Variation in Depression Outcomes among Young People from Dissolved Families

by

Laura Di Manno B.App.Sci (Psych)(Hons)

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Doctor of Psychology (Clinical)

Deakin University

April, 2017
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1Authorship statement for paper 1 is included in Appendix A; Journal permissions for paper 1 is presented in Appendix B. Reference style for each paper was determined by the journal and as such, may differ between papers.
Abstract

Parental separation is consistently associated with increased risk for depressive symptoms; however, there exists wide variation in depression outcomes. This thesis examines heterogeneity in depressive symptoms among individuals who have experienced parental separation or divorce. In order to understand idiosyncratic depressive symptom outcomes, an examination of moderators, i.e. variables that weaken or amplify the relationship between parental separation or divorce and depressive symptoms, was sought. Therefore, the first study presented is a systematic review (published in the Journal of Affective Disorders) that identified and evaluated longitudinal studies examining moderators. A number of factors, among the 14 studies reviewed, were found to moderate the relationship of interest, including gender, age (at assessment and at depression onset), genotype, preadolescent temperament, IQ, emotional problems in childhood and maternal sensitivity. Despite synthesising critical information about depressive symptom variation in heterogeneous populations of those from separated or divorced families, the review revealed a significant gap in person-centred studies that examine individual differences. The second study analysed data from 449 participants from separated or divorced families, from the Australian Temperament Project (ATP), a longitudinal cohort study spanning over 30 years. The study, utilising a person-centred analytic approach, Latent Class Analysis, aimed to identify heterogeneous profiles of adolescents from separated/divorced families to explain differential risk for depressive symptoms in emerging adulthood. Three latent classes emerged from the data, differentiated by 16 demographic, interpersonal and intrapersonal indicators of risk and psychosocial adjustment. While most adolescents were found to be well-adjusted and at low risk of psychopathology in emerging adulthood, one class demonstrated increased risk for depressive symptoms and one for antisocial
behaviour. The LCA (submitted) assisted in understanding who, among those from separated or divorced families, is most at risk for depressive symptoms in emerging adulthood. Gaps remained regarding when, during an individual’s developmental trajectory, the experience of parental separation or divorce increases risk of depression. Therefore, the third and final study in this thesis, used mixed effects regression models with longitudinal data collected approximately every two years from the ATP, to identify the association between age at family dissolution and risk for depressive symptoms before and after the event of divorce. This paper (under review) examined various stages of development, from early childhood, through adolescence and emerging adulthood. A significant two-way interaction showed that overall, females were at greater risk of depressive symptoms than males; however, two years after boys experienced divorce, their depressive risk was no different to the risk levels of girls. The findings of this thesis add to an emerging body of literature on individual differences, including gender and event timing, which account for diversity in outcomes following parental separation/divorce. Such knowledge may be utilised to inform appropriately targeted prevention and intervention strategies for those at risk of depressive symptoms in the wake of family dissolution.
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CHAPTER ONE Introduction to Parental Divorce and Offspring Depression

1.1 Chapter Overview

This chapter provides a narrative literature review on the topic of family dissolution and associated offspring depression. The global and Australian context of parental divorce and separation is presented. Subsequently, an overview of the key theoretical perspectives that seek to explain the underlying association between family dissolution and offspring depression is provided. A description of clinically significant depression, as well as a consideration of the importance of subclinical depressive symptoms concludes the chapter.

1.2 Introduction

Family dissolution refers to a change in the family environment that occurs when a young person’s parents separate or divorce. Research spanning 49 years, has aimed to identify the effects of family dissolution on offspring outcomes. Many studies report a relationship between family dissolution and a range of negative psychosocial outcomes, including lowered academic achievement (Potter, 2010), decreased quality of mother and father-child relations (Schwartz & Finley, 2009), increased conduct problems, poorer self-concept, decreased ability to adjust to social situations, high risk behaviours in early life (i.e., early sexual activity, pregnancy, marriage and cohabitation; Amato, 2001; Amato & Keith, 1991b; Chase-Lansdale, Cherlin, & Kiernan, 1995). Family dissolution has also been demonstrated to increase risk in psychopathology, including subclinical depressive symptoms but also clinically diagnosed Major Depressive Disorder (Culpin, Heron, Araya, Melotti, & Joinson, 2013; Oldehinkel, Ormel, Veenstra, De Winter, & Verholst, 2008). Such an increase in depressive risk has been found to translate into an increased risk for
suicidality, including suicide attempts (Donald, Dower, Correa-Velez, & Jones, 2006; Lizardi, Thompson, Keyes, & Hasin, 2009).

Despite evidence of the consistent relationship between family dissolution and poor outcomes for young people, the effects of divorce are not direct, nor do they occur in every individual (Hetherington, 1989). As Hetherington (1989) said of children who had experienced parental separation, “there are winners, losers, and survivors”. In a narrative review of the current state of literature on marriage, divorce, and families, Amato (2010, pp. 661-662) contends that, “future studies should focus on the heterogeneity of outcomes among children and adults.” Empirical evidence using longitudinal data has demonstrated wide variation in children’s internalising outcomes post-divorce, with some children’s internalising problems increasing, some decreasing, and most remaining unchanged (Amato & Anthony, 2014). Therefore, identifying and evaluating the factors that serve to explain the heterogeneity in depressive symptom outcomes amongst those from dissolved families is the focus of the current thesis.

1.3 Global and Australian Context

Between 2007 and 2012 the crude divorce rate (the number of divorces per 1,000 people in the population)\(^2\) in Australia was reported to be 2.2 to 2.3 (Australian Bureau of Statistics [ABS], 2012). This divorce rate is lower than other Western countries such as the United States, where the rate is 3.6 (Centers for Disease Control and Prevention [CDC], 2011). Russia is the country with the highest crude divorce rate, calculated by the United Nations Statistical Division, at 4.8 (2011). Despite the crude divorce rate in Australia being calculated as seemingly low in comparison with

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\(^2\)All peoples in the population are comprised in the crude divorce rate, including those who are unable to marry, such as children. This is recognised as a limitation of the statistic; however, it is considered to be the most effective way of comparing the divorce rate between countries.
other countries, notably, in the year 2011, there were 24,144 divorces among couples with children under 18 years of age. This represented 48.4% of all divorces granted in that year (ABS, 2012). This indicates the high number of Australian children exposed to a dissolved family environment during their developing years.

1.4 Family Dissolution and Offspring Outcomes

In studies comparing children from dissolved and intact families, those who have experienced parental separation or divorce are more likely to have a range of poorer psychosocial outcomes (see meta-analyses Amato, 2001; Amato & Keith, 1991b). Those who experience parental divorce as children have also been shown to be overrepresented in clinical samples (Amato & Keith, 1991a). However, as children cannot be randomly assigned to divorcing parents in an experimental analysis, literature examining parental divorce is necessarily correlational. Therefore, parental divorce has not been shown to cause the poor outcomes detailed above, as most children from divorced families successfully adapt to new family circumstances (Emery, 1999). Therefore, it is important to discuss the potential mechanisms that are hypothesised to give rise to poorer outcomes in children. The mechanisms that researchers propose are detailed below.

1.5 Explanatory Mechanisms

1.5.1 The economic hardship perspective.

The economic hardship perspective details that those from dissolved families are disadvantaged, compared to those from intact families, due to changes in economic and financial status that arise from a dual parental income reducing to single parental income following separation (Amato, 2005). Single parents may find it more difficult to afford access to goods and services that supplement a child’s
success in school, such as tutors, cognitively stimulating materials, and home computers (Amato, 2005; Votruba-Drzal, 2003). Also, following a family structure change such as divorce, many single parents move house, into lower socio-economic areas, due to a reduction in family income (Amato, 2005). Economic disadvantage during childhood then increases risk for attaining lower levels of education, occupational status, and income (Amato, 2000), all factors associated with increased risk for depression (Lorant et al., 2007; Ross & Mirowsky, 1999).

In a longitudinal analysis of 1,274 adolescents and young adults, VanderValk, Spruijt, de Goede, Maas, and Meeus (2005) found significant differences in internalising and externalising problems between participants who had experienced parental divorce prior to age 12, compared to those whose parents remained married. While these differences in behavioural outcomes persisted from adolescence to young adulthood, internalizing problem behaviour was not found to differ as a function of educational attainment or family income (VanderValk et al., 2005). Bali and Hou (2003), in their longitudinal examination of child outcomes from age 4 years onwards, found that deterioration in economic resources resulting from parental divorce explained the relationship between family structure and cognitive outcomes (math score and reading comprehension) but not emotional-behavioural outcomes (hyperactivity/inattention, emotional disorder/anxiety, property offense/destructive behaviour, physical aggression/conduct disorder, and indirect aggression). These findings suggest that the underlying mechanisms explaining children’s deterioration in emotional health and wellbeing following parental divorce may be better explained by factors other than economic disadvantage.

In an additional analysis, Bali and Hou (2003) also highlighted that income stability, as opposed to total income, was predictive of child outcomes, whereby remaining in a single parent household with a single income was predictive of better
outcomes for offspring, compared to moving into a step-parent household with dual incomes. This finding emphasises the importance of stability, over quantity, when examining economic impacts on offspring outcomes following family dissolution. However, families that undergo separation or divorce are likely to be characterised by instability, especially in the short term post-divorce, in varying features of family life, including finances, housing, and relationships (Burke, McIntosh, & Gridley, 2009; Emery, 1999).

The economic hardship perspective is consistent with the Family Stress Model (FSM) of economic hardship, which hypothesises that financial difficulties have an adverse effect on parents’ emotions, behaviours and relationships, which in turn negatively influence parenting strategies (Conger & Donnellan, 2007). Similarly, the Family Investment Model (FIM) highlights the importance of economic resources in child development (Conger & Donnellan, 2007). The FIM proposes that families with increased financial resources are able to make more substantial investments in the development of their children (Conger & Donnellan, 2007). As evidenced by a large-scale study conducted in the United States (N=12,426), family dissolution is associated with lower academic achievement (DeBell, 2008). At the time that parental separation interrupts child schooling, the ability of the residential single parent to provide economic contributions to the child’s academic development may be impaired. Thus, increasing risk for poor psychosocial outcomes later in life (Currie, 2009; Ross & Mirowsky, 1999). Overall, the economic hardship perspective highlights the importance of a family’s financial situation when considering child development; however, as evidenced by the study conducted by VanderValk et al. (2005), alternate mechanisms may better explain increased emotional and behavioural problems.
1.5.2 The quality of parenting perspective.

Closely linked to the economic hardship perspective is the quality of parenting perspective. This perspective theorises that when compared to children from continuously married parents, those from dissolved families receive different parenting strategies (Bastaits & Mortelmans, 2016; Hetherington, Cox, & Cox, 1982; Steinberg, 2014). Changes to parenting may commence when children enter into new living arrangements post-divorce (Kelly, 2007). In single-custody arrangements, children typically live with the biological mother and have less frequent contact with the non-custodial parent, the biological father (Baude, Pearson, & Drapeau, 2016). Father absence indicates the reduction of a number of protective factors including parental supervision, parental interaction and financial resources available within the home (Bauserman, 2002). Joint-custody on the other hand, where children have ongoing contact with both parents, may indicate that parental supervision, parental interaction and financial resources remain available to the child (Bauserman, 2002). While compared to single-custody arrangements, joint-custody arrangements are associated with positive outcomes for children (see Baude et al., 2016), cluster analysis demonstrates that in some circumstances joint custody arrangements can be associated with exposure to long-term inter-parental conflict, as the child’s parents remain in close contact with one another long after separating (Maccoby, Depner, & Mnookin, 1990). Evidence from 841 cases from Family Court registries in Sydney, Melbourne and Brisbane suggest that the most common parenting arrangement post-separation involves children spending alternate weekends with the non-resident parent (Commonwealth of Australia, 2003).

When considering that many single parents experience increased financial and time pressures following separation, it is understood that their capacity to maintain or implement certain parental strategies may change. Hilton and Desrochers
(2000) highlight the interaction between the economic hardship and quality of parenting perspectives with their finding that higher economic strain experienced by separated/divorced custodial mothers contributes to impaired strategies to cope with role strain, and leads to loss of parental control, interfering with the quality of parenting provided. Furthermore, the quality of parenting provided by separated/divorced parents has been shown to decrease due to psychological difficulties experienced by the single parent following family dissolution (Pruett, Williams, Insabella, & Little, 2003; Simons, Lin, Gordon, Conger, & Lorenz, 1999a; Tein, Sandler, & Zautra, 2000). The strains associated with single parenthood are highlighted by the relationships between sole parenting and reduced emotional support, less supervision, an increase in harsh discipline strategies, and increased conflict with children, compared to continuously married parents (Amato, 2005).

Amato and Sobolewski (2001) found that weak emotional bonds between parent and child play a mediating role in the relationship between parental divorce and adult offspring’s psychological wellbeing, highlighting the potential for long-term effects of parenting quality on offspring outcomes into adulthood.

1.5.3 The exposure to stress perspective.

Exposure to stress is another mechanism linking parental divorce and poorer psychosocial outcomes for offspring. An assumption of stress theory is that a number of changes concentrated within a short time has adverse effects on individual mental and physical health (Pearlin, Schieman, Fazio, & Meersman, 2005). Parental divorce often symbolises significant change in the structure and functioning of a child’s home and family environment (Emery, 1999). Such change is not considered to be sudden and discrete; rather, divorce is described as a process involving multiple changes and transitions (Ahrons, 1979). The divorce stress-adjustment perspective, presented by Amato (2000) describes the process of divorce commencing while the
family remains intact, and continuing a long time after the physical separation of one parent from the family home. A key stressor associated with parental separation which may be evident at different stages throughout the divorce process is inter-parental conflict (Amato, 2005).

Inter-parental conflict is known to be a key predictor of divorce (Rodrigues, Hall, & Fincham, 2006). Notably, not all marriages that end in divorce are characterised by pre-divorce conflict. However, there is evidence that marital conflict predicts divorce, and divorce then increases risk for offspring depression symptoms (Amato & Sobolewski, 2001). Children may be exposed to conflict between parents prior to separation but conflict may also continue after the separation event, exposing to children to ongoing stress (Rodrigues et al., 2006). It is hypothesised that inter-parental conflict undermines a child’s sense of emotional security, and is associated with decreased ability to regulate emotions and respond adaptively in the face of stressors (Davies & Cummings, 1994). Such emotional vulnerability is particularly relevant for children who feel “caught in the middle” between conflictual parents (Buchanan, Maccoby, & Dornbusch, 1996). Inter-parental conflict is thought to explain many of the negative consequences of divorce for children, including depressive symptoms (Emery, 1999; Kelly, 2003).

For children who experience family dissolution, moving house, schools and neighbourhoods, decreased contact with one parent, are some of the additional non-normative life transitions that can occur in a short period of time, all associated with increases in stress (Amato, 2005). This can be described as a snowball effect, whereby cumulative stress affects many aspects of the child’s life. This stress calls for the family as a whole to adapt and utilise new resources (Cicchetti & Cohen, 2006). As the individual child responds to the stress associated with multiple
changes, decreases in school, work, and interpersonal functioning can occur (Amato, 2005).

To measure the impact of cumulative stress, family structure transitions have been examined in an ordinal fashion, where parental separation is considered to be the first in a series of transitions to which the child must adjust (Amato & Sobolewski, 2001). In a sample of 655 children, 137 of whom experienced parental separation, Amato & Sobolewski (2001) examined not only the initial divorce of a child’s parents, but also mother’s remarriage, father’s remarriage, mother’s second divorce and father’s second divorce reflecting that offspring could have experienced up to five family structure transitions. In a Structural Equation Modelling approach, findings demonstrate that as family structure transitions increase, the size of the effect on child outcomes increase (Amato & Sobolewski, 2001).

As examined by Amato and Sobolewski (2001), a child’s biological parents may cohabitate with and/or remarry new partners, following initial separation/divorce. These new relationships have the highest risk for ending in dissolution (ABS, 2000). Such transitions can be concentrated within a short time, increasing the child’s exposure to stress (Amato & Sobolewski, 2001). As highlighted in Fomby and Cherlin’s (2007) nationally-representative, two-generation longitudinal survey study of 3,392 children, those who experience multiple transitions in family structure due to remarriage, not only face worse developmental outcomes than children raised in stable, two-parent families, but also compared to those raised in stable, single-parent families. While it is yet to be established whether all family structure transitions are experienced as equally stressful for children, parental remarriage has not been found to be a protective factor for children, despite remarriage introducing another adult and a second income into the household.
Parental remarriage or new partnership, is therefore characterised as an additional exposure to stress.

1.5.4 The selection perspective.

Selection theory purports that parents whose marriages end in separation or divorce, experience divorce because they carry problematic personality traits or genetically determined psychopathology that contribute to marital problems (Amato, 2005, 2014). Selection theorists contend that parents genetically transmit such traits to their children, and it is these traits that lead to negative outcomes in offspring, including next generation divorce, rather than the experience of parental divorce itself (Amato, 2005).

One assessment of whether patterns of divorce are in part genetically transmitted across generations found that concordance for divorce among monozygotic (identical) twins was significantly higher than in dizygotic (fraternal) twins when the twins’ parents had been divorced (McGue & Lykken, 1992). Literature not specifically assessing genetic influences also provides support for the selection perspective demonstrating that there is an intergenerational pattern of divorce, whereby, those individuals whose parents’ marriages result in divorce are more likely to divorce themselves (Amato & DeBoer, 2001; Wolfinger, 1999). Decreased relationship confidence and commitment as a result of experiencing parental divorce (Whitton, Rhoades, Stanley, & Markman, 2008) may account for the approximately doubled risk of divorce in the next generation (Amato & DeBoer, 2001).

However, findings in support of the selection perspective are not consistent across all studies. In a sample of 610 American biological and adoptive families, Burt, Barnes, McGue, and Iacono (2008) examined the association between parental divorce and adolescent delinquency. The authors reasoned that if genes common to
both the parent and the child mediated this association, then youth from biological families should manifest increased delinquency in the presence of parental divorce even if the divorce preceded their birth (i.e., was from a prior parental relationship). However, should the association be environmental in origin, the authors proposed that adolescents should manifest increased delinquency only in response to exposure to divorce in their lifetime, and this association would not vary depending on family status (biological or adoptive). Results supported that the association between parental divorce and adolescent delinquency is environmental, as opposed to biological in nature (Burt et al., 2008).

Similarly, O'Connor, Caspi, DeFries, and Plomin (2000) conducted a genetic mediation analysis examining the association between parental divorce and a number of prospectively measured child outcomes including internalising and externalising problems, substance use, social adjustment and school achievement. A sample of 398 children from adoptive and biological families that were intact, or had separated by age 12 years was analysed. Common genetics did not mediate the relationship between parental divorce and child outcomes in biological families, whereby children who experienced their parents' separation by the age of 12 years exhibited higher rates of internalising and externalising problems and substance use, and lower levels of achievement and social adjustment, compared with children whose parents' marriages remained intact. Similarly, adopted children who experienced their (adoptive) parents' divorces exhibited elevated levels of internalising and externalising problems and substance use, compared with adoptees whose parents did not separate (O'Connor et al., 2000). Taken together, there are mixed findings for the selection perspective, with some studies demonstrating a genetically mediated relationship between parental divorce and child outcomes and other studies highlighting the importance of environmental exposure to family dissolution. Passive
genotype-environment correlations offer a perspective in which both genotypes and environments are considered (Harris, 2009). Specifically, passive genotype-environment correlations describe the association between the genotype a child inherits from his or her parents and the environment in which the child is raised. As such, offspring depressive risk may be attributed to both the inherited genotype as well as the family environment (Harris, 2009).

1.5.5 The Interactionist Model perspective.

Conger and Donnellan (2007) propose that adaptive functioning in the next generation is influenced not by any one of the perspectives discussed thus far in isolation. Rather, they propose that the mechanism through which a child from a dissolved family experiences poor outcomes results from an interaction between the social causation perspective and the social selection perspective. The social causation perspective, like the economic hardship perspective, purports that socio-economic status influences parental behaviour; thus, impacting on child development. The social selection perspective, as detailed earlier, hypothesises that parents transmit their problematic traits to their children, influencing the child’s social circumstances and future emotions and behaviours. Conger and Donnellan (2007) named this perspective, the Interactionist Model (IM) of human development.

Schofield et al. (2011) found support for the IM in their intergenerational study in which personality characteristics in a sample of generation two adolescents, including social competence, goal-setting, hard work, and emotional stability, were demonstrated to predict later socio-economic status, parenting characteristics, and family characteristics that related to the positive development of a third-generation child. Schofield et al.’s (2011) findings demonstrate that both the social selection and social causation perspective, in conjunction, accounted for the healthy development of children born into generation three. The IM highlights the need to consider all
potential risk pathways when examining the mechanisms linking family dissolution and offspring outcomes.

1.6 Depression

When parents separate, on average, children are at greater risk for concurrent and subsequent depressive symptoms and Major Depressive Disorder (Culpin et al., 2013; Hayatbakhsh, Clavarino, Williams, Bor, O'Callaghan, et al., 2013; Oldehinkel et al., 2008; Strohschein, 2005). The effect of divorce on depression has been examined in both cross-sectional (Schüssler-Fiorenza Rose, Xie, & Stineman, 2014) and longitudinal (Hayatbakhsh, Clavarino, Williams, Bor, O'Callaghan, et al., 2013; Zeratsion et al., 2014) study designs, demonstrating consistency in the available research.

A depressive disorder is characterised by the Diagnostic and Statistical Manual of Mental Disorders (DSM) 5th edition as persistently low mood accompanied by additional psychological and biological symptoms, such as loss of interest and enjoyment in usually pleasurable activities, appetite and sleep disturbances, and reduced energy levels (American Psychiatric Association, 2013). Depression is the leading cause of disability worldwide, as symptoms result in severe impairment in individual levels of functioning (World Health Organization, 2012). Risk of depression is increased with neurotic temperament (Kendler & Gardner, 2011), adverse childhood experiences, especially multiple adverse experiences of differing types (Chapman et al., 2004), and having a first-degree family member with Major Depressive Disorder (MDD; see meta-analysis Sullivan, Neale, & Kendler, 2000). Depression may first appear at any age but is more likely to affect those from adolescence onwards, with only 2% of pre-pubertal children being affected by depression (Son & Kirchner, 2000). Females are more likely to experience a
depressive episode than males (CDC, 2012; Costello, Swendsen, Rose, & Dierker, 2008). People of non-Caucasian race or ethnicity are at increased risk, compared to those of Caucasian ethnicity (Costello et al., 2008; Friedman, Anderson, Arnone, & Denko, 2011). Unemployment, single marital status, low education level, and low income are also associated with increased risk of depression, compared to those who are employed, married, have a high level of education, and a higher income (Friedman et al., 2011).

1.6.1 Development of depression.

Considering the empirical support available for both genetic and environmental influences of depression, it can be understood that depression is a consequence of life stress interacting with heritable genetic and dispositional vulnerabilities that produce physiological and psychological dysfunction (Friedman et al., 2011). Stressors represent the environmental contribution of risk, which interact with genetic predisposition, leading to psychological problems in children and adolescents (Mash & Barkley, 2003; Morris, Ciesla, & Garber, 2008). If an individual is exposed to prolonged stress in their environment, the brain’s neurotransmitter function undergoes chemical changes, contributing to MDD symptomatology (Friedman et al., 2011). The risk of offspring depression, and other behavioural, cognitive, and emotional difficulties, increases with the presence of hereditary factors such as parents’ depression, and other indicators of parent psychopathology or mental illness (Campbell, Cohn, & Meyers, 1995; McLaughlin et al., 2012).

