2011). Second, siblings may be helpful, but are often neglected, in family programs to support young people with mental health and behavioural challenges (Feinberg et al., 2012). Third, siblings are also proposed as a point of intervention to influence family and sibling dynamics as well as individual functioning (Caspi, 2011).

Lastly, a theoretical perspective on close relationships and positive wellbeing suggests that social support can be valuable not only in the context of risk but also as a secure base for thriving and positive wellbeing (Feeney & Collins, 2015). In line with these perspectives, supportive siblings may be influential in promoting wellbeing by cultivating positive life experiences, and fostering personal growth and exploration (Feeney & Collins, 2015; Pietromonaco & Collins, 2017). Furthermore, individuals have an innate need to maintain positive close relationships (Baumeister & Leary, 1995; Clark & Lemay, 2010), as such sibling may promote mental health or wellbeing by fulfilling this basic need (Pietromonaco & Collins, 2017). Research could consider these alternative explanations in their study of the value of siblings.

Overall considering the analytical, methodological, and theoretical concerns, an added challenge is related, generally, to the lack of studies on siblings in emerging adulthood for comparison. Given the shortage of sibling research among emerging adults it can be difficult to identify the underlying reasons for inconsistent results. Divergent results may be due to

differences in theory, measurement, and analytical approach across studies. However, future studies can attempt to resolve this inconsistency by further mapping the conceptual boundaries of sibling effects, to help gain a more complete understanding of siblings in emerging adulthood. These studies can explore: (a) specific facets of support in sibling relationships to identify differential effects (Rueger et al., 2016; Sarason & Sarason, 2009); (b) individual and health processes as mediators, such as affective states, self-esteem, relationship partner characteristics (Pietromonaco, Uchino, Dunkel Schetter, 2013); (c) multiple consequential life domains specific to emerging adulthood, such as identity development and role transition (Arnett, 2007); and (d) how siblings relate to diverse outcomes, including both mental health and wellbeing (O'Connor et al., 2011; Schulenberg & Zarrett, 2006).

Implications. Emerging research in the positive aspects of sibling interactions in adolescence has already led to evidence-based interventions and programs to promote prosocial sibling interactions and improve the mental health of young people (Caspi, 2011; Feinberg, Sakuma, Hostetler, McHale, 2013; Kennedy & Kramer, 2008; Kramer, 2010). As such, there is also the growing recognition of the absence of siblings in the management and treatment of mental illness within the family context, specifically for emerging adults (Bowman, Alvarez-Jimenez, Wade, McGorry, & Howie, 2014; Caspi, 2011). Despite these initial efforts, this thesis suggests that while not necessarily protective or compensatory, siblings may have some positive influences on the lives of emerging adults. At the same time, this thesis provides little evidence for the value of siblings to inform mental health programs and interventions for emerging adults. It is also plausible that given the quality of sibling relationships is relatively stable over time (Dunn, Slomkowski, &Beardsall, 1994; Kramer & Kowal, 2005), sibling interactions may be

more consequential in childhood and adolescence than in emerging adulthood. In the end, more research is need to further understand how siblings may impact mental health in a positive way.

Risk Mechanisms across Multiple Relationships

In addition to research findings specific to the protective and compensatory role of sibling relationships, the thesis also considered the effect of two potential risk factors on stress and psychological distress. The findings suggest the risk mechanisms associated with parent and peer alienation can be described in terms of: (a) a direct effect on stress and psychological distress, (b) a risk mediation model, (c) a lack of a predictive influence on stress and distress over time. Additionally, these findings also inform the potential interplay between sibling, parent, and peer relationships in emerging adulthood.

Direct effect of multiple relationships. In terms of the direct links between relationships and stress and psychological distress, there are three main findings worth discussing. One of the main findings was that parent and peer alienation was consistently related to increased levels of stress and distress, while there was no longitudinal evidence to suggest experiences of alienation had predictive links with stress and distress. There are two possible methodological reasons why experiences of alienation were not identified as risk factors. First, a 3-month semester might be too short of a time-period to examine the potential detrimental effects of interpersonal conflicts on prospective mental health. Longer period might be more appropriate to examine the risk of interpersonal conflict on prospective depression (Cohen et al., 2015). Second, the cross-sectional evidence suggests alienation is consistently related to more stress and distress, however, as the semester progresses these links are no longer evident. An added reason could be related to the fact that we did not consider other sources of stress or potential risk during the semester. For instance, a semester might come with more immediate challenges that could impact mental

health over a few weeks than more persistent interpersonal challenges (Murphy et al., 2010; Terriquez & Guarantz, 2014). Future research warrants a closer examination of stability and change in experiences of alienation relative to other immediate challenges related to a semester, as that may more accurately assess the risk mechanisms associated with these experiences.