In the family context, the development of child depression is considered to be associated with the functioning of the family system (Bowen, 1966). Family systems theory categorises family members into different subsystems, each demonstrating different relationships and behaviours (Cowan & Cowan, 2002). Subsystems within
the family include the marital subsystem, consisting of the parents, and the child subsystem, consisting of the children. Each individual or subsystem in the family is influenced by the others; therefore, the affect and behaviours of one subsystem are directly associated with those in another subsystem (Nelson, O’Brien, Blankson, Calkins, & Keane, 2009). The transfer of affect and behaviour across subsystems is referred to as ‘spillover.’ In the context of parental divorce, the ‘spillover’ hypothesis would suggest that negative affect and inter-parental conflict in the parental subsystem transfers directly to the child subsystem, increasing risk for the development of depression in offspring (Nelson et al., 2009).

1.7 Subclinical Levels of Psychological Distress

Research to date synthesised by two meta-analytic reviews spanning 49 years of research (years 1950-1999) conclude that the association between parental separation and offspring psychopathology is consistent and important, but reasonably small (Amato, 2001; Amato & Keith, 1991b). Laumann-Billings and Emery (2000) assert that much of the literature on divorce focuses on overt child behaviours, subsequently overlooking subclinical levels of psychological distress. Emery (1999) highlighted that while it would be insensitive to suggest that the long-term outcome of divorce is always pathological, it would also be incorrect to undermine the difficult transitions experienced by most families. Consequently, Laumann-Billings and Emery (2000) conducted a study in which subclinical levels of psychological distress was the outcome variable of interest in a sample of college undergraduate students. Results from this study indicated that many students lived with painful feelings about their parents’ divorce. Young adults reported painful feelings of loss, blame and grief. Participants reported blaming a parent for the divorce, feeling as though their childhoods were cut short and wishing that they had more time with
their non-residential parent. Participants also reported worrying about events in which both parents would be attending and felt they had a harder childhood than most (Laumann-Billings & Emery, 2000). Despite these reports, participants had few clinically significant psychological symptoms. Within the same paper, Laumann-Billings and Emery (2000) replicated the study in a community sample of young people from low-income divorced families. In both studies, level of distress was associated with children's residence, frequency of contact with fathers, and inter-parental conflict.

The findings from these studies highlight the need to consider those from dissolved families who cope successfully, but experience subtle distress, as well as those who go on to suffer from clinically significant disorders, such as MDD following their parents’ divorce. While Laumann-Billings and Emery (2000) did not assess the long term effects of subclinical levels of depressive symptoms, longitudinal research demonstrates subclinical depression predicts clinically significant depression later in life (Fergusson, Horwood, Ridder, & Beautrais, 2005; Pine, Cohen, Cohen, & Brook, 1999). Therefore, considering the pathways that lead to varying levels of risk or no apparent risk are important in research assessing offspring outcomes following parental divorce.

1.8 Developmental Processes

1.8.1 Multifinality.

The principle of multifinality helps to explain diversity in individual depressive symptom outcomes. It holds that there can be variation across a population in outcomes that stem from exposure to the same event. In this way, reactions to normative and non-normative life events may be adaptive for some individuals and maladaptive for others (Cicchetti & Rogosch, 1996). This approach
to conceptualising developmental psychopathology acknowledges that in the context of an initial vulnerability such as parental separation, there is likely to be variation among individual depression outcomes (acknowledging that each family dissolution event has inherent differences). For instance, as outlined by Hetherington (1989), following family dissolution, depressive symptoms may decrease, increase in the short-term, or persist in the long-term. Although children of separated parents are at increased risk for depression, certainly not all such individuals develop depressive disorders (Laumann-Billings & Emery, 2000). Exploration of factors associated with various outcome patterns following family dissolution will enable identification of those that require prevention or intervention efforts toward mitigating the risks associated with depression (Achenbach & Edelbrock, 1978).

1.8.2 Sensitive risk periods.

Individual variation in depressive outcomes following parental separation may be best understood utilising a developmental perspective. Investigating particular developmental periods associated with sensitivity or vulnerability to depressive symptoms is of interest among developmental psychopathologists (Sroufe & Rutter, 1984). If the developmental age and stage of an individual is taken into account, their pattern of response to adversity or instability may be better understood. Therefore, an understanding of the normal developmental course is required to assess for patterns of risk.

During the developmental course from infancy to adulthood, a number of transitions occur that are normative across all individuals (Walsh, 2011). These transitions include the changing attachment organisation, formation of interpersonal friendships, pubertal changes and transitions throughout school (Sroufe & Rutter, 1984). These and other transitional turning points or sensitive periods in development are thought to signify times when developmental processes are prone to
adjustment and/or maladjustment. Characteristics of the individual may heighten their vulnerability for maladjustment in the face of normative changes. For instance, child age, specifically at 15 years during the mid-adolescent period is associated with increased risk for onset of depressive symptoms (Burke, Burke, Regier, & Rae, 1990), compared to childhood where depression onset rates are substantially lower (Cohen et al., 1993; Fleming & Offord, 1990). Adolescent-onset depression then strongly predicts persistent depression into adulthood (Bardone, Moffitt, Caspi, Dickson, & Silva, 2009; Lewinsohn, Rohde, Klein, & Seeley, 1999). This highlights that maladaptive transitioning through adolescence, as evidenced by depressive symptoms can have enduring consequences that increase risk for depression in later life. It is therefore vital to mitigate the depressive influence of additional environmental risks, for example parental divorce, during sensitive periods such as adolescence.

1.8.3 Gender differences.

Varying risk for depression among young people is also pronounced by gender. Prior to pubertal onset, girls and boys do not differ in rates of depression (Angold & Rutter, 2008). However, commencing from the adolescent period onwards, girls are consistently found to be at significantly higher risk for depressive symptoms than boys (Kessler et al., 1994). Specifically, from age 15 years, females’ risk for an episode of depression is approximately double that for males (Frank & Young, 2000) and this gender difference has been shown to persist well into adulthood (Kessler et al., 1994). One explanation for these gender differences is the timing of reproductive development. Pubertal onset occurs earlier in girls, compared to boys, and the hormones associated with menarche are also linked to depressive symptoms (Angold, Costello, Erkanli, & Worthman, 1999). Brooks-Gunn and Warren (1989) found that females’ self-reported negative affect increased alongside
an increase in pubertal estrogen. The impact of hormones on mood may help to explain the gender differences in depressive risk among adolescents.

In addition to proposed biological mechanisms, differences in coping styles between males and females are evident. Boys’ and girls’ methods for coping with stressful life events and depressed mood has been found to significantly differ, whereby a passive, internalised, and ruminative style is more likely in females, and an active and instrumental method of coping is more likely in males (Nolen-Hoeksema, 2000). Ruminative responses to depression, displayed more frequently by girls, leads to an internal focus on symptoms and possible causes and consequences of symptoms (Nolen-Hoeksema, 1991). Such rumination predicts prolonged depression, compared to active methods of coping. Rumination has been demonstrated to prolong depression due to its interference with instrumental behaviour and problem-solving (Nolen-Hoeksema, 1991). It is possible that complex interactions between both biological and psychological processes, explain gender differences in depressive symptoms. These normative differences are useful to consider when conceptualising variation in depressive risk related to divorce.

1.9 Conclusion

Divorce is an event that impacts on the family system and to date, research informs us that children can be affected by their parents’ divorce in differing ways. Psychological research has aimed to explain the mechanisms through which children are negatively affected by their parents’ divorce. The perspectives employed assist in framing divorce within a wider family context. Furthermore, they remind us that it is not parental divorce alone that contributes to negative offspring outcomes; rather influential factors such as financial stability and genetic vulnerability are also important to consider. Despite these strengths, no single perspective adequately
accounts for the varying trajectories of young people from dissolved families. A gap in our understanding of these varying trajectories was identified by Amato (2010) who drew attention to this variation and specifically noted a need for studies that sought to identify factors that amplify or weaken (i.e. moderate) the association between family dissolution and depression. With a particular focus on depression and depressive symptoms as an outcome of parental divorce or separation, the next chapter aims to close the gap in understanding moderation effects. Characterising heterogeneous depression outcomes could provide valuable information for targeted prevention and interventions to alleviate risk associated with family dissolution. Identifying and evaluating the factors that serve to explain the variable relationship between parental divorce and offspring depression will allow identification of groups of individuals who are particularly vulnerable to depression following family dissolution. Therefore, the next chapter presents an evaluation of existing literature reporting factors that moderate the association of interest.
CHAPTER TWO  Literature Review of Moderating Factors

2.1 Chapter Overview

This chapter presents the first study of this thesis, a systematic review of current literature that evaluates factors that moderate the association between family dissolution and offspring depression. Synthesising the available research examining moderation effects (factors that amplify or weaken the association of interest), as opposed to mediation effects (factors that explain the association of interest), allows for understanding of variation in depression trajectories in young people from dissolved families.

The study presented in this chapter is published in the *Journal of Affective Disorders* under the title “Family dissolution and offspring depression and depressive symptoms: A systematic review of moderation effects” (Di Manno, Macdonald, & Knight, 2015). The *Journal of Affective Disorders* has specific guidelines for structure, formatting and referencing. This paper was prepared in accordance with those guidelines and outlines the procedures and protocols used to guide a systematic search of the literature as well as a discussion of the quality of presented literature and key findings. Appendix A provides information regarding each author’s contribution to the paper. Appendix B outlines the *Journal of Affective Disorders* permissions for use of the manuscript in other works, such as theses.
2.2 Abstract

**Background:** Parental separation is associated with increased risk for offspring depression; however, depression outcomes are divergent. Knowledge of moderators could assist in understanding idiosyncratic outcomes and developing appropriately targeted prevention programs for those at heightened risk of depression following parental separation. Therefore, the objective of the review was to identify and evaluate studies that examined moderators of the relationship between parental separation and offspring depression. **Methods:** A search of scientific, medical and psychological databases was conducted in April 2015 for longitudinal research that had evaluated any moderator/s of the relationship between parental separation or divorce and offspring depression or depressive symptoms. Papers were assessed for quality by evaluating the study’s sample, attrition rates, methodology and measurement characteristics. **Results:** Fourteen quantitative studies from five countries assessed 15 moderating factors of the relationship between parental separation and offspring depression or depressive symptoms. A number of factors were found to moderate this relationship, including offspring gender, age (at assessment and at depression onset), genotype, preadolescent temperament, IQ, emotional problems in childhood and maternal sensitivity. **Limitations:** While robust longitudinal research was selected for inclusion, common issues with longitudinal studies such as low rates of participation and attrition were among the methodological concerns evident in some of the reviewed papers. **Conclusions:** The current review is the first to assess interaction effects of the relationship between parental separation and offspring depression or depressive symptoms. While further research is recommended, this assessment is critical in understanding variation in heterogeneous populations and can inform targeted policy and prevention.
2.3 Introduction

Children from dissolved families are consistently found to be at greater risk of affective disorders, including depression, compared with those from intact families (see Amato, 2001; Amato & Keith, 1991b). Parental divorce is also associated with increased risk of offspring attempting suicide (Donald et al., 2006; Lizardi et al., 2009). Yet, many children from divorced families do not experience negative outcomes, or they experience poor outcomes that are transient or modest in effect (Hetherington, 1989; Kessler et al., 2010; Ruschena, Prior, Sanson, & Smart, 2005). Rates in western countries inform us that approximately 25 to 35 percent of children up to the age of 18 years, experience their parent’s divorce (Australian Bureau of Statistics [ABS], 2010; Department of Work and Pensions [DWP], 2013). Despite extensive research detailing associated risks (see Amato, 2005), robust evidence for the mechanisms that account for the varying trajectories of children from dissolved families remains limited (Amato, 2010).

Depressive symptomatology is consistently reported in the literature examining outcomes for offspring of divorced parents (Amato, 2001; Amato & Keith, 1991b). Compared with those from intact families, those who have experienced parental separation are at greater risk of experiencing depressive symptoms (Culpin et al., 2013; Hayatbakhsh, Clavarino, Williams, Bor, O’Callaghan, et al., 2013; Oldehinkel et al., 2008). However, despite substantial evidence of this risk relationship, aggregated effect sizes arrived at through meta-analyses, show associations that, while consistent, are reasonably small (Amato, 2001; Amato & Keith, 1991b). An important consideration here is that research to date predominantly focuses on the mean effects of parental separation, concealing the range in adjustment among individuals in heterogeneous populations (Amato, 2010). Furthermore, many studies that seek to ascertain the strength of effects of parental
separation on offspring outcomes, control for variables that might otherwise be moderators of the association. While the separation of variance associated with such variables allows for clearer assessment of main effects, it masks the role these variables potentially play in characterizing subgroups of individuals who fare differently following parental separation.

Assessing the current state of knowledge surrounding research on family dissolution, Amato (2010) concluded that future research should evaluate moderating effects to further understand offspring outcomes following parental separation. To our knowledge, there are no reviews that assess moderators of the relationship between parental divorce and depression. Theoretically, knowledge of characteristics that place individuals at heightened risk for depression following parental separation can lead to identification of the pathways through which offspring develop psychopathology. Pragmatically, knowledge of individual or environmental characteristics that protect against depression following parental separation would assist in designing effective and appropriately targeted prevention and intervention programs for offspring.

Therefore, the aims of the current systematic literature review were to:

- Identify studies that examine any moderators of the association between parental separation and offspring depression or depressive symptoms.
- Assess the quality of the research designs of these studies.
- Determine what familial and/or individual characteristics or conditions are associated with risk or resilience in offspring depression or depressive symptoms following parental divorce.
2.4 Method

2.4.1 Eligibility Criteria

The systematic review method was guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA; Moher, Liberati, Tetzlaff, & Altman, 2009). The search was limited to studies of humans, published in peer-reviewed journals and written in English. Articles were included if they examined a variable, or variables assessed as moderator/s of the relationship between the predictor (parental divorce/parental separation) and the outcome (offspring depression/depressive symptoms). Causes of family dissolution other than parental separation or divorce, such as parental death or immigration, were not considered eligible for inclusion in the current review. Research demonstrates that family dissolution experiences are disparate as they affect children differently; therefore, it is argued that each cause of family dissolution should be examined as unique (Aquilino, 1994; Mack, 2001). Only longitudinal studies were included to ensure that measurement of parental separation/divorce preceded measurement of offspring depression/depressive symptoms. Furthermore, only studies where measurement of the moderator was concurrent with or preceded measurement of the predictor were included. The MacArthur Research Network’s approach to moderation (Kraemer, Stice, Kazdin, & Kupfer, 2001; Kraemer, Wilson, Fairburn, & Agras, 2002) details that temporal precedence of the moderator reduces the likelihood that it is a causal mechanism in the association of interest (Kraemer, Kiernan, Essex, & Kupfer, 2008). An additional criterion of the MacArthur approach is that the predictor and moderator are independent (Kraemer et al., 2008). This is not applied stringently across all approaches to moderation (e.g. Baron & Kenny, 1986) and so it was not mandatory for inclusion in this review; however, the combination of the temporal precedence and independence indicators, mentioned here, serve to reduce ambiguity.
about whether variables deemed moderators might otherwise be mediators. Therefore, adherence to these criteria was noted during quality assessments of included articles.

Family dissolution encompasses both parental divorce and parental separation; therefore, both events were considered to be eligible predictors of offspring depression/depressive symptoms. Studies examining subclinical symptoms of offspring depression were included because longitudinal research demonstrates that subclinical depressive symptoms can indicate subsequent clinical depression (Fergusson et al., 2005; Pine et al., 1999). Papers that collapsed measurement of depressive symptoms into a wider variable, such as “wellbeing” were excluded because depression or depressive symptoms were either not assessed in the overall variable or it was not possible to ascertain their unique contributions. Participant age was not restricted so as to allow examination of the association of interest from a developmental perspective, whereby the depressive effects of parental separation in offspring may change over time or present as risk factors for future depressive symptoms. As samples of children, adolescents and adults were eligible for inclusion, consideration was given to developmentally appropriate measures of offspring depression or depressive symptoms. Therefore, for child and adolescent samples, non-specific measures of offspring depression, such as “internalizing problems,” were included if the assessment instruments used had demonstrated predictive validity in subsequent assessment of depressive symptoms. Given that the current review aimed to assess moderating factors in an association that cannot be manipulated, observational studies of community-based samples were sought where they allowed for comparison by including participants who had and had not experienced family dissolution.
2.4.2 Search Strategy and Selection Process

A search was conducted in April 2015 of articles that included variants of depression or depressive symptoms; parental divorce or separation; and moderation or interaction. A fourth set of terms was included to ensure the search yielded studies in the context of risk and protective frameworks or developmental adjustment. This was required because the terms *moderation* and *interaction* also have non-statistical meaning and without inclusion of the fourth set of terms, the search results were unduly populated with irrelevant articles (see Figure 2.1). Medline Complete, PsycINFO, SCOPUS, and Academic Search Complete were the databases searched. A hand-search of the reference lists of retrieved articles to identify additional studies was also conducted. The titles and abstracts of identified papers were screened for potential eligibility. The full-texts of potential papers were then examined to determine their eligibility for inclusion. Full details of excluded papers and reasons for exclusion are presented in supplementary material (see Appendix C).
**Databases:** PsycINFO, MEDLINE Complete, Academic Search Complete, Psychological and Behavioural Sciences Collection, SCOPUS, Web of Science.

**Search:**

(“parent* divorc*” or “parent* separat*” or “divorc* parent*” or “separat* parent*” or “marital separat*” or “marriage separat*” or “famil* transit*” or “famil* structur*” or “famil* separat*” or “famil* disrupt*” or “marital dissol*” or “famil* dissol*”)

AND

(“Depressi*” or “MDD” or “affect* disorder*” or “affect* symptom*” or “internali?*”)

AND

(“Moderat*” or “interact*”)

AND

(“risk*” or “protect*” or “resilien*” or “prevent*” or “adjust*”)

**Limiters:** English, Human, Peer-Reviewed

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**Fig. 2.1.** Search terms and search strategy.
2.4.3 Data Abstraction and Quality Assessment

Data were extracted and organized into tables to allow for comparison between studies. Information regarding samples, attrition rates, missing data strategies, interactions tested, time-points measured, analytic approaches, findings and descriptions of measures of depression/depressive symptoms employed by the reviewed studies was extracted. The following quality indicators were evaluated and limitations to quality are discussed throughout the review:

(1) Bias and generalizability (sample characteristics): Descriptions of each study’s sample characteristics were extracted and placed in Table 2.1. It was noted specifically whether the participants were sampled from a population-based representative or other sample. Biased samples, or samples that might have led to biased findings, are noted in the discussion.

(2) Sample attrition: Information regarding sample size for each of the studies was extracted and provided in Table 2.1 including the sample size at the first wave, the number of waves of data collection, the sample size at the final wave, the sample size available for analysis, and the study’s attrition rate coded as a percentage.

(3) Method for dealing with missing data: Information regarding each study’s method for dealing with missing data was extracted and placed in Table 2.1 to allow for visual comparison across studies. Where methods may have resulted in bias, it was described as a study limitation in the discussion.

(4) Transparency in reporting of results: Information pertaining to quality indicators 1-3, or to the nature of the analysis and the strength of detected effects, that could not be gleaned during the data extraction phase due to a study’s lack of transparency in the reporting of results was described in Table
2.1 as “unclear” or “not stated”. Implications resulting from the lack of transparency were then reported in the discussion.

(5) Temporal precedence and independence of the moderator: Details of each interaction tested were noted in Table 2.2. Each interaction was allocated a number/numbers categorizing whether the examination of moderation met the temporal precedence and/or independence quality assessment criteria (i.e. 1 = moderator is fixed or measured prior to predictor; 2 = moderator is independent from predictor; 3 = independence of moderator to predictor unknown; 4 = moderator is not independent from predictor).

(6) Depression measurement (clinical tool, self-report etc.): Descriptions of the measures of depressive symptoms employed by each study were detailed in Table 2.3. The nature of measurement is described (e.g. self-report; interview) along with categorization of the measure as an assessment of subclinical or clinical depression symptoms.

2.5 Results

2.5.1 Description of Included Studies

Fourteen quantitative papers were considered relevant for review. Figure 2.2 presents the flow diagram of studies included for review (from the PRISMA group statement, Moher et al., 2009). All studies reported findings relevant to moderators of the relationship between parental divorce and offspring depression or depressive symptoms. The studies included in the review collectively examined 15 variables as moderators that have been categorized as nine fixed and six non-fixed variables.

Information regarding sample (participant description and recruitment strategy), attrition rate and methods employed for dealing with missing data is shown in Table 2.1. All studies sampled both male and female participants. The
review yielded studies from five countries, namely, the United States of America, the United Kingdom, Australia, Sweden and the Netherlands. Two studies in each of the following countries: Great Britain (Chase-Lansdale, Cherlin, & Kiernan, 1995; Rodgers, Power, & Hope, 1997), the Netherlands (Oldehinkel et al., 2008; Sentse, Ormel, Veenstra, Verhulst, & Oldehinkel, 2011) and Sweden (Nilsson, Sjoberg, Leppert, Orelan, & Damberg, 2009; Sjoberg et al., 2006) reported data from the same samples, although different factors were examined in each. Therefore, the current review includes 14 published papers from 11 different studies.

Fig. 2. Flow diagram of reviewed studies.
### Table 2.1. Sampling frames, attrition and missing data.

<table>
<thead>
<tr>
<th>No.</th>
<th>Author (year)</th>
<th>Country</th>
<th>Sample and recruitment</th>
<th>N at Wave 1</th>
<th>No. of waves</th>
<th>n at final Wave</th>
<th>n available for analysis</th>
<th>% attrition*</th>
<th>Method for dealing with missing data</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Chase-Lansdale, Cherlin and Kiernan (1995) USA</td>
<td></td>
<td>Children of The National Child Development Study in Great Britain, a representative cohort study.</td>
<td>17,414</td>
<td>5</td>
<td>12,537</td>
<td>10,353</td>
<td>28.01%</td>
<td>Mean imputation</td>
</tr>
<tr>
<td>2.</td>
<td>Dunlop and Burns (1995) Australia</td>
<td></td>
<td>Adult participants and their adolescent child of a 10-year study recruited via letters sent to schools and the Australian Family Law Court.</td>
<td>78</td>
<td>3</td>
<td>Unclear</td>
<td>57</td>
<td>Unclear</td>
<td>Not stated</td>
</tr>
<tr>
<td>3.</td>
<td>Gilman et al. (2003) USA</td>
<td></td>
<td>A representative sample of offspring of participants in the Providence Rhode Island cohort of the National Collaborative Perinatal Project.</td>
<td>2,051</td>
<td>3</td>
<td>1,267</td>
<td>1,089</td>
<td>38.23%</td>
<td>Complete data used</td>
</tr>
<tr>
<td>5.</td>
<td>Nilsson et al. (2009) Sweden</td>
<td></td>
<td>A representative sample of fifth year secondary school students and third year college students in Västmanland.</td>
<td>4,260</td>
<td>2</td>
<td>785</td>
<td>180 (out of 400 randomly selected from sample)</td>
<td>N/A</td>
<td>Not stated</td>
</tr>
<tr>
<td>6.</td>
<td>O’Connor et al. (2003) USA</td>
<td></td>
<td>Adoptive families recruited through two adoption agencies in Colorado.</td>
<td>245</td>
<td>3</td>
<td>197</td>
<td>188</td>
<td>19.59%</td>
<td>Not stated</td>
</tr>
<tr>
<td>7.</td>
<td>Oldehinkel et al. (2008) The Netherlands</td>
<td></td>
<td>A representative sample of Dutch adolescents and their parents from urban and rural areas participating in a prospective cohort study.</td>
<td>2,230</td>
<td>2</td>
<td>2,149</td>
<td>2,016</td>
<td>3.63%</td>
<td>Corrected item imputation</td>
</tr>
<tr>
<td>8.</td>
<td>Rodgers (1994) UK</td>
<td></td>
<td>A representative sample of adults who had been participants of the National Survey of Health and Development since birth.</td>
<td>5,362</td>
<td>4</td>
<td>3,262</td>
<td>Unclear</td>
<td>39.16%</td>
<td>Equivalent percentile points up</td>
</tr>
<tr>
<td>No.</td>
<td>Author (year)</td>
<td>Country</td>
<td>Sample and recruitment</td>
<td>$N$ at Wave 1</td>
<td>No. of waves</td>
<td>$n$ at final Wave</td>
<td>$n$ available for analysis</td>
<td>% attrition*</td>
<td>Method for dealing with missing data</td>
</tr>
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<td>-----</td>
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<tr>
<td>9.</td>
<td>Rodgers, Power, and Hope (1997) UK</td>
<td>Children of The National Child Development Study in Great Britain, a representative cohort study.</td>
<td>16,496</td>
<td>6</td>
<td>11,407</td>
<td>Unclear</td>
<td>30.84%</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Sentse et al. (2011) The Netherlands</td>
<td>A representative sample of Dutch adolescents from urban and rural areas participating in a prospective cohort study.</td>
<td>2,230</td>
<td>3</td>
<td>1,838</td>
<td>1,274</td>
<td>17.58%</td>
<td>Not stated</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Sjoberg et al. (2006) Sweden</td>
<td>A representative community sample of ninth grade primary school students and third grade secondary school students in Västmanland.</td>
<td>4,260</td>
<td>2</td>
<td>785</td>
<td>180 (out of 400 randomly selected from sample)</td>
<td>N/A</td>
<td>Not stated</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>Summers et al. (1998) USA</td>
<td>Young adolescents and their mothers recruited through local newspaper advertisements and fliers distributed to schools and posted throughout the local community.</td>
<td>285</td>
<td>2</td>
<td>263</td>
<td>242</td>
<td>7.72%</td>
<td>Not stated</td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>Videon (2002) USA</td>
<td>A nationally representative sample of adolescent high school students in grades 7-12 from the National Longitudinal Study of Adolescent Health.</td>
<td>20,745</td>
<td>2</td>
<td>14,738</td>
<td>5,530 out of 7,046 selected from total sample based on family structure</td>
<td>28.96%</td>
<td>Complete data used</td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>Weaver &amp; Schofield (2015) USA</td>
<td>Families recruited in 1991 to participate in the National Institute of Child Health and Human Development Study of Early Child Care and Youth Development.</td>
<td>1,364</td>
<td>21</td>
<td>1,009</td>
<td>520 (260 divorced families propensity score matched to 260 intact families)</td>
<td>26.03%</td>
<td>Full-information maximum likelihood estimation</td>
<td></td>
</tr>
</tbody>
</table>

*Calculated as the percentage difference between $N$ at Wave 1 and $N$ at final Wave. Percentages have been rounded to two decimal places.

USA = United States of America; UK = United Kingdom

*Scores were imputed for ID’s with 1-2 missing items, estimated from the relevant percentile point on the population distribution for completed items. ID’s with 3+ missing items were allocated missing values.

N/A = not applicable as Nilsson et al. (2009) and Sjoberg et al. (2006) used restricted samples and Weaver and Schofield (2014) used a matched sample.
2.5.2 Methodology

The interactions tested, time points measured, analytic approaches, whether measurement of the moderator preceded and was independent to that of the predictor, and findings of each study are shown in Table 2.2. The outcome of interest (offspring depression/depressive symptoms) was assessed using different measures and a description of each is provided in Table 2.3. Sample sizes varied widely across the studies and ranged from small convenience samples (Dunlop & Burns, 1995; O'Connor, Caspi, DeFries, & Plomin, 2003; Summers, Forehand, Armistead, & Tannenbaum, 1998) to large representative cohort studies (Chase-Lansdale et al., 1995; Gilman, Kawachi, Fitzmaurice, & Buka, 2003; Kasen, Cohen, Brook, & Hartmark, 1996; Nilsson et al., 2009; Oldehinkel et al., 2008; Rodgers, 1994; Rodgers et al., 1997; Sentse et al., 2011; Sjoberg et al., 2006; Videon, 2002).
Table 2.2. Summary of time points measured, temporal precedence, independence, analytic approach, adjustment of confounders, interactions tested and findings of reviewed articles.

<table>
<thead>
<tr>
<th>Ref</th>
<th>Time points*</th>
<th>Analytic approach &amp; adjustment</th>
<th>Interactions tested (findings***)</th>
</tr>
</thead>
</table>
| 1.  | Postnatal; Age 7 yrs; Age 11 yrs; Age 16 yrs; Age 23 yrs | Ordinary Least Squares Regression, Logistic Regression | (i) Parental divorce x Offspring emotional problems at age 7\textsuperscript{1,3} (p<.05)  
(ii) Parental divorce x Offspring gender\textsuperscript{1,3} (not stated)  
(iii) Parental divorce x Offspring emotional problems at age 7\textsuperscript{1,3} x Offspring gender\textsuperscript{1,3} (p>.05) |
| 2.  | M=14.7 yrs [13-16.8]; M=17.9 yrs [16-19.7]; M=24.9 yrs [23.2-27.3] | MANOVA | (i) Parental divorce x Offspring gender\textsuperscript{1,3} (p>.05) |
| 3.  | Age 7 yrs; Age ≤ 14 yrs; Age ≥ 21 yrs | Poisson Regression, Hazard ratios adjusted for family history of mental illness, maternal age, age at interview, and study selection factors | (i) Parental divorce by age 7 yrs x Onset of offspring depression by age ≤ 14 yrs\textsuperscript{1,3} (HR=2.39, CI [1.46, 3.91], p<.001; $\chi^2=12.1$, df=1, p<.001)  
(ii) Parental divorce by age 7 yrs x Onset of offspring depression by age 15-20 yrs\textsuperscript{1,3} (p>.05)  
(iii) Parental divorce by age 7 yrs x Onset of offspring depression by age ≥ 21\textsuperscript{1,3} (p>.05) |
| 4.  | Age 1-10 yrs; Age 9-18 yrs | Logistic regression, Odds ratios adjusted for age, socio-economic status, time since divorce, prior anxiety, depressive, immaturity and behavioural problems | (i) Family status (single custodial mother or stepfamily) x Offspring gender\textsuperscript{1,3} (Girls: OR=0.30, CI [2.78, 0.03], p<0.05; Boys: OR=5.19, CI [24.88, 1.08], p<0.05) |
| 5.  | Age 16 yrs or 19 yrs; 3 yrs later | Non-parametric statistical test based on aligned ranks | (i) Parental divorce x AP-2β genotype\textsuperscript{1,3} (df=2, $Q=9.315$, p<.001)  
(ii) Parental divorce x AP-2β genotype\textsuperscript{1,3} x Offspring gender\textsuperscript{1,3} (Boys: df=2, $Q=3.680$, p=.029; Girls: df=2, $Q=9.192$, p<.001) |
<p>| 6.  | Third trimester of pregnancy or shortly after birth of child; Shortly after adoption placement; Age 12 yrs | Hierarchical regression | (i) Parental divorce x Parent negative reactivity\textsuperscript{1,3} (Biological parent: $b=0.02$, p&gt;.25; Adoptive parent: $b=0.02$, p&gt;.21) |</p>
<table>
<thead>
<tr>
<th>Ref</th>
<th>Time points*</th>
<th>Analytic approach &amp; adjustment</th>
<th>Interactions tested (findings***)</th>
</tr>
</thead>
</table>
| 7.  | 2001-2002; 2003-2004 | Linear regression adjusted for parental depression | (i) Parental divorce x Offspring gender$^{1,2}$ (Adolescent-reported depressive symptoms: $B=-.71$, $SE=0.43$, $p>.05$; Parent-reported depressive symptoms: $B=-.33$, $SE=0.35$, $p>.05$)  
(ii) Parental divorce x Offspring age$^{1,3}$ (Adolescent-reported depressive symptoms: $B=-.02$, $SE=0.11$, $p>.05$; Parent-reported depressive symptoms: $B=-.14$, $SE=0.09$, $p>.05$)  
(iii) Parental divorce x Offspring gender$^{1,2}$ x Offspring age$^{1,3}$ (Adolescent-reported depressive symptoms: $B=.37$, $SE=0.16$, $p<.05$; Parent-reported depressive symptoms: $B=.27$, $SE=0.15$, $p>.05$) |
| 8.  | Postnatal; Age 2 yrs; Age 36 yrs; Age 43 yrs | MANOVA adjusted for SES ANOVA | (i) Parental divorce x Offspring gender$^{1,3}$ ($F(2.2957)=5.9$, $p=.003$) |
| 9.  | Postnatal; Age 7 yrs; Age 11 yrs; Age 16 yrs; Age 23 yrs; Age 33 yrs | MANOVA | (i) Parental divorce x Offspring gender$^{1,3}$ ($p>.05$)  
(ii) Parental divorce x Offspring age$^{1,3}$ ($F(2,1311)=3.7$, $p=.026$, adjusted alpha level $\alpha=.25$) |
| 10. | M=11.09 yrs, SD=0.55; Two yrs later (M not reported); M=16.27 yrs, SD=0.73 | Hierarchical regression adjusted for externalizing problems at one time point | (i) Parental divorce x Preadolescent effortful control temperament$^{1,4}$ ($p=.08$)  
(ii) Parental divorce x Preadolescent fearful temperament$^{1,2}$ ($b=.17$, $SE=.08$, $p<.05$) |
| 11. | Ninth graders in primary school and third graders in secondary school; Three years later (age 19 and 22 yrs) | Non-parametric test based on aligned ranks | (i) Parental divorce x 5-HTTLPR genotype$^{1,3}$ ($p=.106$)  
(ii) Parental divorce x Offspring gender$^{1,3}$ x 5-HTTLPR genotype$^{1,3}$ (Boys: $p=.0016$; Girls: $p=.121$) |
| 12. | Age 11-15 yrs (M=13 yrs and 1 mth); Age 18-22 yrs (M=19 yrs and 7 mths) | Linear regression Hierarchical linear regression | (i) Parental divorce x Offspring age$^{1,3}$ ($p>.05$)  
(ii) Parental divorce x Offspring gender$^{1,3}$ ($p>.05$)  
(iii) Parental divorce x Family SES$^{3}$ ($p>.05$)  
(iv) Parental divorce x Adolescent-mother relationship$^{2}$ ($p>.05$)  
(v) Parental divorce x Adolescent-father relationship$^{2}$ ($p>.05$)  
(vi) Parental divorce x Maternal depressive mood$^{4}$ ($p>.05$)  
(vii) Parental divorce x Inter-parental conflict$^{2}$ ($p>.05$) |
<p>| 13. | Sept 1994 – Dec 1995; Apr 1996 – Aug 1996 | Multiple regression | (i) Living apart from one parent x Offspring Gender$^{1,2}$ x Parent-child relationship quality$^{2}$ (Boys: $p&gt;.05$; Girls: $p&gt;.05$) |</p>
<table>
<thead>
<tr>
<th>Ref</th>
<th>Time points*</th>
<th>Analytic approach &amp; adjustment</th>
<th>Interactions tested (findings**)</th>
</tr>
</thead>
</table>
| 14. | 1, 3, 9, 12, 15, 24, 36, 42, 46, 50 and 54 mths, in kindergarten and Grades 1, 2, 3, 4, 5, 6, and 7, and at ages 14 and 15 yrs | Modeling absolute and relative change | (i) Parental separation x Family income\(^{1,3}\) (\(p>.05\))  
(ii) Parental separation x Maternal sensitivity\(^{1,3}\) (Teacher-reported child internalising symptoms: \(b=.009\), \(p=.031\); Mother-reported child internalising symptoms: \(b=.005\), \(p=.001\))  
(iii) Parental separation x Child IQ\(^{3}\) (Teacher-reported child internalising symptoms: \(\chi^2=62.19, df=31, TLI=.986, RMSEA=.043; b=1.23, SE=.60\); Mother-reported child internalising symptoms: \(b=.006, p=.016\)) |

*Time points are expressed as either age of offspring, year of data collection, or both, depending on information available.  
1 = moderator is fixed or measured prior to predictor; 2 = moderator is independent from predictor; 3 = independence of moderator to predictor unknown; 4 = moderator is not independent from predictor  
TP = temporal precedence of moderator to predictor; I = independence of association between moderator and predictor  
**Effect sizes displayed where provided by paper.
Table 2.3. Description of measures of offspring depression/depressive symptoms used in reviewed studies.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Description</th>
<th>Administration</th>
<th>Respondent/s</th>
<th>Ref/s</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Subclinical</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Malaise Inventory</td>
<td>A 24-item measure of the signs of psychological distress of depression in teenagers and adults.</td>
<td>Survey</td>
<td>Offspring</td>
<td>1; 9</td>
</tr>
<tr>
<td>Neuroticism Scale Questionnaire</td>
<td>A 40-item inventory measuring the following constructs: Tender-Mindedness, Depression, Submissiveness, and Anxiety and total Neuroticism score.</td>
<td>Survey</td>
<td>Parent</td>
<td>2</td>
</tr>
<tr>
<td>Youth Self Report</td>
<td>A screening tool for behavioural and emotional problems in children and adolescents.</td>
<td>Survey</td>
<td>Offspring</td>
<td>7; 10</td>
</tr>
<tr>
<td>Child Behaviour Checklist</td>
<td>A checklist designed to detect emotional and behavioural problems in children and adolescents.</td>
<td>Survey</td>
<td>Parent</td>
<td>6; 7; 10; 14</td>
</tr>
<tr>
<td>Brief Symptom Inventory</td>
<td>A 53-item self-report inventory in which participants’ rate the extent to which they have been bothered in the past week by various internalising symptoms.</td>
<td>Survey</td>
<td>Offspring</td>
<td>12</td>
</tr>
<tr>
<td>Center for Epidemiologic Studies Depression Scale</td>
<td>A 19-item self-report scale designed to measure depressive symptomatology in the general population. The items of the scale assess frequency of symptoms associated with depression.</td>
<td>Survey</td>
<td>Offspring</td>
<td>13</td>
</tr>
<tr>
<td><strong>Clinical</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present State Examination</td>
<td>A semi-structured 140-item interview, intended to provide an objective evaluation of symptoms associated with mental disorders.</td>
<td>Interview</td>
<td>N/A</td>
<td>8</td>
</tr>
<tr>
<td>Psychiatric Symptom Frequency scale</td>
<td>An interview of affective symptoms with items covering many of the symptoms of anxiety and depressive disorders.</td>
<td>Interview</td>
<td>N/A</td>
<td>8</td>
</tr>
<tr>
<td>Depression Self-Rating Scale</td>
<td>A self-rated inventory based on the DSM-IV criteria for major depression.</td>
<td>Survey</td>
<td>Offspring</td>
<td>5; 11</td>
</tr>
<tr>
<td>Diagnostic Interview Schedule for Children</td>
<td>A structured respondent-based diagnostic instrument based on DSM-III criteria for Major Depressive Disorder.</td>
<td>Interview</td>
<td>Parent and Offspring</td>
<td>4</td>
</tr>
<tr>
<td>Diagnostic Interview Schedule</td>
<td>A structured interview designed to ascertain the presence or absence of major psychiatric disorders outlined in the DSM.</td>
<td>Interview</td>
<td>N/A</td>
<td>3</td>
</tr>
</tbody>
</table>
2.6 Discussion

This review identified 14 studies that examined 15 variables as moderators of the relationship between parental divorce/separation and offspring depression/depressive symptoms. Five of the nine fixed-variable investigations reported statistically significant interactions, while two of the six non-fixed variables found evidence for moderation. An additional two fixed variables were found to moderate the relationship of interest only when a three-way interaction was tested. Findings related to each variable are discussed in turn.

2.6.1 Fixed Variables

**Offspring gender x Parental divorce**

Seven studies assessed offspring gender as a moderator of the association between parental divorce and depression or depressive symptoms (Chase-Lansdale et al., 1995; Dunlop & Burns, 1995; Kasen et al., 1996; Oldehinkel et al., 2008; Rodgers, 1994; Rodgers et al., 1997; Summers et al., 1998) and results were mixed. Five studies found no gender interaction with parental divorce (Chase-Lansdale et al., 1995; Dunlop & Burns, 1995; Oldehinkel et al., 2008; Rodgers et al., 1997; Summers et al., 1998). Two studies report a significant two-way interaction (Kasen et al., 1996; Rodgers, 1994).

Where gender was shown to moderate the relationship between parental divorce and depression, the studies (Kasen et al., 1996; Rodgers, 1994) sampled representative cohorts and used robust clinical assessments of depression, one of which assessed depression according to DSM criteria (Kasen et al., 1996). Of interest is that the gender at risk differed by study. Kasen et al. (1996), in a sample of 648 boys and girls from pre-puberty to late adolescence (9-18 years), found that following parental divorce, boys were 5.19 times at greater risk of Major Depressive
Disorder (MDD) than girls; however, wide confidence intervals raise some doubt about this effect (CI [24.88, 1.08])\(^3\). In a sample of adults aged 36-43 years, Rodgers (1994) reported that women who experienced parental divorce reported higher depression symptom scores at the time of assessment compared to men. It is possible that offspring age accounts for the gender differences found in these analyses.

All studies where gender interactions were not detected assessed only subclinical depressive symptoms using a range of measurement tools including screeners and measures of symptom severity (see Table 2.3). Furthermore, the studies sampled participants of divergent age ranges; used various sampling frames; and, were potentially subject to a range of attrition-related biases. Chase-Lansdale et al. (1995), Oldehinkel et al. (2008) and Rodgers et al. (1997) measured parental divorce between 7 and 16-years. Dunlop and Burns (1995) measured parental divorce within the smallest sample of the reviewed papers \((n=57)\) at mean ages 14.7 years, 17.9 years, and 24.9 years. The Dunlop and Burns (1995) study also conveniently sampled participants recruited through a Family Law Court. Such participants are likely to constitute a high risk sample, biasing results toward an overestimation of effects, and therefore limiting generalizability of the results to the wider population. Similarly, Summers et al. (1998) assessed gender interactions in a convenience sample of young adults between the ages 18-22 years.

Measurement-type and sample characteristics may account for inconsistent results as only studies that sampled representative cohorts and used robust clinical assessments of depression found evidence of moderation. It may be that the interaction between gender and parental divorce only exists in those with clinical levels of depression. Overall, the findings highlight that the question of whether

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\(^3\)Kasen et al.'s (1996) study reports their confidence intervals with the upper limit before the lower limit.
gender moderates the association between parental divorce and offspring depressive symptoms requires further consideration in prospective representative cohort studies, in which clinical measurements are available, sample biases are minimized, and offspring age can be considered across multiple developmental periods.

**Offspring age at time of assessment x Parental divorce**

Two studies assessed offspring age and its interaction with parental divorce in predicting depressive symptoms (Oldehinkel et al., 2008; Summers et al., 1998). Summers et al. (1998) sampled offspring during adolescence and young adulthood (11-15 years [Time 1] and 18-22 years [Time 2]). Age at Time 2, young adulthood, was utilized in the interaction term. No evidence for moderation was found. Oldehinkel et al. (2008) sampled adolescents (10-12 years [Time 1] and 12-15 years [Time 2]) and examined two separate measures of adolescent depressive symptoms; one reported by the young adolescent and one parent-report. Offspring age was not found to be a moderator, regardless of respondent.

**Offspring age at parental divorce x Parental divorce**

One study examined offspring age at the time of parental divorce as a moderator of the relationship between parental divorce and offspring depressive symptoms (Rodgers et al., 1997). Moderation was not detected. In their study, age was dichotomized as 0-16 years and 17-33 years, with no theoretical justification provided for the division. Consequently, potentially important information relevant to developmental stage of the sampled offspring was lost. While statistical significance was not reached, examination of the means revealed that for both males and females there were higher depression scores when parental divorce occurred during the younger (0-16 years) rather than the older (17-33 years) age range (Rodgers et al., 1997).
**Offspring gender x Offspring age x Parental divorce**

While there was no evidence of a two-way parental divorce x offspring age interaction, Oldehinkel et al. (2008) reported a significant three-way interaction between offspring gender, offspring age at time of assessment and parental divorce, predicting offspring depressive symptoms. Evidence of a significant three-way interaction was found irrespective of whether adolescent self-reported or parents provided reports of their offspring’s depressive symptoms, highlighting consistency across informants. However, the size of the effect was larger when adolescents were the informants ($B=.37$), compared to parents ($B=.27$). In prior research, Najman et al. (2001) used the same measures of offspring depressive symptoms (parent report: Child Behavior Checklist; adolescent report: Youth Self Report) to compare findings across informants. They found that emotionally impaired mothers reported more child behavior problems than their emotionally stable counterparts (Najman et al., 2001). Oldehinkel et al.’s (2008) study adjusted for parental depression, protecting their findings against this source of response bias.

Just as gender was only found to be a significant moderator in samples of certain age ranges (Kase et al., 1996; Rodgers, 1994), age was only found to moderate the relationship of interest when gender was included in the interaction term. Oldehinkel et al. (2008) found that females aged 15-years and males aged 10-years were most at risk of depressive symptoms following parental divorce. These findings expand on those of Kasen et al. (1996) who found that boys aged 9-18 years were most at risk. Kasen et al.’s (1996) and Oldehinkel et al.’s (2008) findings suggest that while boys aged 9-18 years appear to be more vulnerable to depression than girls following parental divorce, when this age range is narrowed further, younger males (aged 10-years) and older females (aged 15-years) appear to be more at risk. Given that prevalence data demonstrate that females experience higher rates
of early onset MDD compared to males (Kessler et al., 2003), Oldehinkel et al.’s (2008) results suggest that those gender norms may not be applicable among offspring of dissolved families. A possible explanation is that, for pre-pubescent boys, anticipated or actual loss of involvement with the same sex parent may be associated with heightened vulnerability to depressive symptoms, whereas post puberty, girls may experience a heightened sensitivity to the depressogenic effects of family dissolution. For girls, this vulnerability in adolescence to interpersonal events is argued to arise out of both hormonal changes, such as increased levels of oxytocin, and greater sociocultural pressures on adolescent females to seek out emotional closeness in affiliative connections (Cyranowski, Frank, Young, & Shear, 2000).

These findings present a persuasive argument for examining offspring gender and age in combination when exploring effects of parental divorce on depressive symptoms. Studying either variable in isolation potentially obscures important information regarding developmental vulnerabilities to depressive symptoms. Oldehinkel et al.’s (2008) finding of three-way moderation is therefore critical in this review, suggesting that there are potentially sensitive developmental periods for stressful life events that differ across females and males.

**Offspring age at depression onset x Parental divorce**

Gilman et al. (2003) examined the interaction between offspring age at depression onset and parental divorce and its effect on lifetime risk of a Major Depressive Episode (MDE). Onset of depression at 14-years or younger significantly increased the lifetime risk for an MDE associated with parental divorce before age 7-years. This interaction effect is considered to be large (HR=2.39, CI [1.46, 3.91]) even after adjustment for a number of potential confounders including, family history of mental illness and maternal age. However, there was no additional risk associated with onset of offspring depression at age 15-20 years or 21-years and above. Gilman
et al.’s (2003) findings suggest that the lifetime risk of MDE for those who experience parental divorce before 7-years of age, dissipates whereby there is no significant risk for MDE at late adolescence and older. An alternative explanation is that, with regard to lifetime risk of MDE, there may be a latency period of up to seven years between the event of parental divorce and onset of offspring depression, irrespective of offspring age at parental divorce. However, it was not possible to determine this from the Gilman et al. (2003) study as they did not assess parental divorce after age 7-years.