Finally, given the lack of longitudinal evidence, it is difficult to rule out the possibly of another variable, not measured in our study, is influencing alienation, stress, and distress. For example, depressive symptoms in the previous semester could contribute to an individual's perception of alienation in relationships and their experiences of interpersonal stress (Eberhart & Hammen, 2006; Hames et al., 2013) yet as the semester progress experiences of alienation is not predictive of stress and psychological distress. Interpersonal theories of depression support this plausible explanation as these theories recognize the reciprocal influence between interpersonal challenges, stress, and depression (Eberhart & Hammen, 2006; Hames et al., 2013; Pettit et al., 2011).

The cross-sectional evidence of the negative effects of experiences of alienation on stress and distress could possibly be extended in several informative ways. First, studies could consider of both positive and negative experiences in each relationship simultaneously to capture how these different experiences interact to predict negative outcomes. For example, positive and negative aspects of interpersonal relationships are distinct and research at times considers these aspects in isolation (Ross et al., 2019). Moreover, while it is known that negative experience can contribute to psychological distress, and positive interactions can possibly mitigate distress, the interplay between these relationship characteristics should be considered simultaneously. One way to address this gap is to consider interpersonal clusters of relationship quality and whether cluster membership is linked to prospective psychological distress. Furthermore, given the

complexities of considering multiple interpersonal relationships, a person-centered approach is helpful to identify patterns of negative and positive interactions across multiple relationships.

Second, the studies of this thesis consistent conceptualized and measured relationship quality from the perspective of one relationships partner. Our self-report measures only captured the participant's perception of their relationships, as opposed to other perspectives of the parents, peers, or siblings. Therefore, measures that capture perceptions of relationship quality among both partners (e.g. parent-child, peer and sibling dyads) is further warranted. For instance, actor-partner interdependence models consider the causal effects of individual characteristics on actor and partner outcomes. These models are increasingly useful in the examination of relationship processes across diverse relationship dyads, such as parent-child, romantic partners, and siblings (Kenny & Ledermann, 2010). The risk and protective effects of parent, peer, and sibling relationships could be further informed by actor-partner interdependence models and their associated methodologies.

Interplay between multiple relationships. This thesis addresses a research call to consider multiple social relationships simultaneously and their impact in emerging adulthood and not in isolation, as well as the need to examine the simultaneous impact of differing interpersonal experiences. However, the main findings of this thesis suggested that while sibling support and parents and peer alienation effect stress and psychological distress directly, the interplay between these relationships seems less clear. Theoretically, we can draw both compensation and congruence hypotheses possible explain how these relationships are related (Derkman et al., 2011). Congruence hypothesis suggests a positive link between two relationships such that the quality of these relationships is consistent; whereas a compensation hypothesis suggests a negative link such that the quality is in opposite directions. In adolescence, parent-child and

sibling relationships suggest evidence for the congruence (or ‘spillover) hypothesis (Derkman et al., 2011).

Although this thesis did not explicitly test these hypotheses, there were consistent bivariate links between these relationships that could support both hypotheses. First, bivariate links between parent and peer alienation could possibly imply congruence among these relationships. Emerging adults who experienced alienation in one relationships also reported alienation in the other. This is not consistent with some cross-sectional evidence that suggest a compensation effect across parent and peer relationships (Voorpostel and Blieszner, 2008). However, this could be in line with evidence of congruence between parent and romantic partner relationships among mid- to late adolescents (Ha et al., 2010).

Second, experiences of alienation (for parents and peers) and siblings support were related in a manner that is in line with a compensation hypothesis, such that sibling support was negatively related to parent and peer alienation in most samples. However, in one of the samples in the first study, peer alienation was related to more sibling support. In line with the compensation hypothesis, this finding would suggest emerging adult who experienced more peer alienation also report more sibling support.