These findings are in line with previous research that demonstrate onset of an MDE in children aged 8-13 years is associated with increased risk of future MDEs (Kovacs, Feinberg, Crouse-Novak, Paulauskas, & Finkelstein, 1984). Because Gilman et al. (2003) did not assess parental divorce after 7-years it is difficult to ascertain whether the sample was vulnerable to lifetime risk of MDEs by virtue of the young age at which parental divorce occurred. Age-related increases in independence and support networks outside the immediate family (Bukatko, 2008), and emotion-regulation mechanisms (Kopp, 1982) might explain the dissipation of MDE risk with onset at the older age ranges, 15-20 years and 21-years-old and above. Gilman et al.’s (2003) findings further highlight the importance of considering developmental stage when examining the association between parental divorce and offspring depression.

**Offspring genotype x Parental separation**

One study assessed the 5-HTTLPR genotype as a moderator of living with separated parents and offspring depression (Sjoberg et al., 2006). The 5-HTTLPR is an insertion/deletion polymorphism in the upstream regulatory region of the serotonin transporter. Sjoberg et al. (2006) examined the short-form of the 5-HTTLPR allele because of its association with anxiety-related personality traits, such
as neuroticism and affective disorders. Sjoberg et al. (2006) found that among the total sample (males and females aged 19-22 years), there was no significant interaction between the genotype and parental separation in relation to offspring depression. When the analysis was conducted among the genders separately, among males only, familial separation interacted significantly with the 5-HTTLPR genotype in relation to offspring depression. Sjoberg et al.’s (2006) findings indicate that males with the short-form of the allele were negatively affected by living with separated parents at age 16 or 19-years. The evidence of three-way, but not two-way interaction effects in the Sjoberg et al. (2006) study again highlights that exploration of more complex interactions can account for otherwise masked effects in subgroups of individuals.

A second study with a sample derived from the same cohort assessed the AP-2β genotype as a moderator of the relationship between parental separation and depression (Nilsson et al., 2009). Activating protein-2 (AP-2) is a transcription factor. Transcription factors are proteins that have the ability to bind DNA and upon binding, regulate the expression of specific target genes. Transcription factor AP-2 is a family of proteins that has been shown to be important in the development and maintenance of the serotonergic system (Nilsson et al., 2009). AP-2β is a gene encoding of one AP-2 transcription factor. Nilsson et al.’s (2009) study found that the intron 2 polymorphism variation of the AP-2β genotype significantly interacted with parental separation to predict depression in the total sample at age 19 and 22-years. This finding was not gender specific as the genotype significantly moderated parental separation when the analysis was repeated on the sample of boys and girls separately.

In light of skepticism surrounding false positive results reported from gene x environment interaction studies (Duncan, 2013; VanderWeele, Ko, & Mukherjee,
2013), it should be noted that a strength of these studies was that samples for analysis were derived from computerized randomization and stratification based on age, gender and risk behavior. For each analysis, a priori hypotheses were presented for the involvement of single polymorphisms of the candidate genes within samples of dissolved and intact families. However, neither study reported bivariate associations between the moderators and predictors, and so independence between these variables was not possible to assess. While independence might be assumed, as already noted, lack of independence deviates from the MacArthur guidelines but in particular it is associated with false positive results in gene x environment studies when there has been inadequate control for environmental confounding (VanderWeele et al., 2013). The above analyses were adjusted for psychosocial factors including indices of relationship conflict, education and employment but not for race/ethnicity. Furthermore, multiple interactions were tested in each paper, increasing the likelihood of chance findings; however, the relevant findings were reported to be significant at reasonably stringent levels (p=0.029 to p<0.001). Nevertheless, without replication, and given publication biases toward significant results (Duncan, 2013), these candidate gene x environment interaction results should be considered with caution.

**Temperament x Parental separation**

Two studies examined temperament as a potential moderator. Because temperament has a biological basis and is resistant to change (Bates & Wachs, 1994; Buss & Plomin, 1984; Chess & Thomas, 1996) it was categorized as a fixed variable in the current review; however, it is acknowledged that there is some degree of malleability in temperament (Josefsson et al., 2013). One study examined parent temperament, specifically negative reactivity (O'Connor et al., 2003), and found no evidence for moderation and one study examined offspring temperament styles:
effortful control and fearfulness (Sentse et al., 2011), and reported that fearfulness moderated the effect of separation on offspring depressive symptoms.

Fearfulness describes a passive child who has difficulty approaching others and making independent decisions (Sentse et al., 2011) and is associated with internalizing problems (Ormel et al., 2005). Sentse et al. (2011) found that children high on fearfulness whose parents had separated experienced greater depressive symptoms than children low in fearfulness whose parents had separated. Although the size of the effect was small ($B=0.17$), assessment of fearfulness preceded the event of parental divorce and examination of the association found that fearfulness was not correlated with parental separation, satisfying quality indicators of both temporal precedence and independence. Therefore, this study highlights an avenue to explore for targeted prevention or intervention, whereby children with fearful temperaments are identified for treatment intended to ameliorate the negative effect of family dissolution and reduce risk of depression.

**Child IQ x Parental divorce**

One study (Weaver & Schofield, 2015) examined Grade-4 children’s ($M_{age}=9.32$ years) IQ as a moderator of the relationship between parental divorce and internalizing problems and found that higher IQ scores were protective for the child. Observed IQ scores ranged from 71-145 ($M=107.44, SD=13.84$) and the association between parental divorce and internalizing problems was weaker for those with higher IQ scores (Weaver & Schofield, 2015).

2.6.2 Non-fixed variables

**Socio-economic status x Parental divorce**

Two studies examined socio-economic status (SES) as a moderator of parental divorce on depressive symptoms (Summers et al., 1998; Weaver & Schofield, 2015). Neither found support for moderation. While Weaver and
Schofield’s (2015) study examined SES prior to divorce, Summers et al. (1998) examined SES concurrent with measurement of divorce. SES can change considerably after divorce (Amato, 2005); therefore, ensuring temporal precedence of SES measurement may be important to reduce ambiguity about its role in the relationship of interest.

**Maternal depression x Parental divorce**

One study (Summers et al., 1998) assessed maternal depression and its interaction with parental divorce in predicting offspring depression. Maternal depression was not found to be a significant moderator. The Summers et al. (1998) study measured maternal depression and parental divorce concurrently; therefore, the temporal precedence quality indicator was not met in the assessment of this non-fixed moderator. Furthermore, parental divorce and maternal depression were correlated, thus failing to satisfy the independence quality indicator. Therefore, the role of maternal depression is highly ambiguous and may mediate the relationship of interest (Kraemer et al., 2008). Future assessment of maternal depression ensuring temporal precedence and independence is recommended.

**Maternal sensitivity x Parental divorce**

Weaver and Schofield (2015) sampled 520 families and found that pre-divorce maternal sensitivity buffered the effect of parental divorce on internalizing problems. Maternal sensitivity, assessed via videotaping mother-child interactions, was found to be a significant protective factor, especially for offspring aged between 11 and 15-years. During this time, maternal sensitivity led to fewer internalizing problems and if problems were evident, they decreased more rapidly (Weaver & Schofield, 2015). While this study did not assess gender as a moderator, Kasen et al. (1996) found that in a similar age range (9-18 years), gender moderated the relationship between parental divorce and offspring depression. Therefore, gender...
differences may be an important consideration when examining maternal sensitivity in future research.

**Parent-child relationship x Parental divorce**

Two studies assessed the parent-child relationship as a moderator of parental divorce and depressive symptoms (Summers et al., 1998; Videon, 2002). Videon (2002) sampled a large young adult cohort \( n=5,530 \). Summers et al. (1998) collected a smaller convenience sample \( n=242 \) of young adults aged 13-years at the first wave and 19-years at the second wave. In the Videon (2002) study, participants appraised the relationship with their parent at Time 1 and in the Summers et al. (1998) study, participants reported on the quality of their relationship with each parent at both waves. Neither study found support for moderation.

**Inter-parental conflict x Parental divorce**

One study assessed the frequency of overt inter-parental conflict as a moderator of parental divorce and offspring outcomes (Summers et al., 1998). The findings indicated no evidence for moderation. In this study, conflict was reported by the mother, which may not be an accurate estimate of the offspring’s awareness of conflict (Grych, Seid, & Fincham, 1992). Assessment of inter-parental conflict as reported or perceived by the child might result in varying findings.

**Emotional problems in childhood x Parental divorce**

Chase-Lansdale et al. (1995) assessed parent-reported emotional problems in childhood as a moderator of parental divorce and offspring depressive symptoms in later life. Parental divorce was associated with depressive symptoms in offspring aged 23-years for those who at age 7-years were well-adjusted, compared to those displaying higher levels of emotional problems at age 7-years. Gender was then included in the interaction term; however, there was no evidence of a differential gender effect. Chase-Lansdale et al. (1995) posited that for children with higher
levels of parent-reported emotional problems at age 7-years, parental divorce may have provided an escape from maladaptive environments, resulting in more positive psychological outcomes. Alternatively, children who were reported to be well-adjusted at 7-years may have been negatively impacted by divorce because it disrupted adaptive factors within the environment, such as financial security. Given that child emotional problems were reported by parents, the possibility remains that parents who subsequently separated may not have accurately identified offspring affective states due to the immediacy of their own interpersonal difficulties.

2.6.3 Study quality and limitations

The current review was limited by a number of study characteristics. Firstly, there was considerable variation in measurement of depression and depressive symptoms, partly because all offspring ages were considered eligible for the review and developmental appropriateness of depression measures was taken into account. Nine studies assessed subclinical depressive symptoms with measures such as self-report scales, while five studies examined clinical depression levels (see Table 2.3). Differences in depression criteria and measurement make comparisons between the studies difficult; however, it was considered important to include all age ranges to allow consideration of developmental differences and because of the small number of studies that met the eligibility criteria. Furthermore, as was apparent among the seven studies that assessed interactions of offspring gender x parental divorce, measurement quality of depression appears to be a potential factor in the likelihood of detecting significant findings.

Not all studies were clear about timing of parental divorce. For example, in Chase-Lansdale et al.’s (1995) study, parental divorce occurred sometime between age 7 and 23-years. This wide age range includes many stages of child and
adolescent development and as was apparent from studies in which offspring age was considered, effects of parental divorce may differ depending on developmental stage.

Due to the research question and review criteria, only longitudinal studies were included in the current review. An advantage of examining longitudinal research is that the sequence of familial dissolution and subsequent occurrence of depression can be ascertained. Furthermore, several reviewed studies were able to assess potential moderators of the association between parental divorce and offspring depression, prior to the occurrence of parental divorce, reducing the possibility that the moderator is on the causal pathway to offspring depression. Despite these advantages, low rates of participation and attrition are common concerns for longitudinal studies. These problems were evident in some of the reviewed studies. While 10 of the 14 studies sampled large representative cohorts, the remaining four studies sampled smaller convenience or non-representative samples. The smallest sample (Dunlop & Burns, 1995) consisted of only 57 participants; severely limiting generalizable conclusions. Furthermore, this study lacked transparency regarding the sample size at the final wave of data collection (see Table 2.1), and so the rate of attrition could not be determined. Rates of attrition ranged widely from approximately 3-39% (see Table 2.1) indicating that some studies underwent significant loss of participants across waves; however, consideration should be taken to the number of waves studied. The Oldehinkel et al. (2008) study had the best sample retention (approximately 96%) of the representative cohort studies but only sampled across two waves, while the Rodgers et al. (1997) study sampled across six waves but had a larger attrition rate of approximately 30 per cent. Furthermore, only seven of the 14 studies were transparent regarding the strategies employed to deal with missing data (see Table 2.1), limiting the capacity to assess potential bias in analyses. Of those that did report some form of imputation, only Weaver et al. (2015)
reported employing a technique that would currently be considered best practice (Graham, 2009). One study reported the use of mean imputation as a method for replacing missing data (Chase-Lansdale et al., 1995), a technique known to reduce variance and introduce bias into the data. Overall, samples may have introduced bias into their sample or findings as a result of recruitment and sampling, statistical approaches, or due to high attrition rates, potentially leaving some individuals under-represented. Where information that allowed for assessment of bias was available, limitations have been reported and discussed. However, assessment of bias was also not always possible due to a lack of transparency in papers, which impinged on the authors’ ability to assess and report bias.

Temporal precedence and independence of the moderator and predictor were examined as quality indicators in the current review. The moderator preceded the predictor in all but three of the papers (Summers et al., 1998; Videon, 2002; Weaver & Schofield, 2015). It is possible that in these three studies the examined variables are on the causal pathway to offspring depression. The correlation between moderator and predictor was reported among nine of the interactions tested and two were significant, thus failing to meet the independence quality indicator (see Table 2.2). The remaining interactions were tested without first examining the moderator/predictor relationship; therefore, independence assessment was not possible. Findings where the independence quality indicator are met are considered less ambiguous than those where independence has not been statistically determined (Kraemer et al., 2008). Of all moderation assessments detailed in the current review, only Sentse et al.’s (2011) examination of preadolescent fearful temperament meets all stringent MacArthur criteria (Kraemer et al., 2008).

Only 14 studies met the inclusion criteria and were included in the current review, sometimes leading to the examination of moderators that had only been
examined by one study. Caution should therefore be taken in the conclusions and generalizations that can be drawn from these findings. The small number of studies reviewed also demonstrates that although cross-sectional and longitudinal studies evaluating the effect of family dissolution on offspring is vast, there is a lack of longitudinal research in this area examining moderators. As a result, there remains a scarcity of robust evidence to support prevention and intervention programs targeted at offspring from dissolved families who are most at risk.

2.6.4 Implications

The current review included longitudinal studies that had examined offspring of any age in the hope of gleaning information regarding the developmental trajectory of depressive symptoms following parental divorce or separation. Although four of the reviewed studies (Gilman et al., 2003; Oldehinkel et al., 2008; Rodgers et al., 1997; Summers et al., 1998) examined offspring age as a moderator, the findings do not provide robust evidence pointing to a particular age or developmental stage as being a risk or protective factor for depression in the context of parental divorce. However, collation of the findings indicate that younger age may be associated with increased risk. Means derived from the Rodgers et al. (1997) study point to higher depression scores in offspring who experienced parental divorce at a younger age (0-16 years), compared to those at an older age (17-33 years) of comparable offspring. Furthermore, regression statistics from the Gilman et al. (2003) study indicate that onset of depression at 14-years or younger significantly increased the lifetime risk for an MDE associated with parental divorce before age 7-years. However, no additional risk appeared to be associated with onset of offspring depression at age 15-20 years or 21-years and above. It is possible that these preliminary results regarding age can be explained by the increased independence from family that is associated with older age (Bukatko, 2008). While the findings
pertaining to offspring age suggest that youth is associated with increased risk, it is recommended that further longitudinal research is conducted to determine if the depressive effects of parental separation in offspring change over time or present as risk factors for future depressive symptoms. Trajectory analyses could shed light on developmental processes and moderators within this context.

Eight papers in this review reported significant two or three-way interactions involving seven fixed variables and two non-fixed, potentially modifiable variables. Of the fixed moderators, findings related to versions of the 5-HTTLPR and AP-2β genotypes, child IQ and fearful temperament suggest the importance of understanding differential inherited risk. Possible candidates for this line of investigation are too many to mention, but the four reviewed studies that investigated offspring genetic or phenotypic moderators have only explored a small number of potential factors. Modifiable moderators are particularly important to investigate in order to identify targets for interventions. Of the non-fixed variables assessed in the reviewed studies, two were found to moderate the association between parental divorce and depressive symptoms. Maternal sensitivity is an important non-fixed variable to consider in future studies assessing moderation. Recent research demonstrates that maternal sensitivity can be improved by treatment targeting the mother-child interaction (Pillhofer et al., 2015; Thomas & Zimmer-Gembeck, 2011). Future prevention and intervention strategies for offspring from separated families may consider the inclusion of mother-child interaction therapy to benefit from the significant buffering effects of maternal sensitivity on offspring depression.

Three studies found that interactions were significant when a third factor was considered (Nilsson et al., 2009; Oldehinkel et al., 2008; Sjoberg et al., 2006). This indicates that multiplicative relationships including more than one variable may further identify subgroups at risk of depression or depressive symptoms following
family dissolution. The possibility that several variables need to be considered is in line with suggestions that a combination of developmental, contextual, and intrapersonal variables increase vulnerability to depression following adverse life events (Chapman et al., 2004).

All but one reviewed paper (Weaver & Schofield, 2015) utilized a variable-centred approach to longitudinal analysis. Variable-centred approaches are well placed to determine the relative contribution that parental divorce makes to the outcome of offspring depressive symptoms (Laursen & Hoff, 2006). However, this approach assumes that the population is homogeneous with respect to the impact of parental divorce on offspring depressive symptoms. The current review aimed to further understand the heterogeneity among individuals who had experienced parental divorce. Person-centred analytic models such as latent profile, class and cluster analyses assume heterogeneity among the population (Laursen & Hoff, 2006). This approach to longitudinal analysis would be useful in future research to further understand individual differences in the relationship between parental divorce and offspring depressive symptoms.

2.6.5 Conclusions

The current systematic literature review is the first to assess interaction effects of the relationship between parental divorce/separation and offspring depression/depressive symptoms. The criteria of the systematic review led to the inclusion of studies that were longitudinal and ecologically authentic. This examination of longitudinal research is critical in understanding variation in heterogeneous populations and informing targeted policy, prevention and interventions.

Both fixed and non-fixed variables were found to be significant moderators of the relationship between parental divorce/separation and offspring
depression/depressive symptoms, namely, offspring gender, offspring age at depression onset, genotype AP-2β, preadolescent fearful temperament, maternal sensitivity, offspring emotional problems in childhood and child IQ. Some variables, however, were only shown to moderate the relationship of interest when a third interaction term was added, i.e. offspring age at assessment and genotype 5-HTTLPR.

The findings from the current review demonstrate that investigations of moderation are in their infancy and further research is needed to understand the varying trajectories of mental health outcomes, specifically depression and depressive symptoms, of children from divorced families. Future research may benefit from utilizing person-centred approaches to longitudinal analysis to assess individual differences. Within these approaches multiple variables, rather than single interaction terms, may be included in analyses and individuals can be categorized by patterns of association among variables that are similar within groups and different between groups (Laursen & Hoff, 2006). This approach might lead to further understanding of individual differences in the relationship between parental divorce and offspring depressive symptoms.
CHAPTER THREE Overview of Empirical Analyses

3.1 Chapter Overview

The present chapter outlines the overarching aims, research questions, and methods of the two empirical studies that will be included in the thesis, both of which were informed by the findings of the systematic literature review presented in Chapter Two. The focus in this chapter is to provide a general overview of the analyses and of the Australian Temperament Project (ATP) from which data were drawn for the analyses. Specific details of the aims, research questions and methods of each of the empirical studies are presented in subsequent chapters in the form of the manuscripts that have been submitted for publication.

3.2 Aims and Research Questions

The empirical studies to follow (presented in Chapters Four and Five) aim to extend on previous research, as synthesised in the systematic literature review presented in Chapter Two, by examining factors that explain variation in depressive symptom outcomes among individuals from dissolved families. The aims and research questions of the studies are described below.

3.2.1 Empirical Analysis One

The use of a person-centred approach to longitudinal analysis, Latent Class Analysis, is employed in Chapter Four. Person-centred approaches, unlike traditional variable-centred approaches, allow for assessment of individual depressive risk in the context of family dissolution. Using Latent Class Analysis, the study presented in Chapter Four examines a combination of risk and protective factors assessed during adolescence. Differential risk of depression in emerging adulthood for each emerging latent class is then assessed.
Adolescent environmental, intrapersonal and interpersonal risk and protective factors were chosen for inclusion into the Latent Class model based on their associations with family dissolution and depression. This analytic approach assumes heterogeneity among individuals who share a common life event and clarifies patterns across multiple psychosocial risk and protective factors.

Using this approach, the purpose of the current study was twofold: (1) to identify underlying classes of individuals from dissolved families, using multiple demographic, inter- and intra-personal depressive risk and protective factors examined during adolescence (13-14, 15-16, and 17-18 years), and; (2) to estimate class differences on depressive symptoms in emerging adulthood (19-20 years). In the absence of prior person-centred analyses of adolescents from dissolved families, the nature of this study was exploratory.

Identifying different trajectories of adjustment, or maladjustment, as characterised by increased depressive symptoms, is considered to be of critical importance for clinicians. Assessment of a combination of risk and protective factors, instead of any one factor alone is more closely aligned with the task faced by clinicians in practice. A holistic formulation of depressive risk may assist in differentiating between depression outcomes for individuals from divorced families.

3.2.2 Empirical Analysis Two

In Chapter Five, a longitudinal investigation of depression risk in the period before and after family dissolution is conducted using a mixed models approach to data analysis. With access to multiple measurements of parent- and participant-reported family structure and internalising/depressive symptoms across the developmental periods of childhood (age 3-4, 5-6, 7-8, 9-10, 11-12 years), adolescence (age 13-14, 15-16, and 17-18 years) and emerging adulthood (19-20 years), mixed modelling was considered to be the most appropriate way to model
depressive risk before and after the occurrence of family dissolution. This approach allowed for assessment of main effects in addition to moderation effects. As informed by the systematic review of the literature, presented in Chapter Two, an examination of age at family dissolution and gender as potential moderators was conducted.

The approach in this analysis allowed for prospective assessment of the interval between the event of divorce and depression risk, while accounting for the possibility that depressive risk may either precede and/or follow the experience of divorce. Interactions between age at family dissolution and gender and their impact on internalising/depressive symptoms were then tested.

This study addressed gaps in prior longitudinal studies that were limited by the length of the longitudinal investigation or failed to account for temporal intervals between parental divorce and depressive risk. The aim was to provide clinically relevant information regarding when and for whom (males or females, older or younger children) family dissolution increased risk for depressive symptoms.

3.4 Methods

Empirical studies One and Two, presented in Chapter Four and Five, used longitudinal, prospectively collected data from Australian families participating in the ATP. While the methods of each of the empirical studies are presented in their respective chapters, further details regarding the ATP and the study’s overall methodology are presented here.

3.4.1 Participants

The ATP is a large scale ongoing Australian longitudinal study following the psychosocial development of a representative community sample. The study began recruitment in both urban and rural areas in 1983, inviting parents with infants aged
between 4-8 months old to participate. Targeted recruitment focused on 67 Local Government Authority areas (LGAs), 20 urban and 47 rural areas. These were selected using Australian Bureau of Statistics demographic data that identified locales that would provide for a representative sample of the population in the south-east Australian state of Victoria at the time. Generation One (G1) families attending Maternal and Child Health Centres within the selected LGAs in a two-week period (22nd April to 6th May 1983) were handed an ATP questionnaire for completion. A total of 2,443 families returned the questionnaire in a provided pre-paid envelope, resulting in the final sample. Fifty-two percent of Generation Two (G2) infants at the commencement of the study were male, and 48% were female. In addition to parent-reported questionnaires, Infant Welfare Sisters working at the Maternal and Child Health Centres at the time also completed a brief questionnaire enquiring about relevant medical information such as the child’s birth history, weight, and feeding method (breast or bottle). In addition, a rating of each child’s temperament, and a perception of the current adjustment of the mother-baby pair was provided by the Infant Welfare Sisters. Infant Welfare Sisters identified G1 parents who had difficulties completing the questionnaires because of reading or English language problems.