In sum, while there was little longitudinal evidence of the risk and protective effects of these relationships, these findings also suggest the plausibility that these relationships interact in congruent or compensating ways. Hypotheses of congruence and compensation would need to be further tested longitudinal to identify whether these links exist and if they can predictive influence each other.

Risk mediation model. Another key finding across all the studies is the consistent and robust support for the proposed risk mediation model. In this risk model, experiences of

alienation in parent and peer relationships were related to psychological distress (partially through the mechanism of general stress). General stress was a consistently mediating mechanism across three studies. This is in line with evidence that suggests persistent interpersonal challenges are related to stress (Darling, McWey, Howard, & Olmstead, 2007; Hammen, 2005) and the role of stress in the development of psychological distress (Liu & Alloy, 2010; Riggs & Han, 2006). Moreover, this mediating influence of general stress was not evidence for interpersonal stress. Interesting, Study 3 did find interpersonal stress was associated with alienation, general stress, and psychological distress, however, when included in the mediation model, interpersonal stress did not predict psychological distress after accounting for general stress. As mentioned in Article 2, it could be plausible that general stress better accounted for the risks associated with alienation than did interpersonal stress. Additionally, our measure of interpersonal stress was a single-items that might not have captured the different aspects of this construct.

An additional consideration in understanding this risk mediation model is the potential bidirectional relationships between aspects of relationships quality, experiences of support or alienation, and psychological distress. As mentioned previously, interpersonal theories outline the influence of interpersonal issues on depression, as well as the need to control or account for prior levels of psychological distress on experiences of interpersonal difficulties (Eberhart & Hammen, 2006; Hames, Hagan, & Joiner, 2013). As such, experiences of psychological distress, including depression and anxiety symptoms, can progressively compromise the quality of relationships, despite supportive experiences in close relationships (Hames et al., 2013; Pettit et al., 2011). Naturally, longitudinal data are also needed to examine the directionality of these links more conclusively.

Stress and Psychological Distress in Emerging Adulthood

The mental health of emerging adults is of growing concern given the prevalence of depression and anxiety-related symptoms (Hunt & Eisenberg, 2010; Zivin, Eisenberg, Gollust, & Golberstein, 2009). Therefore, this thesis examined the development of stress and psychological distress the course of an academic semester as well as the predictive effects of sibling, parent and peer relationships on the development of stress and distress.

Decreases in stress and psychological distress over time. One of the main findings of my thesis is that both stress and psychological distress decrease over the course of three academic months. Specifically, in terms of stress, there was evidence to suggest that baseline levels and the slope of stress were negatively related. This trend suggests that individual who were higher in stress at the beginning of the semester had a slower decrease in stress throughout the semester. This trend was not evident for psychological distress. These decreasing trends are consistent with our alternative hypothesis related to the *Resilience Model* of emerging adults, which proposed that stress and psychological distress would decrease over the course of a semester. This hypothesis implied that this decrease could be due to adaptions on the part of students to the academic and social tasks and challenges of a semester. For instance, the concept of coping may be a valuable explanatory mechanism for this decrease. Coping refers to a process of self-regulation (emotion, cognition, and behaviour) that is enacted in the context of stressful experiences (Compas, 2009). A recent meta-analysis suggests adaptive coping strategies (e.g., emotional expression, cognitive reappraisal) are related to less psychological distress cross-sectionally and longitudinally (Compas et al., 2017). Moreover, maladaptive coping (e.g., emotional suppression, avoidance) is alternatively related to more psychological distress over time (Compas et al., 2017). Based on these trends, studies can examine the influence of different

coping strategies on the trajectory of stress and psychological distress over the course of an academic semester.

Additionally, the decreasing trajectory of these negative outcomes were not related, suggesting individuals may decrease in experiences of stress and psychological distress in ways that are different over the course of the semester. The possible differential trajectory of stress and psychological distress could be dependent on varying risk factors specific to emerging adulthood. Although researchers have identified individual and contextual correlates of poor mental health outcomes, many stressors can reflect the complex interplay between these levels of influence. For instance, in emerging adulthood, changes in psychological distress over time were uniquely related to identity exploration (Wängqvist & Frisén, 2011), stress reactivity (Howland, Armeli, Feinn, & Tennen, 2017), as well as interpersonal challenges and relationship quality (Finan, Ohannessian, Gordon, 2018). Risk factors having unique effects on stress and psychological distress separately could explain differential patterns of change in these outcomes over time.