3.4.2 Procedure

Data were collected approximately every two years using a mail survey methodology in which questionnaires and a reply paid envelope were provided. G1 parents provided survey data from when participants were 4-8 months old and as the participant children grew older (age 11-12 onwards), both study parents and participant children provided age-appropriate information on temperament, behavioural adjustment, sociodemographic indices, and health.
After sending the ATP questionnaires to each participant’s postal address, one postal reminder letter was sent, followed by a second mail-out of questionnaires to participants who did not respond. A final telephone follow up reminder was conducted if no response was received from these letters. During telephone follow up calls, participants were encouraged to complete and return their questionnaires. Participants provided informed consent under study protocols approved by the Human Research Ethics Committees of the University of Melbourne and the Australian Institute of Family Studies. Domains measured in the questionnaires during waves across participant’s childhood include temperament, behavioural and emotional problems, physical health, family stress, school adjustment, reading skills, and social competence. In adolescence, a broader range of topics were included to assess personality, peer relationships, parenting, and civic mindedness. In emerging and young adulthood, occupational and vocational pursuits, spirituality/religion, police involvement and driving experiences were also included in the questionnaires. Table 3.1 presents the survey respondents at each wave of data collection.
Table 3.1. *ATP survey respondent at each wave of data collection.*

<table>
<thead>
<tr>
<th>Wave. Year</th>
<th>G2 participant age</th>
<th>Respondent(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 1983</td>
<td>4-8 months</td>
<td>Parent, maternal and child health nurse</td>
</tr>
<tr>
<td>2. 1984</td>
<td>1-2 years</td>
<td>Parent</td>
</tr>
<tr>
<td>3. 1985</td>
<td>2-3 years</td>
<td>Parent</td>
</tr>
<tr>
<td>4. 1986</td>
<td>3-4 years</td>
<td>Parent</td>
</tr>
<tr>
<td>5. 1988</td>
<td>5-6 years</td>
<td>Parent, primary school teacher</td>
</tr>
<tr>
<td>6. 1990</td>
<td>7-8 years</td>
<td>Parent, primary school teacher</td>
</tr>
<tr>
<td>7. 1992</td>
<td>9-10 years</td>
<td>Parent</td>
</tr>
<tr>
<td>8. 1994</td>
<td>11-12 years</td>
<td>Parent, primary school teacher, participant</td>
</tr>
<tr>
<td>9. 1995</td>
<td>12-13 years</td>
<td>Parent, participant</td>
</tr>
<tr>
<td>10. 1996</td>
<td>13-14 years</td>
<td>Parent, participant</td>
</tr>
<tr>
<td>11. 1998</td>
<td>15-16 years</td>
<td>Parent, participant</td>
</tr>
<tr>
<td>12. 2000</td>
<td>17-18 years</td>
<td>Parent, participant</td>
</tr>
<tr>
<td>13. 2002</td>
<td>19-20 years</td>
<td>Parent, participant</td>
</tr>
<tr>
<td>14. 2006</td>
<td>23-24 years</td>
<td>Parent, participant</td>
</tr>
<tr>
<td>15. 2010</td>
<td>27-28 years</td>
<td>Parent, participant</td>
</tr>
<tr>
<td>16. 2015</td>
<td>32-33 years</td>
<td>Parent, participant</td>
</tr>
</tbody>
</table>
As is common in longitudinal studies, a proportion of original participants of the ATP were lost to attrition. Attrition has occurred on average at a rate of less than 1% per year. Currently, 76% of the original G2 cohort remains registered with the study. Table 3.2 indicates that, compared with the retained sample at wave 13, when G2 participants were aged 19-20 years, the original cohort of families contained a higher proportion from lower socio-economic background and a higher proportion with a parent born outside of Australia. The study sample is still considered to be generally representative of families from a wide range of backgrounds and circumstances. Table 3.3 presents the participants living circumstances from age 9-10 to 19-20 years. Most participants in the study were living with both biological parents at each wave.
Table 3.2. *Comparison of retained sample and original cohort on characteristics at recruitment in 1983 (Wave 1).*

<table>
<thead>
<tr>
<th>Domain</th>
<th>Original cohort</th>
<th>Retained sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4-8 months</td>
<td>19-20 years</td>
</tr>
<tr>
<td></td>
<td>(Wave 1)</td>
<td>(Wave 13)</td>
</tr>
<tr>
<td></td>
<td>N=2,443</td>
<td>n=1,958</td>
</tr>
<tr>
<td>SES tertiles at birth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highest</td>
<td>31.5%</td>
<td>33.6%</td>
</tr>
<tr>
<td>Medium</td>
<td>34.1%</td>
<td>34.8%</td>
</tr>
<tr>
<td>Lowest</td>
<td>34.3%</td>
<td>31.5%</td>
</tr>
<tr>
<td>Mother’s country of birth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australia</td>
<td>79.6%</td>
<td>81.9%</td>
</tr>
<tr>
<td>UK</td>
<td>6.0%</td>
<td>5.6%</td>
</tr>
<tr>
<td>Other</td>
<td>14.0%</td>
<td>12.2%</td>
</tr>
<tr>
<td>Father’s country of birth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australia</td>
<td>71.8%</td>
<td>74.3</td>
</tr>
<tr>
<td>UK</td>
<td>7.1%</td>
<td>6.6</td>
</tr>
<tr>
<td>Other</td>
<td>19.0%</td>
<td>17.3</td>
</tr>
<tr>
<td>Infant behavior problems Mean (SD)</td>
<td>1.73 (.69)</td>
<td>1.72 (.68)</td>
</tr>
<tr>
<td>n=cases of complete data</td>
<td>n=2,434</td>
<td>n=1,951</td>
</tr>
<tr>
<td>Infant easy-difficult temperament Mean (SD)</td>
<td>2.46 (.63)</td>
<td>2.45 (.63)</td>
</tr>
<tr>
<td>n=cases of complete data</td>
<td>n=2,443</td>
<td>n=1,958</td>
</tr>
</tbody>
</table>

**Note.** Percentages reported for categorical data may not equal 100% as a result of missing data on variable.
Table 3.3. Participant’s living arrangements at age 9-10 years, through to 19-20 years old.

<table>
<thead>
<tr>
<th>Age</th>
<th>9-10 years</th>
<th>11-12 years</th>
<th>13-14 years</th>
<th>15-16 years</th>
<th>17-18 years</th>
<th>19-20 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both biological parents</td>
<td>1,319</td>
<td>1,226</td>
<td>1,123</td>
<td>1,073</td>
<td>941</td>
<td>610</td>
</tr>
<tr>
<td>Mother</td>
<td>110</td>
<td>123</td>
<td>130</td>
<td>145</td>
<td>159</td>
<td>110</td>
</tr>
<tr>
<td>Father</td>
<td>5</td>
<td>8</td>
<td>16</td>
<td>20</td>
<td>27</td>
<td>27</td>
</tr>
<tr>
<td>Biological parent and step-parent</td>
<td>61</td>
<td>62</td>
<td>73</td>
<td>74</td>
<td>70</td>
<td>38</td>
</tr>
<tr>
<td>Other living arrangement</td>
<td>12</td>
<td>13</td>
<td>16</td>
<td>27</td>
<td>77</td>
<td>291</td>
</tr>
</tbody>
</table>

*Note:* Living arrangements are presented from participant’s age 9-10 years onwards as living data were not available in earlier waves.
3.4.3 Materials

The two empirical studies, presented in Chapter Four and Five utilise varying measures that were collected over the course of the ATP to assess for variation in depression outcomes among participants who experienced family dissolution. The full details of the variables included in each empirical study are presented in their respective chapters. Scale items are presented in supplementary material (see Appendix D). Chapter Four and Five also describe in detail the method through which participants who had experienced parental separation or divorce were identified.

3.4.4 Analytic strategy for Empirical Analysis One

Latent Class Analysis (LCA; Asparouhov & Muthen, 2014), a type of mixture model, was the chosen statistical method for the first empirical analysis presented in this thesis. LCA allows for the modelling of possible distinct categories of individuals within a sample, and such categorisation is represented by latent variables (Collins & Lanza, 2010). The latent variable/s, or subgroup categories, are not observed or measured directly, rather, they are measured indirectly by observed variables. Observed variables within an LCA can be continuous or categorical, and are modelled by their means and proportions, respectively. Observed variables within LCA are referred to as indicators.

Like factor analysis, LCA models hypothesise that underlying latent variables exist within the data that can be measured by observed variables. However, unlike factor analysis, the nature of the latent variable is categorical, defining subgroups within the sample. Categorical latent variables are those in which, “qualitative differences exist between groups of people or objects” (Ruscio & Ruscio, 2008). Categorical latent variables have a multinomial distribution. Contrastingly, the latent variables revealed by factor analysis are continuous and normally distributed (Collins
& Lanza, 2010). Furthermore, LCA is considered to be a person-oriented approach to statistical analysis (Laursen & Hoff, 2006). This is distinct from variable-centred approaches, such as traditional factor analysis. In factor analysis, the factor structure identified within the data is assumed to hold for all individuals. LCA, on the other hand, emphasises the individual, and patterns of individual characteristics is the focus of enquiry. Such a person-oriented approach assumes heterogeneity among the population (Laursen & Hoff, 2006) and reveals subtypes of individuals exhibiting similar patterns of characteristics.

The LCA presented in Chapter Four was performed in Mplus version 7.2 (Muthén & Muthén, 2012) a statistical program widely used for mixture modelling (e.g. Nylund, Asparouhov, & Muthén, 2007). Observed psychosocial indicators assessed at three time points during adolescence, age 13-14, 15-16 and 17-18 years were included in the analysis. To identify latent classes of adolescents from dissolved families, both categorical and continuous variables were modelled. The probability of an adolescent belonging to a specific class and their categorisation in that class was calculated as a function of their scores on these variables. Means of the continuous variables, and probabilities of the categorical variables, represent the estimate of the association between the indicator and the latent classes.

Mplus provides maximum likelihood estimation for all models, including mixture models. Maximum likelihood estimation accounts for non-normality of observed continuous variables (Gould, Pitblado, & Sribney, 2006). As such, it was not necessary to test the distribution of the continuous variables included in the LCA for skew and kurtosis with traditional tests of non-normality, such as the Kolmogorov-Smirnov test (Lilliefors, 1967).

Due to the longitudinal nature of the data, missing data were present. Of all the variables included in the analysis, the most missing data occurred at the distal
depressive symptom outcome measured at participant age 19-20 years (36.7% missing). Little’s Missing Completely at Random (MCAR) test was conducted in order to determine the nature of the missing data among observed indicators. A non-significant Little’s MCAR test, indicates the data are MCAR and as such the missingness is unrelated to the observed data (Enders, 2006), yielding unbiased parameter estimates (Graham, 2009). However, a significant Little’s MCAR test ($p<0.05$) indicated that the data were not MCAR suggesting that missingness was related to observed data. Given that indicators included in the LCA were correlated (see Table 4.2 presented in Chapter Four), we assume the data were Missing at Random (MAR). Therefore, Full Information Maximum Likelihood (FIML; Graham, 2009) was used within Mplus, as this approach produces unbiased parameter estimates and standard errors when data are MAR (Enders, 2010). Compared to alternative methods of missing data replacement, such as listwise deletion and mean substitution (Collins, Schafer, & Kam, 2001), FIML reduces bias by using all available information to compute the most likely parameter estimates for missing data points (Graham, 2009).

Within LCA, a number of models are estimated and model fit is examined using established criteria. The degree to which a model fits the data is examined by a number of fit statistics, including the Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC; Akaike, 1987; Schwarz, 1978), the Vuong-Lo-Mendell-Rubin (VLMR) Likelihood Ratio Test, and Lo-Mendell-Rubin (LMR) Adjusted Likelihood Ratio Test and entropy values (Duncan, Duncan & Strycker, 2006).

The AIC and BIC are likelihood criteria that allow for an assessment of model fit and provide a means for selecting the best fitting latent class model. Lower AIC and BIC values are preferred as they indicate that a model is considered to be
“closer to the truth” (Nylund et al., 2007). AIC and BIC penalise models that add many model parameters, demonstrating robustness against attempts to increase the fit of the data (Nylund et al., 2007).

The Vuong-Lo-Mendell-Rubin (VLMR) Likelihood Ratio Test, and Lo-Mendell-Rubin (LMR) Adjusted Likelihood Ratio Test compare the model under discrimination, i.e., the $k$ class model, where $k$ is the number of classes in the latent class model, to class models that differ by one class. The performance of the Likelihood Ratio Tests is examined by looking at the rate at which the indexes are able to discriminate between the $k – 1$ versus the $k$ class models. Significant Likelihood Ratio Tests indicate that the model under examination is statistically better fitting than the model with $k – 1$ class (Nylund et al., 2007).

Entropy values were also used as a measure of classification accuracy (Duncan et al., 2006). As entropy values approach 1, the model’s ability to clearly delineate participants between latent classes is indicated (Celeux & Soromenho, 1996). Entropy values of 0.80 and above are considered to demonstrate that participants have been classified to their most likely class membership (Celeux & Soromenho, 1996).

Once the optimal latent class model was identified based on assessment of the model fit statistics described above, parameters for each of the class indicator variables were fixed, while depression scores were estimated freely across the different classes. This allowed for the test of mean differences in depression scores across classes. Significant differences between classes on depression scores were based on non-overlapping 95% confidence intervals.

3.4.5 Analytic strategy for Empirical Analysis Two

A linear mixed model was conducted in the second empirical analysis to examine the influence of timing of family dissolution on repeated measures
depression symptoms. Four measures were used to assess internalizing and depressive symptoms across nine waves of data collection within the ATP. As such, the nature of the data was clustered (i.e., multiple time points nested within individuals). Mixed models allow for the modelling of dependent variables that are measured repeatedly over multiple time points. This approach to statistical analysis accounts for the hierarchical structure of the data, where there are participants at the top level and repeated measurements within participants at the lower level. Correlation between repeated measurements within participants is expected and modelled within the analysis.

To conduct the mixed models analysis, Stata 14 (StataCorp, 2015) was used. As stated earlier, due to the longitudinal nature of the data, missing data on the outcome of interest (internalising/depressive symptoms) were present. However, within Stata 14, maximum likelihood estimation utilised available data to provide estimates of missing values (Acock, 2008). Thus, complete data on the outcome variable was not required. This approach is considered best practice for dealing with missing data (Graham, 2009).

The distribution of internalising/depressive symptoms was examined. Internalising and depressive symptom scores were positively skewed, indicating that most participants scored in the lower range of symptoms. To account for non-normality within the data, the mixed models analyses were bootstrapped (1,000 repetitions) and a robust estimator was used (Singh & Xie, 2008; White, 1980). A bootstrap estimation of the standard errors that drew 1,000 random samples with replacement was used in the second empirical analysis conducted in Chapter Five. The mixed model was then examined for each of the 1,000 bootstrapped samples. Stata 14 examines the distribution of each parameter across the 1,000 results and uses the variance of that distribution to estimate a standard error (Acock, 2008). To
account for non-normality within the data, the robust command within Stata 14 was used to produce standard errors that do not assume normality (Acock, 2008).
CHAPTER FOUR  Adolescent Risk Profiles in Divorced Families

4.1 Chapter Overview

This chapter presents the first empirical study of this thesis, and utilises Latent Class Analysis, a person-centred analytic strategy, to examine adolescent risk and protective factors that cluster together to demonstrate differences in depressive symptoms in emerging adulthood.

Adolescence, generally thought to occur between the ages of 13-18 years, is considered to be an important developmental period in which to examine risk and protective factors for depression. Adolescence is associated with increased risk for depression (Ge, Natsuaki, & Conger, 2006; Sawyer et al., 2002) with between 20–50% of adolescents reporting symptoms of depression (e.g. Offord et al., 1987; Reinherz et al., 1989). This elevated risk of mental health problems is thought to be a byproduct of normative challenges and developmental tasks that individuals face during this period. Developmental tasks include the formation of autonomy, identity and self-concept (Burt, 2002). While developmental tasks can occur simultaneously, at different stages throughout adolescence, certain developmental tasks become more significant than others (Ingersoll, 2002). In early adolescence (13-14 years), establishing peer relationships is particularly important as adolescents face increased social demands. Middle adolescence (15-16 years) is a time marked by establishing independence from parents and can be characterised by some delinquent behaviour. Finally, during late adolescence (17-18 years) the formation of a personal identity while establishing educational and vocational goals occurs (Ingersoll, 2002).

Successful completion of the tasks across adolescence fosters healthy psychological development (Cicchetti & Toth, 1998); however, as stated in Chapter One, the experience of a number of challenges and changes concentrated within a short time...
can have adverse effects on mental health (Pearlin et al., 2005). Additional non-normative life stressors experienced during adolescence, such as family dissolution, may therefore serve to exacerbate the already elevated risk for depression during this period.

Developmental psychopathologists, Cicchetti and Toth (1998), contend that successful completion of the tasks associated with adolescence fosters a healthy psychological system in the next developmental stage of the life course. Therefore, an individual’s successful transition through the significant emotional, moral, cognitive and physical changes typical of adolescence is thought to foster positive mental health and development in emerging adulthood (Masten & Tellegen, 2012). Difficulty transitioning through adolescence, as characterised by depressive symptoms during this period may consequently increase risk for future psychopathology. Prospective longitudinal research demonstrates that adolescent depression is associated with later depression, as well as difficulties in functioning across a number psychosocial domains including psychological (i.e. anxiety, substance dependence, suicidality), vocational (i.e. educational underachievement, unemployment), and interpersonal domains (i.e. early parenthood; Fergusson & Woodward, 2002). Therefore, an interactional assessment of risk and protective factors, conducted with Latent Class Analysis, during the adolescent period is not only an important task for establishing a better understanding of at-risk adolescents and developing effective interventions, but it can also inform preventative measures for potential sequelae in emerging adulthood.

The study presented in this chapter has been submitted to an academic journal and is currently under review (see Appendix G for evidence of submission). The journal has specific guidelines for structure, formatting and referencing. This paper was prepared in accordance with those guidelines.
4.2 Abstract

When parents separate, on average, children are at greater risk for concurrent and subsequent depression; however, averaged outcomes mask substantial variation. This study aimed to identify heterogeneous profiles of adolescents from separated families to explain differential risk of depression in emerging adulthood. The sample comprised a subset of participants with separated parents \((n=449)\) from a longitudinal Australian cohort study \((N=2,443)\). Three groups emerged from Latent Class Analysis performed on 16 self- and parent-reported indicators of demographic, interpersonal and intrapersonal functioning assessed across adolescence (13-14, 15-16 and 17-18 years). These were Adjusted \((n=253)\); Moderate Risk \((n=156)\); and High Risk \((n=40)\). Differences between classes on emerging adult depressive symptoms were then examined. Compared to the Adjusted class, the Moderate Risk, but not the High Risk class had significantly elevated depressive symptomatology in emerging adulthood \((d=4.77)\). Findings are relevant for targeted prevention strategies aimed at young people from dissolved families.

*Keywords:* Family Dissolution; Parental Separation; Adolescence; Emerging Adulthood; Depression; Antisocial Behaviour
4.3 Introduction

Family dissolution, caused by parental separation or divorce, has been consistently associated with negative outcomes for young people (see meta-analyses Amato, 2001; Amato & Keith, 1991b). Common among findings is an increased risk for depressive symptoms and disorders (Culpin et al., 2013; Oldehinkel et al., 2008). However, it is also true that a substantial proportion of individuals from dissolved families do not experience elevated depressive symptoms, or symptom increases are transient or modest in effect (Kessler et al., 2010; Ruschena et al., 2005). Such variation in depressive symptom outcomes following family dissolution is in line with the developmental principle of multifinality (Cicchetti & Rogosch, 1996), whereby the effect of a distinct event varies among individuals. In light of differences to individual patterns of adaptation or maladaptation to divorce, Amato (2010) called for researchers to investigate heterogeneity in outcomes of young people from dissolved families. In order to achieve this aim, longitudinal data that allows for delineation of various patterns of risk and protective factors over time is required.

Few studies have attempted to identify the factors that account for individual differences in depressive risk within young people from dissolved families (Amato, 2010; Di Manno et al., 2015). In particular, no studies of this population have explored the manner in which individual and contextual risk factors cluster during adolescence, and whether such clusters form a substratum for subsequent depressive risk. The adolescent period is associated with a normative elevated risk for depressive symptoms (Ge et al., 2006; Sawyer et al., 2002). Additional non-normative life stressors experienced during adolescence, such as family dissolution, may therefore serve to exacerbate the already elevated risk for depression during this period.
Investigating multiple indicators of risk simultaneously is in line with evidence that demographic, interpersonal and intrapersonal variables combine in complex ways to increase vulnerability to depressive disorders following adverse life events (Chapman et al., 2004). In contrast to variable-centred analytic approaches, in which those from intact and divorced families are compared in between-group analyses, attention to the specific subgroup of young people from dissolved families is essential for examining multifinality in depressive symptom outcomes.

4.3.1 Demographic factors

A key question in the investigation of heterogeneity among children from divorced families is whether vulnerability to depressive symptoms differs depending on the child’s age at the time of parental separation. The impact of the timing of divorce is of interest to couples who are considering separation, in addition to clinicians for whom nuanced knowledge of risk factors and outcomes assists in formulating timely and appropriate therapeutic responses. To date, most studies that investigate the impact of timing assess behavioral and psychosocial outcomes in the period following divorce. In analyses where short- to medium-term examinations have been conducted, depressive symptoms appear to persist up to two years following parental separation (Amato & Anthony, 2014; Gobbi et al., 2015; Hetherington & Stanley-Hagen, 1999; Kelly, 2003). Those investigating the long term impact of parental divorce find that compared to those from intact families, parental divorce before 18 years is associated with early onset depressive disorders (Gilman et al., 2003), episodic depressive symptoms in emerging adulthood (Pelkonen, Marttunen, Kaprio, Huurre, & Aro), persistent lifetime depression risk (Gilman et al., 2003; Patton et al., 2014; Pelkonen et al.), and increased risk for suicide attempts in young adults (Bruffaerts et al., 2010; Donald et al., 2006; Lizardi et al., 2009). Longitudinal studies that have examined the impact of the pre- as well
as post-divorce period indicate that risk for depression may also exist for some children prior to the family dissolution event (Amato & Anthony, 2014; Strohschein, 2005). Investigating the possible differential depressive risk of age in moderation analyses presents non-significant results (Rodgers et al., 1997; Summers et al., 1998). Findings indicate possible, but not yet adequately explored, variation in depressive risk related to the timing of family dissolution (Chang, Chung, Keyes, Jung, & Kim, 2015).

Low socio-economic status (SES) is associated with both depression and family dissolution. A decline in SES is common in the wake of parental separation where there is a division of assets or a shift from dual to single income households (see review Amato, 2005). For children of divorced parents, family SES change is marked by greater risk for low levels of education, occupational status, and income (Amato, 2000), all known risk factors for depression (see meta-analysis Lorant et al., 2003). Therefore, for adolescents from dissolved families, demographic characteristics are especially important to consider when examining risk profiles associated with subsequent depressive symptoms.

4.3.2 Interpersonal factors

Family dissolution has been linked to a reduction in parental monitoring and quality of the parent-adolescent relationship, with such relationship disruption triggering risk for psychopathology and behavior problems (Borawski, Ievers-Landis, Lovegreen, & Trapl, 2003; Sander & McCarty, 2005). Some adolescents increase reliance on peer and other social relationships outside the immediate family during adverse life events, and such associations may be either protective (e.g., emotionally supportive) or harmful (e.g., antisocial) with respect to depressive symptoms (Costello et al., 2008; Fergusson, Wanner, Vitaro, Horwood, & Swain-Campbell, 2003; Myklestad, Røysamb, & Tambs, 2012). Young people from
divorced families have been shown to perceive a greater number of social supports beyond the family than those from intact families (Riggio, 2004); however, accessing support can prove difficult when there may be multiple residential moves, which are associated with peer rejection and social withdrawal (Oishi & Schimmack, 2010). Characterization of risk patterns in adolescent parental and peer connections is therefore specifically relevant to the context of family dissolution.