Lack of predictive effects of parent, peers, and siblings. A main finding of the last study is the lack of predictive effects of parent and peer relationships, as risk factors, and sibling support, as a compensatory factor. Although experiences of alienation were consistently associated with stress and psychological distress in the cross-sectional studies, there were no predictive effects of these relationships on the development of stress and psychological distress. This finding emphasizes the importance of the temporal sequence of risk factors and negative outcomes as well as the need for longitudinal research in establishing predictive risk mechanisms. Furthermore, in this longitudinal design, interpersonal relationships were only measured at baseline, therefore, no prospective links between unfolding experiences of alienation

and psychological distress could be assessed (Hammen, 2006). Ideally, future studies would consider the reciprocal influences of psychological distress and changes in relationships (alienation) over time. Furthermore, future studies would also need to account for the contribution of demographic and personality variables in the association between stress and psychological distress.

Limitations and Future Research

This thesis adds to research on experiences of alienation, sibling support, stress and psychological distress in emerging adulthood. Nevertheless, this thesis also has important limitations that merit mention and discussion. The main limitations of these studies are associated with: (a) the nature of our samples, (b) the challenges related to the study constructs and measures, (c) lack of consideration for covariates, (d) the cross-sectional design, and (e) type II error considerations.

Study Samples

First, the six samples of this thesis were predominately white women university students. Research has identified gender differences in the experience and reporting of mental health symptoms (Nolen-Hoeksema & Girgus, 1994) and the links between interpersonal stressors and depression symptoms (Hammen, 2003). Specifically, women have a significantly higher prevalence than men for mood and anxiety symptoms and disorders (Kessler et al., 2012), and while women experienced more daily stress, the types of stressors listed by men and women are different (Matud, 2004). Therefore, the predominately female samples limit the generalizability of these findings to people of diverse gender identities. Future research would need to ensure a gender representative sample to establish the validity of these findings for the general population of emerging adults. The lack of ethnic diversity is also a limitation to the generalizability of these

findings to non-white emerging adults. Future research would need to consider the applicability of results to gender and more ethnically diverse samples. Researchers often rely on targeted recruitment strategies to ensure their samples are representative. These strategies include selective recruitment, changing inclusion criteria based on the demographics of the initial data collection, as well as other diverse on and offline advertising. Future studies could benefit from such targeted recruitment strategies to ensure they have sample that reflection the general population across multiple demographics.

Finally, our samples also consisted of emerging adults who were attending university and did not account for year of study. Although national studies suggest that mental health challenges are experienced at comparable rates among young adults, whether attending college or not (Blanco et al., 2008), studies will need to verify the validity of the findings of this thesis to a community sample of emerging adults. Furthermore, longitudinal studies have shown students experience more stress in their first year than later years, although the pattern of change remain similar over the course of a semester (Baker et al., 2018; Bewick et al., 2010). As such, future studies would need to consider to what extent the year of study explained variation in stress and psychological distress both within and over the course of a semester.

Study Constructs and Measures

Beyond sample characteristics, there are limitations associated with the conceptualization and measurement of the study variables. First, although we used a well-established and validated measure of psychological distress, this measure was specific to non-clinical symptoms of depression and anxiety, and did not capture other distinct mental health experiences of emerging adults. In this thesis, depression and anxiety were measured as part of an unobserved construct of psychological distress. This was important because psychological distress is a common mental

health experience, it captures a range of subclinical symptoms, there are standardized scales available for community and clinical samples, and subclinical symptoms of depression and anxiety often co-occur (Hunt & Eisenberg, 2010; Kessler et al., 2003). Future studies can be measure symptoms of depression and anxiety separately given siblings, parent, and peer relationships may have differential effects of these two outcomes. Additionally, there is growing recognition in psychology that mental health consists of aspects of both psychopathology and positive psychology (Keyes, 2007; Westerhof & Keyes, 2010). As such, research must describe mental health as a dual continuum model based on both the presence of wellbeing and absence of mental illness (Keyes, 2007). Therefore, studies on the risk and protective effects of social relationships can consider no only psychological symptoms of distress, but also indicators of wellbeing.

Furthermore, the stress measure used in this thesis was a single-item measure. Single-item measures come with known limitations, notably inadequacy to represent complex constructs and inability to calculate internal consistency estimates (Fisher, Matthews, & Gibbons, 2016). Although multi-item measures are preferred, similar single-item measures are quite common and psychometrically sound and viable option in both the psychological and behavioural sciences (Hawkers et al., 2011; Herring et al., 2006; Tomlinson et al., 2010). Also, fewer items can minimize risks to attrition and participant burden (fatigue) in longitudinal studies, and potentially improve response rates and reduce the risk of redundancy in items (Fisher et al., 2016). Specifically, the stress thermometer (Kowalski & Crocker, 2001) used in this thesis has been used in studies with emerging adults in research on stress, stress appraisal, coping and performance (Gaudreau, Nicholls, Levy, 2010; Hadd & Crocker, 2007; Kaiseler, Polman, Nicholls, 2009; 2012; 2013).

Additionally, parent and peer alienation were only measured using 4 items of the widely-used Inventory of Parent and Peer Attachment, which consistently suffered from poorer reliability across the studies. It is known that Cronbach's alpha is easily influenced by the number of items and the redundancy of item content (John & Benet-Martinez, 2014). For our measure of alienation, a low alpha may be deflated due to the few items and the lack of redundancy in the item content rather than due to the quality of this measure. Finally, both measures of supportive siblings, were abridged versions of longer established versions, developed specifically for this thesis from psychometrically validated measures. Overall, future research can conceptually replicate these findings using multiple different measures to represent alienation and sibling support to more explicit consider alternative interpretations and conceptually replicate our findings.

Consideration of Covariates

An additional limitation in this thesis is the lack of consideration of key covariates related to individual and sibling dyad characteristics. Considering covariates in research is valuable for refining theoretical models. Given the novelty of our proposed models in this thesis, key covariates were not considered in our analysis. This thesis was explicitly interested in the relationships between supportive siblings, yet, there are several unexamined variables that could account for the links identified in this thesis. A key unexamined variable this thesis was personality, as relatively enduring dispositions that are linked to interpersonal challenges and psychological distress. More specifically, neuroticism (trait negative emotionality) reflects a vulnerability to experience stress and distress, such that individuals high in neuroticism tend to experience more stress (Carver & Connor-Smith, 2010; Connor-Smith & Flachsbart, 2007) and have increased risks of developing symptoms of depression and anxiety (Kotov, Gamez,

Schmidt, & Watson, 2010; Tackett, 2006). Therefore, future studies would need to account for personality to test the incremental influence of alienation on stress and distress.

A key consideration in the study of sibling relationships in general is the need to account for the substantial variability in sibling relationships due to characteristics of individual siblings (age, gender, personality) and the composition of the dyad (age gap, gender composition). For example, sister-sister dyads and sibling dyads with a larger age difference report better mental health than other sibling dyads (McHale, et al., 2013; Updegraff, McHale, Whiteman, Thayer, & Dalgado, 2005; Van Volkom et al., 2011). Furthermore, family size has also been linked to poor mental health, such that emerging adults from larger families (i.e., more than 3 children) report more depressive symptoms than smaller families (Reinherz, Paradis, Giaconia, Stashwick, & Fitzmaurice, 2003). Although the average family size across my samples was 4 children, a closer examination of the average number of siblings and the distribution family size suggests majority were less any 3 children. In Article 1, sample 1 (77%), 2 (82%), and 3 (80%) were primarily families with 3 or less children. Similarly, in Article 2, Study 2 (75%) and 3 (76%) were primarily smaller families of 3 or less children. In article 3, the majority (75%) were smaller families (3 or less children) as well. In most cases, families with 4 or more children, including families of up to 8 children, were a minority and often less than 25% of each sample.

Although these characteristics are less influential on the quality of sibling relationships in emerging adulthood than in childhood and adolescence (White, 2001), these characteristics can still account for some variability. For example, emerging adult females appear to engage in more emotional exchanges and personal discussions with their same-sex siblings than emerging adult males (Scharf, Shulman, & Avigad-Spitz, 2005), which may impact the quality and supportive nature of these relationships. As such, sister-sister dyads and sibling dyads report more mental

health benefits than other sibling dyads (McHale, et al., 2013; Updegraff, McHale, Whiteman, Thayer, & Dalgado, 2005; Van Volkom et al., 2011). Given my samples were predominately women, the distinct positive and supportive nature of sister-sister dyads, the generalizability of the findings of my thesis to diverse sibling dyads is limited. Future studies would need to control for sibling dyad characteristics to account for variability in the supportive role of siblings. Although conflict in sibling relationships decreases by emerging adults, it appears conflict might be an inherent reality of sibling relationships (Bedford et al., 2000; Kramer, 2010), and therefore would need to be controlled for in the study of sibling relationship quality.