4.3.3 Intrapersonal factors

Individual attributes that confer differential risk for depressive symptoms include reactive, fearful or shy temperaments (Klein, Dougherty, Laptook, & Olino, 2008), and attention and behavioral problems (see meta-analysis Loth, Drabick, Leibenluft, & Hulvershorn, 2014). Temperament characterized by social evasiveness, poor regulation and avoidance of problem solving can reduce the capacity to elicit appropriate support in the context of parental separation. Similarly, young people with attention problems, who have difficulties with behavioral regulation, may particularly struggle with changed living and social circumstances (Compas, Connor-Smith, Saltzman, Thomsen, & Wadsworth, 2001). In contrast, increased social skills are associated with increased wellbeing (Leme, Del Prette, & Coimbra, 2015), reduced risk of depression (see review Segrin, 2000), and more cohesive social networks (Werner & Smith, 2001); thereby potentially buffering the negative effects of family disruption.

The demographic, interpersonal and intrapersonal factors that are relevant to the contexts of adolescents from dissolved families, and that drive differential susceptibility to depressive symptoms, are interdependent. It is therefore apt to adopt a person-centered, Latent Class Analysis (LCA) to identify subgroups of this population that share similar characteristics. This analytic approach assumes heterogeneity among individuals who share a common life event and clarifies
patterns across multiple psychosocial risk and protective factors. Using this approach, the purpose of the current study was twofold: (1) to identify underlying classes of individuals from dissolved families, using multiple demographic, inter- and intra-personal depressive risk and protective factors examined during adolescence (13-14, 15-16, and 17-18 years), and; (2) to estimate class differences on depressive symptoms in emerging adulthood (19-20 years). In the absence of prior person-centered analyses of adolescents from dissolved families, the nature of this study was exploratory.

4.4 Methods

4.4.1 Participants

Participants were drawn from the Australian Temperament Project (ATP), an ongoing longitudinal study from Victoria, Australia that has followed the development of a representative community sample of 2,443 children from infancy to adulthood. Participants provided informed consent under study protocols approved by the Human Research Ethics Committees of the University of Melbourne and the Australian Institute of Family Studies. For further details on sampling see Prior, Sanson, Smart, and Oberklaid (2000). Study attrition details are provided in supplementary material (see Appendix E).

Data used in the present study came from participants at four time points when they were ages 13-14, 15-16, 17-18 and 19-20 years. Participants were included in the analytic sample if parents had separated or divorced at any age between 0-18 years. A final sample size of 449 resulted (Males=49.7%; Females=50.3%).
4.4.2 Measures

*Family separation/divorce*

To identify those who had experienced family dissolution a number of parent- and participant-reported items collected over the course of the study were examined. It is acknowledged that while children may undergo a number of family structure changes during their lifetime, in the present study, the initial separation of a child’s parents was of interest. Therefore, family dissolution was deemed to have occurred at a time point if 1) there was parent-reported change in marital status from one wave to the next (e.g. from “married” in wave four to “separated” in wave five) or 2) the participant’s parent had endorsed separation or divorce as a life event (adapted from the Life Events Questionnaire, Coddington, 1972; Holmes & Rahe, 1967) that had occurred in the 12 months prior to survey completion. Parent-reported marital status and/or life events data were corroborated where possible by a study-devised retrospective family dissolution item included in both the parent and participant surveys when participants were aged 17-18 years. Examination of each of these variables in the identification of those who had experienced parental separation allowed for differentiation between age at parental separation. 84 young people had experienced parental divorce during pre-school (0-4 years; 19.3%), the majority during primary school (5-11 years; n=191; 43.8%) and 161 during secondary school (12-18 years; 36.9%).

*Latent class indicators*

In order to comprehensively observe the adolescent’s context, data were obtained from both parent- and adolescent-reported surveys at 13-14 years (early adolescence), 15-16 years (mid-adolescence) and 17-18 years (late adolescence). Sixteen repeated measures indicators were chosen based on their association with depressive symptom risk and resilience in the context of parental separation or divorce. A full summary of measures is presented in Table 4.1.
Demographic indicators

Demographic indicators were gender, SES risk (none, temporary, or persistent) and age at parental separation (pre-school 0-4 years, primary school 5-11 years, and secondary school 12-18 years).

Interpersonal indicators

The adolescent’s interpersonal environment was indicated by parental warmth and monitoring, presence or absence of an adult mentor, quality of peer attachment and deviant peer affiliations.

Intrapersonal indicators

Intrapersonal indicators were examined with the temperament factors of negative reactivity, shyness and mother’s rating of child difficulty, adolescent anxiety, conduct problems, socialised aggression, attention problems and social skills.

Emerging adulthood outcome variable

Depressive symptoms were assessed at 19-20 years with the 7-item self-report depression subscale of the 21-item Depression, Anxiety and Stress Scale (DASS-21; Lovibond & Lovibond, 1995). Mean scores of the DASS-21 were calculated after the obtained scale scores were multiplied by two so as to be equivalent to the 42-item DASS (Lovibond & Lovibond, 1995).
### Table 4.1. *Summary of measures.*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Informant</th>
<th>Instrument source(s)</th>
<th>Response scale</th>
<th>Age</th>
<th>Item no.</th>
<th>Cronbach’s Exemplar item</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Demographic</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age at family dissolution</td>
<td>Parent/</td>
<td>1. Study devised marital status item</td>
<td>1. ‘married’; ‘defacto’; ‘separated’; ‘single’; ‘divorced’; ‘widowed’; ‘remarried’; ‘other’</td>
<td>4-8 months$^1$</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Participant</td>
<td>2. Adapted from Life Events Questionnaire (Smith, 1992)</td>
<td>2. Qualitative response provided</td>
<td>1-2 years$^1$</td>
<td></td>
<td>Describe any changes, losses or problems that have occurred in your family over the past year$^2$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Study devised retrospective family dissolution item</td>
<td>3. 1=yes; 2=no</td>
<td>2-3 years$^1$</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>3-4 years$^1$</td>
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<td></td>
<td></td>
<td>5-6 years$^1$</td>
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<td></td>
<td>7-8 years$^{1,2}$</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>9-10 years$^{1,2}$</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>11-12 years$^1$</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>12-13 years$^1$</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>13-14 years$^1$</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>15-16 years$^1$</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>17-18 years$^{1,2}$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Socio-economic status (SES)*</td>
<td>Parent</td>
<td>Study devised item from the mean of 4 items, mother’s education and occupation and father’s education and occupation</td>
<td>8 education response options: ‘postgraduate’; ‘tertiary degree’; ‘technical diploma’; ‘trade apprenticeship’; ‘11\textsuperscript{th} or 12\textsuperscript{th} year secondary’; ‘9\textsuperscript{th} or 10\textsuperscript{th} year secondary’; ‘primary’</td>
<td>13-14 years$^1$</td>
<td></td>
<td>Mother and fathers current occupation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6 occupation response options: ‘upper professional’; ‘managerial’; ‘clerical’; ‘trade craft’; ‘process operative’; ‘service, laborer’</td>
<td>15-16 years$^1$</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>17-18 years$^1$</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Interpersonal</strong></td>
<td>Parent</td>
<td>Study devised item</td>
<td>1=yes; 2=no</td>
<td>13-14 years$^1$</td>
<td></td>
<td>Is there someone special outside the immediate family to whom child turns for help or support?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15-16 years$^1$</td>
<td></td>
<td></td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>17-18 years$^1$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variable</td>
<td>Informant</td>
<td>Instrument source(s)</td>
<td>Response scale</td>
<td>Age</td>
<td>Item no.</td>
<td>Cronbach’s α</td>
</tr>
<tr>
<td>--------------------------</td>
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<td>-------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------</td>
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<td>----------</td>
<td>--------------</td>
</tr>
<tr>
<td>Deviant peer affiliations</td>
<td>Participant</td>
<td>Study devised items where adolescent describes up to 3 friends</td>
<td>3-point Likert scale from ‘never’ to ‘often’</td>
<td>13-14 years  15-16 years</td>
<td>6 a=.87  6 items a=.86  6 items</td>
<td></td>
</tr>
<tr>
<td>Peer attachment^</td>
<td>Participant</td>
<td>Inventory of Parent and Peer attachment (IPPA; Armsden &amp; Greenberg, 1987)</td>
<td>5-point Likert scale from ‘almost always/always true’ to ‘almost never/never true’</td>
<td>13-14 years  17-18 years</td>
<td>8 a=.76  12 items a=.85  12 items</td>
<td></td>
</tr>
<tr>
<td>Parental warmth</td>
<td>Parent</td>
<td>Study devised parenting practices scale</td>
<td>5-point Likert scale from ‘never/almost never’ to ‘always/always’</td>
<td>13-14 years  15-16 years  17-18 years</td>
<td>6 a=.74  5 items a=.83  5 items  16 items a=.90  16 items</td>
<td></td>
</tr>
<tr>
<td>Parental monitoring</td>
<td>Parent</td>
<td>Study devised parenting practices scale</td>
<td>5-point Likert scale from ‘never/almost never’ to ‘always/always’</td>
<td>13-14 years  15-16 years  17-18 years</td>
<td>5 a=.47  12 items a=.60  12 items  9 items a=.83  9 items</td>
<td></td>
</tr>
</tbody>
</table>

**Intrapersonal**

<table>
<thead>
<tr>
<th>Gender</th>
<th>Parent</th>
<th>-</th>
<th>1=male; 2=female</th>
<th>Item included at every study wave</th>
<th>Item no.</th>
<th>-</th>
<th>Sex of child</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mother’s overall rating of child difficulty</td>
<td>Parent</td>
<td>Study devised item</td>
<td>5-point Likert scale from ‘much easier than average’ to ‘much more difficult than average’</td>
<td>13-14 years  15-16 years  17-18 years</td>
<td>1 item</td>
<td>-</td>
<td>Compared to other children, this child is…</td>
</tr>
<tr>
<td>Negative reactivity</td>
<td>Parent</td>
<td>School-Age Temperament Inventory (SATI; McClowry, 1995)</td>
<td>5-point Likert scale from ‘never/almost never’ to ‘always/always’</td>
<td>13-14 years  15-16 years  17-18 years</td>
<td>12 a=.92  12 items a=.92  12 items</td>
<td></td>
<td>Reacts strongly (i.e. complains loudly or cries) to a disappointment or failure</td>
</tr>
<tr>
<td>Variable</td>
<td>Informant</td>
<td>Instrument source(s)</td>
<td>Response scale</td>
<td>Age</td>
<td>Item no.</td>
<td>Cronbach’s α</td>
<td>Exemplar item</td>
</tr>
<tr>
<td>------------------------</td>
<td>-----------</td>
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<td>-------------------------------------------------------------------------------</td>
<td>--------------------------</td>
<td>----------</td>
<td>---------------</td>
<td>--------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Shyness</td>
<td>Parent</td>
<td>SATI (McClowry, 1995)</td>
<td>5-point Likert scale from ‘never/almost never’ to ‘always/almost always’</td>
<td>13-14 years</td>
<td>4 items</td>
<td>α = .89</td>
<td>Approaches people his/her own age even when he/she does not know them</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15-16 years</td>
<td>9 items</td>
<td>α = .88</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>17-18 years</td>
<td>9 items</td>
<td>α = .84</td>
<td></td>
</tr>
<tr>
<td>Conduct problems</td>
<td>Parent</td>
<td>The Revised Behavior Problem Checklist (RBPQ; Quay &amp; Peterson, 1987)</td>
<td>3-point Likert scale from ‘no problem’ to ‘severe problem’</td>
<td>13-14 years</td>
<td>22 items</td>
<td>α = .91</td>
<td>Disruptive, annoys and bothers others</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15-16 years</td>
<td>22 items</td>
<td>α = .91</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>17-18 years</td>
<td>18 items</td>
<td>α = .87</td>
<td></td>
</tr>
<tr>
<td>Socialized aggression</td>
<td>Parent</td>
<td>The Revised Behavior Problem Checklist (RBPQ; Quay &amp; Peterson, 1987)</td>
<td>3-point Likert scale from ‘no problem’ to ‘severe problem’</td>
<td>13-14 years</td>
<td>17 items</td>
<td>α = .83</td>
<td>Belongs to a gang</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15-16 years</td>
<td>17 items</td>
<td>α = .84</td>
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<td>17-18 years</td>
<td>15 items</td>
<td>α = .84</td>
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<tr>
<td>Attention problems</td>
<td>Parent</td>
<td>The Revised Behavior Problem Checklist (RBPQ; Quay &amp; Peterson, 1987)</td>
<td>3-point Likert scale from ‘no problem’ to ‘severe problem’</td>
<td>13-14 years</td>
<td>16 items</td>
<td>α = .89</td>
<td>Has short attention span, poor concentration</td>
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<td>15-16 years</td>
<td>16 items</td>
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<td>17-18 years</td>
<td>14 items</td>
<td>α = .89</td>
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<tr>
<td>Social skills</td>
<td>Participant</td>
<td>Social Skills Rating System (SSRS; Gresham &amp; Elliot, 1990)</td>
<td>3-point Likert scale from ‘rarely/never’ to ‘very often’</td>
<td>13-14 years</td>
<td>39 items</td>
<td>α = .68</td>
<td>Starts conversations rather than waiting for others to talk first</td>
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\textit{Distal outcomes}
<table>
<thead>
<tr>
<th>Variable</th>
<th>Informant</th>
<th>Instrument source(s)</th>
<th>Response scale</th>
<th>Age</th>
<th>Item no.</th>
<th>Cronbach’s α</th>
<th>Exemplar item</th>
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</thead>
<tbody>
<tr>
<td>Depressive symptoms</td>
<td>Participant</td>
<td>Depression, Anxiety and Stress scale 21-item short-form (DASS 21; Lovibond &amp; Lovibond, 1995)</td>
<td>4-point Likert scale from ‘did not apply’ to ‘applied very much/most of the time’</td>
<td>19-20 years</td>
<td>7</td>
<td>.89</td>
<td>I felt that I had nothing to look forward to</td>
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<tr>
<td>Antisocial behavior</td>
<td>Participant</td>
<td>Adapted from Elliott and Ageton’s (1980) Delinquency Scale</td>
<td>6-point Likert scale from ‘never’ to ‘10 or more times’</td>
<td>19-20 years</td>
<td>19</td>
<td>.69</td>
<td>How many times during the past 12 months have you got into physical fights with other people</td>
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</table>

Note. * Continuous SES variables from each of the 3 adolescent waves were transformed into tertiles. Tertiles were then used to create a categorical variable denoting whether adolescent had no SES risk (i.e. never in lowest SES tertile during adolescence), temporary SES risk (i.e. in lowest SES tertile risk at least once) and persistent SES risk (i.e. in lowest SES tertile 2+ times).

* Dichotomous mentor variable from 3 adolescent waves was transformed into 1 variable denoting whether adolescent had a mentor at any time during adolescence.

* Peer attachment total score was derived from computing weighted items in the subscales using the formula (trust + communication) – alienation (Armsden & Greenberg, 1987).
4.4.3 Analytic Strategy

Preliminary assessment of between-group differences, using Pearson’s chi-square analyses and independent sample t-tests, compared the analytic sample of ATP participants who had experienced parental separation/divorce between age 0-18 years (n=449) and those from intact families (n=1,994) on variables included in the LCA. These preliminary assessments were conducted in Stata 14 (StataCorp, 2015) and provide additional descriptive information on the subset of participants used in the main analysis. Multiple Imputation (MI) was used to treat missing data prior to between-group difference testing (Rubin, 1987). Auxiliary variables used in MI were: gender, mother’s age at child birth, father’s age at child birth, and family SES at child birth. These variables were included in the MI to make estimates on incomplete data, but were not part of the main analysis (Collins et al., 2001).

Second, to identify adolescent classes amongst those who experienced family dissolution, Latent Class Analysis (LCA; Asparouhov & Muthén, 2014) was performed in Mplus version 7.2 (Muthén & Muthén, 2012). LCA is a descriptive approach used to characterize subtypes of people who have experienced divorce and allows for the examination of class differences in depressive risk. As such, mean differences in depression scores at the outcome, emerging adulthood, were tested between classes.

Latent classes were modelled using observed psychosocial indicators assessed at the three adolescent time points (13-14, 15-16 and 17-18 years). The probability of an adolescent belonging to a specific class and their categorization in that class was calculated as a function of the scores on these variables. Means of the continuous variables, and probabilities of the categorical variables, represent the estimate of the association between the indicator and the latent classes. To interpret class membership, all continuous variables were standardized and represented as z-
scores. Covariates were not included in the analysis. As such, the observed adolescent indicators are the only variables influencing the latent class distribution.

Two, three, and four-class LCA models were estimated. Model fit was determined using Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC; Akaike, 1987; Schwarz, 1978), the Vuong-Lo-Mendell-Rubin (VLMR) Likelihood Ratio Test, and Lo-Mendell-Rubin (LMR) Adjusted Likelihood Ratio Test, for which significant p-values indicate the specified model is statistically better fitting than a model with one less class. Entropy values were also used as a measure of classification accuracy (Duncan, et al., 2006). Missing data were accounted for using Full Information Maximum Likelihood (FIML; Graham, 2009), which is conducted by default in Mplus and assumes data are missing at random and uses all available information to compute the most likely parameter estimates given the available data. Once the optimal latent class model was identified, parameters for each of the class indicator variables were fixed, while depression scores were estimated freely across the different classes. This allowed for the test of mean differences in depression scores across classes. Significant differences between classes on depression scores were based on non-overlapping 95% confidence intervals.

4.5 Results

4.5.1 Preliminary analyses

Pearson’s chi-square analyses revealed that significantly more participants from separated families had a mentor during adolescence, compared to those from intact families ($\chi(1)=22.198, p<0.01$). Furthermore, fewer participants from separated compared to intact families were categorized as having no SES risk during
adolescence and more participants from separated families were categorized as experiencing temporary SES risk ($\chi^2(2)=9.179, p=0.01$).

Independent samples $t$-tests found significant differences between divorced and intact family groups on adolescent inter- and intra-personal factors. Those from dissolved families had significantly higher scores on deviant peer affiliations at age 13-14 ($t(26.744)=-3.250, p<0.01$) and 15-16 years ($t(84.186)=-5.215, p<0.01$), mother’s rating of child difficulty at age 15-16 ($t(38.837)=2.059, p<0.05$) and 17-18 years ($t(36.154)=2.112, p<0.05$), and socialized aggression at age 13-14 years ($t(146.334)=-3.752, p<0.01$) and 17-18 years ($t(61.330)=-2.696, p<0.01$), compared to those from intact families. Additionally, individuals who experienced parental separation scored significantly lower on peer attachment at age 17-18 years ($t(477.650)=2.393, p<0.05$), when compared to those from intact families. A trend toward significance was found between groups on parental monitoring at age 15-16 years ($t(39.027)=1.813, p<0.10$), where those from dissolved families scored lower than those from intact families.

4.5.2 Descriptive statistics

Data were inconsistent with a missing completely at random pattern (Little’s MCAR: $\chi^2=2289.562, df=1800, p=0.000$). FIML, the approach to dealing with missing data within the LCA, has been demonstrated to produce unbiased estimates even when data are not missing completely at random (Enders, 2011). Missing data for variables used in the longitudinal analysis averaged 24.41% with the most missing data present for the outcome variable, depressive symptoms, measured at 19-20 years (36.7%). Descriptive statistics for continuous (correlations) and categorical (frequencies and proportions) variables are presented in Table 4.2 and 4.3, respectively.
Table 4.2. Correlations between continuous variables used in the analyses.  

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</table>

Note.  
* T1: age 13-14 years; T2: age 15-16 years; T3: age 17-18 years; T4: age 19-20 years  
** p<0.01 (2-tailed)  
* p<0.05 (2-tailed)
Table 4.3. Frequencies and percentages for categorical variables used in analyses.

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age at parental separation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-school (0-4 years)</td>
<td>84</td>
<td>19.3</td>
</tr>
<tr>
<td>Primary school (5-11 years)</td>
<td>191</td>
<td>43.8</td>
</tr>
<tr>
<td>Secondary school (12-18 years)</td>
<td>161</td>
<td>36.9</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>223</td>
<td>49.7</td>
</tr>
<tr>
<td>Female</td>
<td>226</td>
<td>50.3</td>
</tr>
<tr>
<td><strong>Socio-economic risk status during adolescence</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No risk</td>
<td>188</td>
<td>53.4</td>
</tr>
<tr>
<td>Temporary risk</td>
<td>42</td>
<td>11.9</td>
</tr>
<tr>
<td>Persistent risk</td>
<td>122</td>
<td>34.7</td>
</tr>
<tr>
<td><strong>Mentor during adolescence</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No mentor</td>
<td>151</td>
<td>42.1</td>
</tr>
<tr>
<td>Mentor</td>
<td>208</td>
<td>57.9</td>
</tr>
</tbody>
</table>
4.5.3 Identification of adolescent classes

In the absence of prior person-centered analyses assessing adolescents from dissolved families, no \textit{a priori} hypotheses were formulated regarding the number of latent classes that would emerge.

Two, three and four classes were specified, and as shown in Table 4.4, a three-class model was the best fit for the data. This was determined by a comparison of the fit indices for the estimated LCAs. The three-class model demonstrated lower AIC and BIC values compared to the two-class model. While the three-class model was found to have larger AIC and BIC values than the four-class model, likelihood ratio tests (VLMR and LMR) indicated the latter model did not significantly improve on the three-class model, but there was some evidence that the three-class was superior to the two-class model ($p<0.10$). While the three-class likelihood ratio tests did not reach statistical significance at the $p<0.05$ cut off (VLMR, $p=0.0643$; LMR, $p=0.065$), combined with lower BIC and AIC values, there was sufficient evidence in support of the three-class model over the two-class model. Moreover, over-estimating the number of classes is preferred to under-estimating because the model with fewer classes can generally be derived by combining classes from the larger model (Nylund et al., 2007). Finally, entropy for the three-class model was greater than the acceptable value of .80, indicating high classification accuracy (Nagin, 2005). Consequently, the three-class model was retained for further analysis.
Table 4.4. Model fit indices for adolescent LCA: 2- to 4-class solutions.

<table>
<thead>
<tr>
<th>Class No.</th>
<th>Log likelihood</th>
<th>AIC</th>
<th>BIC</th>
<th>Entropy</th>
<th>VLMR p-value</th>
<th>LMR p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>-15379.03</td>
<td>30976.059</td>
<td>31423.725</td>
<td>0.895</td>
<td>0.0299</td>
<td>0.0306</td>
</tr>
<tr>
<td>3</td>
<td><strong>-14888.284</strong></td>
<td><strong>30072.567</strong></td>
<td><strong>30680.406</strong></td>
<td><strong>0.820</strong></td>
<td><strong>0.0643</strong></td>
<td><strong>0.065</strong></td>
</tr>
<tr>
<td>4</td>
<td>-14668.275</td>
<td>29710.55</td>
<td>30478.563</td>
<td>0.829</td>
<td>0.5418</td>
<td>0.5435</td>
</tr>
</tbody>
</table>

Note. LCA = Latent Class Analysis; AIC = Akaike’s information criteria; BIC = Bayesian information criteria; VLMR = Vuong-Lo-Mendell-Rubin likelihood ratio test; LMR = Lo-Mendell-Rubin adjusted likelihood ratio test; BLRT = bootstrapped likelihood ratio test. Best fitting model in bold text.
Class 1 \((n=253, 56.3\%)\) was termed the *Adjusted* class. The *Adjusted* class consisted of 43.9% male participants and 56.1% female participants. Class 2 \((n=156)\) categorized approximately a third of adolescents from dissolved families (34.7%) and was called the *Moderate Risk* class. This class displayed a relatively even gender split, with 51.4% males and 48.6% females. The smallest class, Class 3 \((n=40, 8.9\%)\) was named *High Risk*, consisting of predominantly males (72.7%) and fewer females (27.3%).

*Demographic indicators*

Age at family dissolution and SES risk did not differentiate the latent classes.

*Interpersonal indicators*

Psychosocial risk (deviant peers) and protective factors (peer attachment, parental warmth, parental monitoring, mentor) were examined within the adolescent interpersonal domain. The *High Risk* class scored significantly higher on deviant peer affiliations, compared to the *Adjusted* and *Moderate Risk* classes. The *Adjusted* adolescent class had significantly higher scores on the protective factor, peer attachment, compared to the *Moderate Risk* and *High Risk* classes. Parental warmth and monitoring scores were significantly lower in the *Moderate Risk* and *High Risk* classes, compared to the *Adjusted* class. Furthermore, while there were no significant differences between classes on the presence/absence of a mentor during adolescence, a higher proportion of the *Moderate Risk* class (64.3%) had an adult mentor outside the immediate family, compared to the *Adjusted* (53.7%) and *High Risk* (57.4%) classes.

*Intrapersonal factors*

Gender distinguished between the *Adjusted* class (43.9% male) and the *High Risk* adolescent class (72.7% male), with significantly more males in the latter. Maternal perception of adolescent difficulty significantly differed between all three
classes, with the Adjusted class scoring the lowest of all the groups, indicating low perceived difficulty. The Moderate Risk class scores sat slightly above the mean and the High Risk class demonstrated the highest difficulty scores. Furthermore, adolescent social skills significantly differed between all three classes, with the Adjusted class scoring the highest of all the groups, indicating high social skills. The Moderate Risk class’ social skills scores sat slightly below the mean and the High Risk class demonstrated the lowest social skills with standardized mean scores falling more than 1 Standard Deviation (SD) below the mean.

*Internalising symptoms*

Negative reactivity, shy temperament and anxiety indicated intrapersonal adolescent internalizing symptoms. Negative emotional reactivity significantly differentiated between all three classes, with the Adjusted class characterized by the lowest scores, compared to the Moderate Risk and High Risk classes. The Moderate Risk class was also characterized by significantly lower negative reactivity scores compared to the High Risk class. The Moderate Risk and High Risk classes had significantly higher scores on shy temperament and anxiety symptoms when compared to the Adjusted class; however Moderate Risk and High Risk class scores on shy temperament and anxiety did not significantly differ.

*Externalising symptoms*

Conduct problems, attention problems and socialized aggression were indicators of intrapersonal adolescent externalizing symptoms. The Adjusted class was characterized by scores consistently below the mean on all externalizing variables, which significantly differed from the Moderate Risk and High Risk classes on conduct problems and attention problems at all adolescent time points. The Moderate Risk class scored slightly above the sample mean on conduct and attention problems while the High Risk class had the highest scores averaging more than 1 SD
above the sample mean. Socialized aggression was consistently highest in the *High Risk* class across adolescence.

The means and confidence intervals of standardized continuous indicators and the proportions and confidence intervals of categorical indicators for the three-class LCA solution can be found in Table 4.5. Continuous indicators are also presented graphically in Figure 4.1.
### Table 4.5. Means and CIs of standardized continuous indicators measured at T1 (13-14 years), T2 (15-16 years) and T3 (17-18 years). Proportions and CIs of categorical indicators for three-class LCA solution.

<table>
<thead>
<tr>
<th>Continuous variables</th>
<th>Adjusted n=253</th>
<th>Moderate Risk n=156</th>
<th>High Risk n=40</th>
<th>Sig. contrasts</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>95% lower CI</td>
<td>95% upper CI</td>
<td>M</td>
</tr>
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<td>Difficulty T1</td>
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<td>-0.67</td>
<td>-0.36</td>
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<td>Difficulty T2</td>
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<td>Difficulty T3</td>
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<td>-0.65</td>
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<td>Negative reactivity T1</td>
<td>-0.50</td>
<td>-0.66</td>
<td>-0.34</td>
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<td>Negative reactivity T2</td>
<td>-0.56</td>
<td>-0.70</td>
<td>-0.42</td>
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<td>-0.32</td>
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<tr>
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<tr>
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<table>
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<td>95% upper CI</td>
<td>%</td>
<td>95% lower CI</td>
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<td>0.39</td>
<td>0.54</td>
<td>35.7</td>
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Note. LCA=Latent Class Analysis
CI=Confidence Interval
C1=Adjusted class, C2=Moderate Risk class, C3=High Risk class
Figure 4.1. Psychosocial classes of adolescents from dissolved families identified using continuous indicators in LCA.
Note: LCA=Latent Class Analysis. Scores were standardised for ease of interpretation. Higher scores are indicative of high level of measurement construct.
*Significant difference between LC1 and LC2 ($p < .05$)
+Significant difference between LC1 and LC3 ($p < .05$)
^Significant difference between LC2 and LC3 ($p < .05$)
4.5.4 Depressive symptoms in emerging adulthood

Sample and class proportions for each depressive symptom severity label (normal, mild, moderate, severe, extremely severe) based on recommended DASS-21 cut-off scores (Lovibond & Lovibond, 1995) were first examined descriptively. Majority of adolescents classified in the Adjusted class scored in the normal range for depressive symptoms (75.9%). Approximately, more than one-third (38.3%) of the Moderate Risk class demonstrated elevated depressive symptoms past the normal range. In the High Risk class, approximately half of the adolescents scored in the normal range on depressive symptoms (54.2%), with the other half demonstrating increased depressive symptoms.

When examining differences in the mean depressive symptom scores across the classes, the Moderate Risk adolescents had the highest depressive symptoms in emerging adulthood ($z=0.283, \text{CI} [0.04, 0.52]$) with some participants in the Moderate Risk class scoring up to four SDs above the sample mean. Depressive symptoms of the Moderate Risk class were significantly higher than those from the Adjusted class ($z=-0.202, \text{CI} [-0.35, -0.05]; d=4.77$) who had the lowest depressive symptom scores. The High Risk adolescents scored closest to the sample mean on depressive symptoms ($z=0.086, \text{CI} [-0.26, 0.43]$). Depressive symptoms in the High Risk class did not significantly differ from the Adjusted or Moderate Risk class scores.

4.5.5 Post-hoc analysis

Wide 95% CI [-0.26, 0.43] for depression scores indicated considerable variation in depressive symptoms for the High Risk group. Only two of the 40 participants in this class scored above the DASS-21 recommended cut-off for severe depressive symptoms while the majority of participants (54.2%) reported normal depressive symptomatology (Lovibond & Lovibond, 1995).
As the *High Risk* class was characterized by particularly high scores on observed indicators that measure externalizing problems (e.g. deviant peer affiliations, conduct problems, and socialized aggression), it was hypothesized that rather than depressive symptoms, this class may instead be at risk for psychopathology consistent with externalizing outcomes at emerging adulthood. In order to further understand the subsequent risk in emerging adulthood for the *High Risk* adolescent class, post hoc testing was conducted whereby mean antisocial behavior scores across the classes were examined using the same approach employed for examining mean differences in depression scores (i.e., parameters for each of the class indicator variables were fixed while antisocial behavior scores were estimated freely across the different classes). Significant differences between classes on antisocial behavior scores were based on non-overlapping 95% confidence intervals.

As hypothesized, the *High Risk* adolescents were found to have the highest antisocial behavior scores in emerging adulthood ($z=1.02$, CI [0.36, 1.68]). These scores significantly differed from the *Adjusted* class ($z=-0.069$, CI [-0.45, 0.32]; $d=3.95$) and the *Moderate Risk* class ($z=-0.141$, CI [-0.74, 0.46]; $d=3.60$). Participants categorized in the *High Risk* class scored up to six SDs above the sample mean on antisocial behavior.

4.6 Discussion

The purpose of this study was to investigate individual differences in susceptibility to depressive symptoms in emerging adulthood in a representative sample of adolescents from separated or divorced families. We employed a person-centered analytic technique to build on the existing body of variable-centered research to examine differences among a sample of adolescents from dissolved families. Using LCA, three distinct classes were identified, the *Adjusted, Moderate*
Risk, and High Risk adolescent classes. These results demonstrate clear and meaningful diversity in temperamental, behavioral and social characteristics of adolescents from dissolved families that differentiate risk for depressive symptoms in emerging adulthood.

The Adjusted class exhibited several markers of positive development, including social skills and peer attachment (Hawkins et al., 2009). Participants in this group also scored low on behavioral problems during adolescence. This group captured the majority of the sample (56.3%) suggesting that most people from separated families are resilient and will function well during their adolescent years. This is consistent with 49 years of between-group comparisons showing small effect sizes when measuring the association between parental separation and measures of offspring wellbeing (see meta-analyses Amato, 2001; Amato & Keith, 1991b).

Our approach, focusing on constellations of depressive risk and protective factors, revealed nuanced patterns of risk that were neither uniformly positive nor negative. In particular, the Moderate Risk and High Risk classes while both generally at greater risk for poorer emerging adult outcomes compared to the Adjusted class, were also clearly differentiated in the manifestation of their risk profiles. Moderate Risk participants scored above the mean on all behavioral risk factors, excluding externalizing problems such as socialized aggression and deviant peer affiliations, demonstrating a profile predominantly characterized by moderate internalizing problems. Compared to the Adjusted class, the Moderate Risk class also demonstrated poorer peer attachment and social skills. Research demonstrates that there is an interplay between depression and social factors such as peer attachment and social skills. Peer attachment and social skills are known protective factors in the face of depression (Costello et al., 2008; Segrin, 2000), but there is also evidence that depression predicts reduced social skills and increased social isolation (Bornstein,
Hahn, & Haynes, 2010; Burt, Obradovic, Long, & Masten, 2008). The cluster of risk factors that characterized the Moderate Risk class was associated with the highest depressive symptoms in emerging adulthood.

The High Risk adolescents were characterized by the highest scores on behavioral risk indicators. The profile is unique in indicating extreme scores on externalizing Behaviours, such as conduct problems. The High Risk profile is consistent with the Patterson, DeBaryshe, and Ramsey (1989) developmental perspective on antisocial behavior. For example, the group are characterized by major determinants of antisocial behavior including exposure to parental divorce, male gender (72.7%), deviant peer affiliations, and problems with attention and conduct (Patterson et al., 1989). The trajectory of severe externalizing problems during adolescence leading to adult antisocial behavior may be explained by a reciprocal process whereby stressful life events, including parental divorce, at one point, predict subsequent externalizing behaviours, which, in turn, predict further stressful life events and so on (Kim, Conger, Elder Jr, & Lorenz, 2003).

Accumulating disadvantage of parental separation and behavioral problems during adolescence mutually reinforces adjustment problems over time (Kim et al., 2003). In our sample, this “snowball effect” culminated in some adolescents from the High Risk class scoring up to six SDs above the mean on antisocial behavior in emerging adulthood. Despite no statistically significant differences between classes on SES risk, ≈59% of High Risk adolescents compared to ≈44% of Adjusted adolescents experienced temporary or persistent SES risk during adolescence.

4.6.1 Strengths, limitations and directions for future research

The current study has allowed for the inclusion of multiple variables measured prospectively, using parent and adolescent reports over the critical developmental period of adolescence. While previous research has revealed
important single interaction terms that moderate (i.e. either amplify or attenuate) the relationship between parental divorce and depressive symptoms (see Di Manno et al., 2015), the current study extended understanding by identifying patterns of association among variables that are similar within groups and different between groups of young people from dissolved families, through the use of LCA.

Nevertheless, there are limitations to be acknowledged. We were able to draw on prospective data of family dissolution across childhood and adolescence, however, a proportion of our sample had experienced divorce or separation during the period of measurement of adolescent risk and protective factors (13-18 years). These participants were retained in the sample as it was of interest to examine not only those who had experienced parental divorce prior to adolescence, but also during adolescence. As suggested by prior longitudinal studies (e.g. Sun & Li, 2002), young people may demonstrate a decline in psychosocial functioning prior to parental divorce as a result of inter-parental conflict (Fabricius & Luecken, 2007; Simons, Lin, Gordon, Conger, & Lorenz, 1999b) and poor parental mental health (Hetherington et al., 1982; Kitson & Morgan, 1990). Therefore, including participants who experienced parental separation during the adolescent period (13-18 years) was done with a view to examine whether proximal timing of divorce and measurement of adolescent indicators differentiated the resultant latent classes.

To ensure that this did not affect the composition of profiles and probability of class membership, we conducted an additional LCA on only those participants who experienced family dissolution up to age 12 years (70.6% of all 449 individuals who experienced parental divorce sometime from age 0-18 years). In this filtered sample, a consistent class structure emerged, with comparable mean estimates on latent class indicators. We were therefore confident that the model was robust to the inclusion of participants who experienced parental separation during adolescence.
(13-18 years). The consistencies between filtered and complete sample models were in line with our finding that age at time of divorce was not a distinguishing factor between classes.

While a strength of our study was the inclusion of multiple indicators from different domains, latent classes are determined only by the particular indicators that are used in the analysis. Therefore, a different combination of indicators could lead to a different set of classes. The current study did not have access to prospectively measured information about parental conflict or family violence. Additionally, our measure of parental monitoring when adolescents were aged 13-14 years demonstrated poor internal consistency with an alpha of .47. Given, the pattern of monitoring across classes at this age was not dissimilar from subsequent time points, we remain confident in the model; however, it is recommended that future studies incorporate measures of family and parental behaviours and circumstances with optimal psychometric properties. In particular, exposure to family violence may account for the high levels of externalizing problems seen in the High Risk class.

4.6.2 Implications

Our findings underscore the importance of developing and evaluating interventions that are tailored to individual adolescent presentations. As the nature of this study was exploratory, the pattern of associations between demographic, intrapersonal and interpersonal factors would benefit from further disentangling in order to formulate recommendations translatable into clinical practice. However, in our sample, we found most adolescents from dissolved families to be well-adjusted, suggesting that preventative efforts and intervention for depressive symptoms may not be necessary. Rather, a focus on subclinical psychological distress in the context of parental divorce may be more appropriate for Adjusted adolescents, as identified by prior research (e.g. Laumann-Billings & Emery, 2000). However, differences
between the Moderate Risk and High Risk classes provide clear signals of risk for differentiated pathways relevant for clinicians working with this population. Specifically, internalizing symptoms such as shyness and elevated anxiety in adolescence do not by themselves differentiate the nature of subsequent risk presentations in emerging adulthood. However, when assessed in conjunction with, and accounting for the degree of externalizing problems, it is potentially possible to tailor treatment towards preventing specific trajectories. For instance, when presented with moderate levels of internalizing problems but the absence of deviant peers in adolescence, clinicians may note the potential ongoing risk of depressive symptoms in emerging adulthood. In contrast, a comorbid pattern of moderate internalizing and extreme externalizing problems, as in the High Risk class, may warrant action toward mitigating the risk for future antisocial behavior. While the minority of participants were categorized in the High Risk class, their Behaviours present risk of considerable harm at great social and economic cost (Krug, Mercy, Dahlberg, & Zwi, 2002).

4.7 Conclusion

The current study’s examination of interactions between multiple variables over time contrasts previous cross-sectional studies of single variables, and it is the first study to identify risk profiles that differentiate adolescents from dissolved families. Membership of latent classes demonstrated differences in future mental health concerns, with the Moderate Risk profile at increased risk for depressive symptoms and the High Risk profile at increased risk for antisocial behavior in emerging adulthood. This study did not aim to determine the impact of parental divorce on psychological outcomes in emerging adulthood, as past research has done. Rather, it is the first to extensively describe within-group differences among a
sample of individuals from divorced families. With the understanding that adolescent sub-populations exist, and are characterized by unique patterns of demographic, inter- and intrapersonal factors, efforts may be directed toward developing targeted and individualized prevention and interventions for individuals from dissolved families.
CHAPTER FIVE  Depressive Risk Pre- and Post-Divorce

5.1 Chapter Overview

This chapter presents the second empirical study of this thesis, which utilised longitudinal mixed models, a statistical model containing both fixed and random effects. This study used longitudinal data with multiple prospective measurements of depressive symptoms across the lifespan nested within participants. Mixed modeling was considered the best approach to investigate the research question as it allowed for multiple inherent levels within the data.

Although there is consistency in the literature demonstrating the association between parental separation and depressive symptoms (Culpin et al., 2013; Hayatbakhsh, Clavarino, Williams, Bor, O'Callaghan, et al., 2013; Oldehinkel et al., 2008; Strohschein, 2005), the impact of timing on this relationship presents mixed findings. The introduction to the mixed model analysis, describes the mixed findings within the literature which may, in part, be due to methodological differences. For instance, previous examinations of the influence of timing have utilized retrospective reports of parental divorce (Larson & Halfon, 2013), cross-sectional study designs (Schüssler-Fiorenza Rose et al., 2014), or have used longitudinal designs covering only part of a developmental period (i.e. adolescence; Zeratsion et al., 2014). Among available prospective longitudinal research designs, it is clear that measurement of timing differs across studies e.g. age at assessment (Oldehinkel et al., 2008), age at parental divorce (Rodgers et al., 1997), and age at depressive symptom onset (Gilman et al., 2003).

Results of the LCA presented in Chapter Four provided a description of within-group differences among a sample of adolescents from divorced families. The LCA indicated that multiple intra- and inter- personal factors differentiated
adolescents from dissolved families; however, age at parental separation/divorce did not distinguish between classes. These findings prompted further investigation into the influence of timing, both the timing of parental separation and the timing of depressive risk. While emerging adulthood was the period of interest for examining depressive risk in the LCA, it is also possible that depressive symptoms may also have occurred earlier and subsided by emerging adulthood. Examination of family structure change and depressive outcomes across the lifespan from early childhood to emerging adulthood within the ATP allows for further investigation of the influence of timing.

Specifically, the second empirical study of this thesis aimed to longitudinally examine the age at which parental divorce occurred and depressive symptoms across the developmental stages of childhood, adolescence, and emerging adulthood, disentangling the interval between the occurrence of family dissolution and risk for depressive symptoms.

The study presented in this chapter has been submitted to an academic journal and is currently under review (see Appendix G for evidence of submission). The journal has specific guidelines for structure, formatting and referencing. This paper was prepared in accordance with those guidelines.
5.2 Abstract

Background: It is well established that parental divorce is associated with risk for offspring depressive symptoms, in childhood, adolescence and into adult life. However, it remains unclear whether child sex and age might moderate depression risk in the event of prior or imminent parental divorce. Aim: The aim of this study was to determine for whom (older or younger children; boys or girls) depressive risk preceded and/or followed parental divorce. Method: Data were from 1,943 participants of the Australian Temperament Project, 473 of whom experienced parental separation or divorce between the ages of 0-20 years. Depressive symptoms were measured every two years from childhood (age 3-4 years) to emerging adulthood (19-20 years). Results: In longitudinal mixed models there were no main effects of child sex or age on depression risk before or after parental divorce. However, a two-way interaction between divorce timing (occurring two years prior or not) and child sex was found. Conclusions: Findings from this study suggest that among children and adolescents who do not experience parental divorce, girls compared to boys have a normative heightened risk for depressive symptoms, whereas for those who have experienced parental divorce, there is no sex discrepancy during immediate post-divorce period. As such, both boys and girls need to be supported through the processes of divorce.

Keywords: Parental Divorce; Parental Separation; Childhood; Adolescence; Emerging Adulthood; Depression
5.3 Introduction

Parental divorce is known to be associated with depressive symptoms in offspring across childhood, adolescence and adulthood (Culpin et al., 2013; Hayatbakhsh, Clvarino, Williams, Bor, O’Callaghan, et al., 2013; Oldehinkel et al., 2008; Strohschein, 2005); however, it remains uncertain whether key characteristics of the child, in particular age and sex, influences this risk association. It is possible that there are developmentally sensitive periods for risk of depression associated with parental separation, and that these may differ between boys and girls. It is also possible that risk for depression might differ at different points in the divorce process (pre-separation compared to post-separation). To investigate these possibilities further, prospective data are required that account for intervals between the event of divorce and assessments of depressive symptoms. To date, however, few longitudinal studies have examined associations between age at parental divorce, child sex and depressive symptoms. Yet, effects on offspring associated with the timing of divorce are of high concern to couples who have resolved to separate but are assessing whether to “wait for the benefit of the children”. They are also of importance to clinicians for whom nuanced knowledge of risk factors and outcomes assists in formulating timely and appropriate therapeutic responses for children and families.

Parental divorce marks a momentous change in a child’s family structure and the home environment. However, rather than a discrete, sudden life event, separation and/or divorce is understood to be a series of transitions whereby changes in the family system are evident prior to the end of cohabitation (Ahrons, 1979). The divorce-stress-adjustment perspective, presented by Amato (2000), conceptualizes the transitions associated with divorce as a process. The divorce process is described as one that begins while the family still lives together and does not end until long after the legal proceedings of divorce are finalized. The divorce process is known to
include numerous events that are experienced by children as stressful, such as a decline in economic status (Amato, 2005; Bali & Hou, 2003), increased inter-parental conflict (Fabricius & Luecken, 2007; Simons et al., 1999b) and poor parental mental health (Hetherington et al., 1982; Kitson & Morgan, 1990). The stressors associated with parental divorce, in turn, lead to an increased risk for a number of negative emotional, behavioral, and health outcomes for children (Amato, 1993, 2001; Amato & Keith, 1991b; Fendrich, Warner, & Weissman, 1990; Strohschein, 2012). The onset, severity and duration of these negative outcomes differs among children from divorced families, and is likely to depend on moderating factors such as child’s sex and age (see Di Manno et al., 2015).

Longitudinal studies that have examined psychological indicators of wellbeing before and after parental separation indicate that children may be at increased risk for poor outcomes, not only after a divorce occurs, but also before the family structure change. Sun and Li (2002) examined adolescent outcomes among 9,524 participants aged 13, 15 and 17 years at four time points and found that, compared to peers in intact families, risk for decreased self-esteem and locus of control in children from separated families was temporary, ranging from one year preceding to one year post-separation. This study captured effects of the pre-divorce period; however, children’s age range was restricted to adolescence, and the study did not assess depression outcomes. In a representative sample of 2,819 children, Strohschein (2005) tested the moderating impact of child sex and age and found that parental separation similarly affected boys and girls, and older and younger children. However, prior to divorce, children whose parents later divorced exhibited higher levels of anxiety, depression, and antisocial behavior compared to children who remained in intact families, yet these differences were not maintained upon controlling for other child and family variables (e.g. child sex, child age, parent
education etc.). Assessments in this sample continued only up until age 11 years, and so the potential for increased risk during adolescence and emerging adulthood remained unexamined. Limiting assessments to certain developmental periods such as childhood restricts the capacity to identify differential risk across sensitive periods of development. For instance, there are normative increases in depressive risk during adolescence (Ge et al., 2006; Sawyer et al., 2002), posited to be a consequence of common challenges faced during this life stage, including social and psychological changes associated with the transition through puberty (Angold, Costello, & Worthman, 1998). The experience of additional non-normative life stressors, such as parental separation, may therefore serve to exacerbate the existing elevated risk for depression during adolescence.