Cross-sectional Design

In addition to limitations associated with the research sample and construct measurement, there are also drawbacks associated with our research design, particularly, the cross-sectional nature of three of the studies in this thesis. Although the cross-sectional links between experiences of alienation, stress and distress are relevant, it is of greater interest whether a covariation between these experiences reflect predictive relationships. Longitudinal designs can test and control for the temporal sequence of the variables in our proposed mediation model, and further research will be needed to test a true predictive sequence. Notwithstanding the known drawbacks of cross-sectional designs in risk research, in reality, the initial identification of risk factors can begin with preliminary cross-sectional evidence as these research designs are more cost-effective (e.g. time, money, and resources) and eventually, encourage the identification of plausible risk and protective factors that merit further longitudinal attention (Compas & Reeslund, 2009). As such, given the lack of support for our proposed moderated-mediation model in multiple cross-sectional studies, there was little justification to test this proposed model and the moderating role of sibling support longitudinally in Article 3.

Type II Error Considerations

In addition to the previously mentioned limitations, there are several considerations related to the increased risk of type 2 error for my thesis. Type II error occurs when a null finding is, in fact, false; and a researcher accepts the null hypothesis when they should, in fact, reject it (Tabachnick & Fidell, 2007). The risk of this error is influenced by the sample size across my studies, the strength of the real effect of supportive sibling relationships, and the amount of variability in my sample. As such, the consistent null findings across the five samples of my thesis can be understood in terms of methodological and conceptual considerations, and is less likely due to type II error.

The sample size for my studies were sufficient and likely did not contribute to the increased risk of type II error. While structural equation modeling techniques usually require large samples, there is no set standard for a minimum sample size (Kline, 2010). One approach to estimate sample size of a model is to consider the complexity of the model being tested and the number of estimated parameters using a parameter-to-sample size ration (Kline, 2010; Ullman, 2007). Based on this approach and the number of parameters included in my hypothesized model, a minimum sample of 250 would have been sufficient. The five cross-sectional samples of my thesis were more than this minimum value. Given this consideration, we can conclude the risk of type II due to a small sample size is unlikely.

An additional methodological consideration related to the risk of type II error is the difficulty of identify, estimate, and replicate interaction effects (Marsh et al., 2012; Kline, 2010). To mitigate the difficulties of estimating interaction effects and the small size of these effects, my thesis relied on a theoretically justified model, psychometrically valid measures, and structural equation modelling. Despite these strengths, there was limited, and inconsistent,

evidence of an interaction effect of the protective role of supportive siblings. Given these advanced techniques, the null findings in my studies are less likely to be due to type II error.

Finally, a main methodological strength of my thesis is the use of replication across three studies and five samples. Replication is, often, essential to establish the validity and credibility of research findings (Duncan, Engel, Claessens, & Dowsett, 2014; Earp & Trafimow, 2015). Conceptually, my replicated null findings are not sufficient to prove or falsify a theory (Earp & Trafimow, 2015), however, my replicated findings may establish with appreciable validity and credibility that sibling support is not protective in emerging adulthood in the context of alienation. Furthermore, given the limited research on siblings in emerging adulthood, a single sample would have increased the risk of type II error. As such, the methodological strength of replication can help further mitigate the risk of type II error. While the risk of type II error cannot be completely and definitively removed, the methodological and conceptual considerations of these studies suggest several steps were taken to mitigate the possible risk of type 2 error for my thesis.

Conclusion

Understanding the role of siblings in emerging adulthood is important, as these close relationships are ubiquitous, can span a lifetime, and are known to be supportive for development and mental health (Riggio, 2000; Stocker, Lanthier, & Furman, 1997; Van Volkom et al., 2011). This thesis answers a call for the study of siblings and mental health in emerging adulthood (Conger & Little, 2010; Milevsky, 2004; Milevsky, 2005; Myers & Bryant, 2008; Van Volkom et al., 2011). However, contrary to the theorized value of siblings and their presumed beneficial influence in emerging adulthood, this thesis consistently found that supportive sibling relationships, whether with one sibling or multiple, did not protect against the risk posed by

parent and peer alienation. This finding is noteworthy given the protective role of siblings against multiple risk factors has been well established in childhood and adolescence, and points to potential developmental differences in the value and functions of close relationships in emerging adulthood compared to childhood and adolescence. Additionally, while there was some evidence of the compensatory and promotive influences of siblings, these findings were inconsistent and not replicated across multiple samples. Future studies that wish to test the value of siblings must employ advanced statistical techniques and replication across multiple samples, to avoid overestimating the potential value of siblings in mitigating negative mental health outcomes.

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Appendices

Appendix A. Ethics Approval Notice, Social Sciences and Humanities REB, 2014

File Number: 03-13-15 Date (mm/dd/yyyy): 11/25/2014

Université d'Ottawa University of Ottawa
Bureau d'éthique et d'intégrité de la recherche Office of Research Ethics and Integrity

Ethics Approval Notice

Social Sciences and Humanities REB

Principal Investigator / Supervisor / Co-investigator(s) / Student(s)

First Name	Last Name	Affiliation	Role
Dave	Miranda	Social Sciences / Psychology	Supervisor
Muna	Osman	Social Sciences / Psychology	Student Researcher

File Number: 03-13-15

Type of Project: PhD Thesis

Title: A study of the developmental importance of sibling profiles on the psychosocial adjustment of young people from diverse ethnocultural backgrounds

Renewal Date (mm/dd/yyyy)	Expiry Date (mm/dd/yyyy)	Approval Type
10/11/2014	10/10/2015	Ia

(Ia: Approval, Ib: Approval for initial stage only)

Special Conditions / Comments:
N/A

Appendix B. Ethics Approval Notice, Social Sciences and Humanities REB, 2015

File Number: 03-13-15 Date (mm/dd/yyyy): 10/13/2015

Université d'Ottawa University of Ottawa
Bureau d'éthique et d'intégrité de la recherche Office of Research Ethics and Integrity

Ethics Approval Notice

Social Sciences and Humanities REB

Principal Investigator / Supervisor / Co-investigator(s) / Student(s)

First Name	Last Name	Affiliation	Role
Dave	Miranda	Social Sciences / Psychology	Supervisor
Muna	Osman	Social Sciences / Psychology	Student Researcher

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Renewal Date (mm/dd/yyyy)	Expiry Date (mm/dd/yyyy)	Approval Type
10/11/2015	10/10/2016	Ia

(Ia: Approval, Ib: Approval for initial stage only)

Special Conditions / Comments:
N/A

Appendix C. Ethics Approval Notice, Social Sciences and Humanities REB, 2016

File Number: 03-13-15 Date (mm/dd/yyyy): 08/31/2016

Université d'Ottawa
Bureau d'éthique et d'intégrité de la recherche

University of Ottawa
Office of Research Ethics and Integrity

Ethics Approval Notice

Social Sciences and Humanities REB

Principal Investigator / Supervisor / Co-investigator(s) / Student(s)

First Name	Last Name	Affiliation	Role
Dave	Miranda	Social Sciences / Psychology	Supervisor
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File Number: 03-13-15

Type of Project: PhD Thesis

Title: A study of the developmental importance of sibling profiles on the psychosocial adjustment of young people from diverse ethnocultural backgrounds

Renewal Date (mm/dd/yyyy)	Expiry Date (mm/dd/yyyy)	Approval Type
10/11/2016	10/10/2017	Approved

Special Conditions / Comments:
N/A

Appendix D. Ethics Approval Notice, Social Sciences and Humanities REB, 2017

File Number: 03-13-15 **Date (mm/dd/yyyy):** 09/01/2017

Université d'Ottawa University of Ottawa
Bureau d'éthique et d'intégrité de la recherche Office of Research Ethics and Integrity

Ethics Approval Notice

Social Sciences and Humanities REB

Principal Investigator / Supervisor / Co-investigator(s) / Student(s)

First Name	Last Name	Affiliation	Role
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File Number: 03-13-15

Type of Project: PhD Thesis

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