While evidence exists for negative pre-divorce effects on children, findings are not consistent across all studies. Over two waves, at child age 3 and 12 years, in a sample of 6,426 children, Robbers et al. (2011) found post-divorce risk for child internalizing problems at age 12 years, but no differences between intact and divorced groups on pre-divorce internalizing problems. Their nine-year interval between assessments prevented detection of proximal effects. Weaver and Schofield (2015) conducted assessments at one-year intervals over 10 years, capturing the period before and after parental separation in children age 5-15 years, and found no significant differences in child internalizing symptoms at the assessment immediately before parental separation. Mixed findings highlight the need for further research examining the impact of the pre-divorce period.

Among studies investigating the immediate short-term post-divorce period, poor psychosocial outcomes for young people appear to persist at least up to two years following parental separation (Amato & Anthony, 2014; Gobbi et al., 2015; Hetherington & Stanley-Hagan, 1999; Kelly, 2003). Gobbi et al. (2015) found that,
compared to those living with both parents, adolescents separated from their fathers were more likely to report depressive symptoms four to six months post-separation. In their study, depression outcomes were examined every three months, allowing for assessment of the proximal impact of separation. However, assessments were restricted to the adolescent period, and age was treated in the analysis as a confounding variable. Overall, while Gobbi et al.’s (2015) study provides evidence for the short-term interval between exposure to father separation and depression outcomes, controlling for age omits potentially important information about whether there is a particular period of adolescence (e.g. early, mid, or late adolescence) associated with increased risk. During these sub-stages of adolescence, young people face different challenges that might be associated with differential risk. For instance, older adolescents might be less reliant than younger adolescents on parents but more engaged in the formation of romantic relationships (Cowan & Cowan, 2003). Controlling for age at parental divorce inhibits exploration of effects of parental divorce concurrent with normative developmental challenges.

In studies examining longer-term risk for depression outcomes, divorce during childhood predicts persistent risk, long after the immediate post-separation period (Lacey, Bartley, Pikhart, Stafford, & Cable, 2014; VanderValk et al., 2005; Weaver & Schofield, 2015). Weaver and Schofield (2015) examined internalizing problems across ten assessments from early childhood (age 5 years) to mid-adolescence (age 15 years). Children showed significant increases in internalizing problems at the first assessment following parental separation. The difference in internalizing problems among those from divorced and intact families subsequently persisted up to age 15 years (Weaver & Schofield, 2015). While this study provides evidence of persistent depressive risk in the post-divorce period, age at parental divorce was not examined as a moderating variable. Therefore, it is unclear whether
the immediate and longer-term risk of depression posed by the post-divorce period depends on the child’s age at the time of divorce.

Examinations that extend beyond childhood and adolescence suggest that risk associated with divorce persists into adulthood. VanderValk et al. (2005) assessed internalizing problems at three time points (age 12-23, 15-26, and 17-29 years) and, compared to those from intact families, those who experienced parental divorce prior to the first wave demonstrated significantly higher internalizing problems. Divorce had on average taken place nine years before the first wave. Additionally, respondents whose parents divorced during the course of the study were excluded from the sample (VanderValk et al., 2005). Due to the nine-year average length of time from exposure to divorce and the first assessment of depressive symptoms, the association between divorce timing and subsequent risk in this study remains unclear. It is possible that for some respondents, depressive symptoms were present immediately after the divorce and persisted until young adulthood, while for others there may have been a delay in the elevation of depression risk. This raises important questions about when in the separation process risk for depression might peak. It is also possible that primary characteristics of the child, in particular child age and sex, may play an important (yet poorly understood) role in depression risk on parental separation.

Longitudinal studies that examine the moderating impact of child sex (Dunlop & Burns, 1995; Oldehinkel et al., 2008; Rodgers et al., 1997; Summers et al., 1998) or age (Oldehinkel et al., 2008; Summers et al., 1998) on the relationship between parental divorce and offspring depression, have mostly found the interactions to be non-significant (Chase-Lansdale et al., 1995; Dunlop & Burns, 1995; Oldehinkel et al., 2008; Rodgers et al., 1997; Summers et al., 1998). However, when testing effects of child sex and age, Oldehinkel et al. (2008) reported evidence
of a three-way interaction with parental separation. Compared to those who did not experience parental separation, females from dissolved families were found to be most at risk of depressive symptoms at age 15-years. However, for males, depressive risk was evident before puberty, at age 10. When psychological outcomes are examined in representative samples of adults (18 years or older), studies report associations between parental divorce occurring in childhood and depression among adult women, but not men (e.g. Rodgers, 1994). Taken overall, these findings suggest sensitive developmental periods for parental separation that might differ for girls and boys, whereby boys may be at increased risk before puberty and girls after puberty.

The findings reported by Oldehinkel et al. (2008) are consistent with considerable theory and research that documents that adolescence is a risky period for the onset of depressive symptoms, particularly for girls (Crick & Zahn-Waxler, 2003). Prospective research demonstrates that starting in early adolescence, more girls than boys exhibit depressive symptoms (Angold, Erkanli, Silberg, Eaves, & Costello, 2002; Ge, Lorenz, Conger, Elder, & Simons, 1994; Twenge & Nolen-Hoeksema, 2002; Wade, Cairney, & Pevalin, 2002). Furthermore, research reveals that the sex divergence in depressive symptoms persists into adulthood (Hankin & Abramson, 1999; Kuehner, 2003). In attempting to explain these sex differences various studies have found that compared to boys, adolescent girls demonstrate increased vulnerability to interpersonal stressors; that is, events that involve a significant interaction between the adolescent and another person, such as a family member or peer (Rudolph, 2002; Stroud, Papandonatos, D’Angelo, Brush, & Lloyd-Richardson, 2017; Stroud, Salovey, & Epel, 2002). Parental separation is likely to present a young person with a multitude of interpersonal stressors including inter-parental discord, changes to parental functioning and overall familial conflict.
Therefore, parental separation may be conceptualised as an additional interpersonal stressor, increasing what is for girls an already elevated risk for depressive symptoms. Although girls are more likely to display depressive risk in the context of interpersonal stressors, this does not indicate that males are necessarily protected from depression in the context of parental divorce. Socialisation theories (e.g. Bandura, 1969) provide support for the proposal that boys may experience, but not express sad emotions at the same rate as girls due to modeling or encouragement to adopt sex-role consistent behaviors (Chaplin, 2015). Notably, studying the depressive impact of age at parental divorce without accounting for child sex may obscure important information regarding developmental vulnerabilities. Such differential risk may only be revealed in tests of moderation where both child sex and age are included (see Di Manno et al., 2015).

Study design limitations are also important to address. Prior studies investigating timing of divorce have been limited particularly by the length of the investigation and so have been unable to differentiate effects of divorce across different developmental periods. Additionally, most study designs have either neglected to report or failed to account for temporal intervals between parental divorce and depressive risk by assessing depression both pre- and post-separation. In those that have examined temporal intervals between parental divorce and depressive risk, variation among studies prevents adequate comparison of findings that would allow for conclusions about whether there are proximal, distal, transient or persistent effects. It is exceedingly rare to have access to multi-decade prospective data that combines a record of the age at which an individual’s family structure changes from intact to separated with observations of depressive symptoms before and after separation. Within the divorce literature, this type of research design is necessary to help explain mixed findings regarding the importance of timing.
5.3.1 Aim of current study

The purpose of this study is to provide clinically and theoretically relevant information regarding when (i.e., pre/post divorce) and for whom (i.e. boys/girls, older/younger children), parental divorce increases risk for depressive symptoms. This is the first study to prospectively assess the importance of the interval between the event of parental divorce and offspring depression risk, while accounting for the possibility that depressive risk may either precede and/or follow the experience of divorce. We test interactions between child sex and age with data from a longitudinal Australian cohort study that allows for measurement of parental divorce and depressive symptoms every two years across multiple developmental stages, from early childhood into emerging adulthood. Although prior literature presents mixed findings and the current analysis is novel, we present the following hypotheses:

1. Depressive symptoms will be correlated with parental divorce immediately pre- and post-divorce.

2. Child sex and age will moderate the impact of parental divorce on depressive symptoms, specifically boys will be at increased depressive risk before puberty and girls after puberty.

5.4 Method

5.4.1 Participants

Participants were drawn from the Australian Temperament Project (ATP), an ongoing longitudinal study of psychosocial adjustment from infancy to adulthood that commenced in 1983. Recruitment was conducted in maternal health care centers across urban and rural areas when participants were 4-8 months old. The sample of 2,443 children was representative of the state of Victoria at the time. Using a mail survey methodology approximately every two years, parents reported on child
temperament, behavioral adjustment and social-emotional health. In addition, self-report data were obtained from participants themselves at age 11-12 years onwards. For further details on sampling see Prior et al. (2000). Study attrition is described in Table 5.1.

Data used in the present study were from participants at nine time points when they were aged 3-4, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16, 17-18 and 19-20 years. Participants were included in the analytic sample if data were available on internalizing and/or depressive symptom measures at one or more of these waves. A final sample size of 1,943 resulted (Males=1,021 [52.5%]; Females=922 [47.5%]), of whom 473 (24.34%) experienced parental separation or divorce at some time from birth to age 19-20 years (Males=236 [49.9%]; Females=237 [50.1%]). The average age at family dissolution was 10.05 (SD=5.23) years. The rate of parental separation or divorce in our sample is consistent with the Australian rate of 0-17 year olds who experience parental divorce or separation (25%; ABS, 2006).
### Table 5.1. Comparison of the analytic sample, divorced sample, and original cohort on characteristics at recruitment in 1983 (wave 1).

<table>
<thead>
<tr>
<th>Domain</th>
<th>Original cohort at 4-8 months N=2,443</th>
<th>Analytic sample at 19-20 years n=1,943</th>
<th>Divorced sample n=473</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SES Quartiles at birth</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highest</td>
<td>26.61%</td>
<td>28.6%</td>
<td>24.1%</td>
</tr>
<tr>
<td>Medium-High</td>
<td>29.14%</td>
<td>28.7%</td>
<td>30.0%</td>
</tr>
<tr>
<td>Medium-Low</td>
<td>24.36%</td>
<td>23.7%</td>
<td>24.5%</td>
</tr>
<tr>
<td>Lowest</td>
<td>19.73%</td>
<td>16.0%</td>
<td>18.0%</td>
</tr>
<tr>
<td><strong>Mother’s country of birth</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australia</td>
<td>79.6%</td>
<td>79.7%</td>
<td>82.2%</td>
</tr>
<tr>
<td>UK</td>
<td>6.0%</td>
<td>5.0%</td>
<td>5.9%</td>
</tr>
<tr>
<td>Other</td>
<td>14.0%</td>
<td>11.9%</td>
<td>7.6%</td>
</tr>
<tr>
<td><strong>Father’s country of birth</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australia</td>
<td>71.8%</td>
<td>72.3%</td>
<td>75.1%</td>
</tr>
<tr>
<td>UK</td>
<td>7.1%</td>
<td>6.4%</td>
<td>7.6%</td>
</tr>
<tr>
<td>Other</td>
<td>19.0%</td>
<td>16.9%</td>
<td>12.1%</td>
</tr>
<tr>
<td><strong>Infant behavior problems† Mean (SD)</strong></td>
<td>1.73 (.69)</td>
<td>1.73 (.69)</td>
<td>1.75 (.68)</td>
</tr>
<tr>
<td>n=cases of complete data</td>
<td>n=2,434</td>
<td>n=1,878</td>
<td>n=454</td>
</tr>
<tr>
<td><strong>Infant easy-difficult temperament‡ Mean (SD)</strong></td>
<td>2.46 (.63)</td>
<td>2.45 (.64)</td>
<td>2.46 (.65)</td>
</tr>
<tr>
<td>n=cases of complete data</td>
<td>N=2,443</td>
<td>n=1,883</td>
<td>n=457</td>
</tr>
</tbody>
</table>

*Note.* †Infant easy-difficulty temperament was measured utilizing a study-devised scale where the mean was taken from subscales: infant approach, co-operation and irritability. Scores range from 1-5 with higher scores indicating higher levels of difficulty.

‡Infant behavior problems were measured using a composite of ATP devised items enquiring about the severity of colic, sleep problems, excessive crying. Response options were, 1=none, 2=mild, 3=moderate, 4=severe.

Percentages reported for categorical data may not equal 100% as a result of missing data on variable.
5.4.2 Measures

*Primary exposure variable: Parental separation or divorce*

The primary exposure variable of interest was parental separation/divorce. In order to identify those who had experienced parental separation or divorce sometime between birth and 20 years of age, we were able to draw on data collected from multiple sources, described below.

*Marital status*

At 10 waves of data collection (participant ages 3-4, 5-6, 7-8, 9-10, 11-12, 12-13, 13-14, 15-16, 17-18, and 19-20 years), parents reported on their marital status. Response options included: ‘married’, ‘defacto’, ‘separated’, ‘single’, ‘divorced’, ‘widowed’, ‘remarried’, and ‘other’. Parent-reported marital status as ‘separated’ or ‘divorced’ was utilized as an indicator for divorce.

*Life events*

Parents were asked to “Describe any changes, losses or problems that have occurred in your family over the past year” at each wave from participant ages 7-8 to 19-20 years. This item was adapted from the Life Events Questionnaire (Coddington, 1972; Holmes & Rahe, 1967). Written qualitative responses were coded and responses indicating loss of a partner through separation or divorce allowed for the identification of participants from dissolved families.

*Retrospective parental separation items*

Two study-devised retrospective parental separation items were included in the parent survey, at participant’s age 17-18 years that asked whether parental separation or parental divorce had occurred during the participant’s lifetime. Response options were ‘yes’ and ‘no’. In addition, at the same wave, a participant-reported item asked, “Over your lifetime, have any of these family changes occurred…” Response options included ‘death of parent’, ‘parents separated’, and
‘parents divorced’. Participants were then asked to report their age at the time of the family structure change. If participants endorsed either the ‘parents separated’ or ‘parents divorced’ response option, they were included in the current analysis.

**Timing of parental separation or divorce**

Upon examination of parent- and participant-reported items collected over the course of the study, parental separation/divorce was deemed to have occurred at a time point if: 1) the parent reported change in marital status from one wave to the next (e.g. from “married” in wave four to “separated” in wave five); or, 2) the parent had reported separation or divorce as a life event in the previous 12 months when responding to the Life Events Questionnaire (adapted from Coddington, 1972; Holmes & Rahe, 1967). Parent-reported marital status and/or life events data were corroborated where possible by the study-devised retrospective parental separation item included in both the parent and participant surveys when participants were aged 17-18 years. At age 17-18 years, 13 participants endorsed previously experiencing their parent’s separation or divorce, however, age at the time of separation was not reported.

Missing values for the binary parental separation variable were replaced by the last observed family structure value. For example, if parent marital status was recorded as “married” in wave 4 and missing in wave 5, the missing value in wave 5 was replaced by “married”. While it was possible that this approach resulted in some under-identification of separation and divorce, hereafter referred to as divorce, we believe this to be minimal given our multiple sources of data and the alignment between divorce rates in our sample and in the Australian population.

To specify timing of parental divorce, binary variables (0=no; 1=yes) were created for each wave to denote whether divorce had occurred at that concurrent wave (‘CON’). From these binary variables, which denoted parental divorce at a
concurrent wave, we were able to create time-lagged variables to represent parental divorce that had occurred at waves prior to, or following, the concurrent wave of measurement. Of these, three negative lagged variables indicated whether parental divorce occurred one (‘NEG1’), two (‘NEG2’), or three (‘NEG3’) waves previously (i.e. two, four, or six years respectively), and three positive lagged variables denoted whether divorce would occur one (‘POS1’), two (‘POS2’), or three (‘POS3’) waves (two, four, or six years) into the future.

In comparison to the commonly used time-invariant variable that simply denotes whether participants family structure is intact or divorced, the multiple time-lagged divorce variables created for the current study are time-varying. Thus, it was possible to examine whether the effect of parental divorce on internalizing/depressive symptoms was delayed (e.g., the effect of divorce on the outcome is observable later in time but not at the concurrent time of divorce) or occurred before the divorce event (e.g., perhaps indicating a stressful family environment in the period preceding divorce). This time-varying variable also allowed for examination of the proximity of any effect of divorce, in order to determine the immediacy or delayed nature of the divorce effect. As noted above, for 13 participants, age at the time of divorce was unknown. It was therefore not possible to classify these participants within any of the time-lagged categories.

**Dependent variable: Depressive symptoms**

Four separate age-appropriate instruments were used to obtain parent and participant reports of depressive symptoms across nine waves of data through the periods of childhood (ages 3-4, 5-6, 7-8, 9-10, 11-12 years), early adolescence (ages 13-14, 15-16 and 17-18 years) and emerging adulthood (19-20 years). Psychometric properties of each of the measures are described below.
Childhood depressive symptoms

During childhood, the parent-reported 5-item Anxious-Fearful subscale from the Pre-School Behavior Questionnaire (PBQ; Behar & Stringfield, 1974) and the identical Anxious-Fearful subscale of the Child Behavior Questionnaire (CBQ; Rutter, 1970) were used to measure internalizing behavior. The PBQ and CBQ have been shown to validly distinguish between children with and without significant emotional problems (Behar & Stringfield, 1974). Therefore, PBQ and CBQ scores provide an indicator of depressive risk. Reliability coefficients ranged from $\alpha=.63$ to $\alpha=.70$ across five time points at participant ages 3-4, 5-6, 7-8, 9-10 and 11-12 years. Parents were asked to respond to items describing their child’s behavior, e.g., “Often appears miserable/unhappy” on a 3-point Likert scale ranging from ‘does not apply’, ‘applies somewhat’, and ‘certainly applies’.

Adolescent depressive symptoms

Depressive symptoms during adolescence, at ages 13-14, 15-16 and 17-18 years, were assessed with the 13-item self-report Short Mood and Feelings Questionnaire (SMFQ; Angold et al., 1995). Responses to items such as, “I don’t enjoy anything at all” were provided by the adolescent on a 3-point Likert scale. Response options were ‘true’, ‘sometimes’, and ‘not true’. Reliability coefficients for the SMFQ ranged from $\alpha=.80$ to $\alpha=.87$. The SMFQ is a valid measure that is highly correlated with depression in clinical samples ($r=0.65$; Angold, Costello, Messer, & Pickles, 1995).

Emerging adult depressive symptoms

At emerging adulthood the self-reported 7-item depression subscale of the 21-item Depression, Anxiety and Stress Scale (DASS-21; Lovibond & Lovibond, 1995) assessed participant depressive symptoms at age 19-20 years ($\alpha=.89$). A 4-point Likert scale included response options from ‘did not apply’ to ‘applied very
much/most of the time’ for items such as “I felt that I had nothing to look forward to”. Mean scores of the DASS-21 were calculated after the obtained scale scores were multiplied by two so as to be equivalent to the 42-item DASS (Lovibond & Lovibond, 1995). High correlation with depression measured in clinical samples demonstrates the validity of the DASS-21 depression subscale (Antony, Bieling, Cox, Enns, & Swinson, 1998).

Covariates

Adjustments were made for mother’s age at birth and family socio-economic status (SES) at birth. Covariates were centered at the sample mean.

SES was calculated as a mean of both parent’s occupational and educational levels. Occupational level was measured by the Broom, Lancaster Jones, and Zubrzycki (1976) 8-point scale ranging from ‘upper professional’ to ‘unskilled’. Educational level was measured by an adapted version of the Brotherton, Kotler, and Hammond (1979) 8-point scale ranging from the lowest (primary schooling) to the highest (postgraduate) educational levels achieved. The composite of both parents’ educational and occupational levels ranged from 1 to 8, with higher scores indicating lower SES (Sanson, Smart, Prior, Oberklaid, & Pedlow, 1994).

5.4.3 Analytic Strategy

Given the clustered nature of the data (i.e., multiple time points nested within individuals) we employed linear mixed effects regression in Stata 14 (StataCorp, 2015) as the primary analytical approach. All models were estimated with a random intercept and with maximum likelihood estimation which allows for missingness on the dependent variable (i.e., depressive symptoms) by using the available data to obtain maximum likelihood parameter estimates. (Acock, 2008).

Given that four depressive symptom measures were used across the nine waves of data collection, mean scores were z-score standardized to facilitate
interpretation. We also conducted analyses using the Percentage Of Maximum Possible (POMP) approach to standardization (Cohen, Cohen, Aiken, & West, 1999) but found no difference to results and thus we present only the results using $z$-scores for ease of interpretation. Due to positively skewed depressive symptom scores, the analyses were bootstrapped (1,000 repetitions) and a robust estimator was used to account for heteroscedasticity.

The mixed effects regression models comprised a series of stages. First, the influence of each of the parental divorce variables (i.e., concurrent divorce at each wave, negative lagged divorce occurring at two, four or six years prior and positive lagged divorce occurring two, four, or six years into the future) on depressive symptoms were examined in separate regression models. An example of the use of a lagged variable in the regression models is provided. To assess for negative lagged divorce occurring six years prior, parental separation (yes=1, no=0) occurring at wave 1, 2, 3, 4, 5, and 6 was correlated with depressive symptoms three waves later, at wave 4, 5, 6, 7, 8, and 9 respectively. Within these models, two- and three-way interactions were examined to determine whether the influence of parental divorce on the outcome differed as a function of wave (denoting child age), sex, or wave and sex.

Across the duration of the study, as participants were followed up longitudinally, measures that were developmentally appropriate to the age and developmental stage of the participant were chosen to assess internalizing behavior and depressive symptoms. In the current analysis, if wave (which indicates age) was examined continuously, changes in depression measurement over time would likely have confounded any effects of wave. As such, we treated wave as a categorical rather than continuous measure of time. Comparisons between groups (e.g. divorce and no divorce) were conducted for each wave separately. The categorical variable,
5.5 Results

5.5.1 Descriptive statistics

Table 5.2 presents the frequency of parental divorce at each wave of assessment. Table 5.2 shows that the highest frequency of parental divorce occurred at the time participants were aged 3-4 years \((n=84)\). However, this is the first time we asked about family structure in our study. Therefore, this represents any divorce since conception. After this time, rates of divorce appear to decline until there is another peak in adolescence, when participants' are aged 13-14 years \((n=69)\) after which, rates of divorce decrease once again.
Table 5.2. Frequency of divorce events at each wave of assessment.

<table>
<thead>
<tr>
<th>Wave</th>
<th>Wave 1</th>
<th>Wave 2</th>
<th>Wave 3</th>
<th>Wave 4</th>
<th>Wave 5</th>
<th>Wave 6</th>
<th>Wave 7</th>
<th>Wave 8</th>
<th>Wave 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at wave</td>
<td>3-4 yrs</td>
<td>5-6 yrs</td>
<td>7-8 yrs</td>
<td>9-10 yrs</td>
<td>11-12 yrs</td>
<td>13-14 yrs</td>
<td>15-16 yrs</td>
<td>17-18 yrs</td>
<td>19-20 yrs</td>
</tr>
<tr>
<td>Rate of parental divorce at each wave (total $n=473^*$)</td>
<td>84</td>
<td>67</td>
<td>50</td>
<td>48</td>
<td>26</td>
<td>69</td>
<td>56</td>
<td>36</td>
<td>24</td>
</tr>
<tr>
<td>Sex of participants whose parents divorced</td>
<td>M=35</td>
<td>M=36</td>
<td>M=31</td>
<td>M=19</td>
<td>M=12</td>
<td>M=35</td>
<td>M=22</td>
<td>M=24</td>
<td>M=13</td>
</tr>
<tr>
<td></td>
<td>F=49</td>
<td>F=31</td>
<td>F=19</td>
<td>F=29</td>
<td>F=14</td>
<td>F=34</td>
<td>F=34</td>
<td>F=12</td>
<td>F=11</td>
</tr>
</tbody>
</table>

Note: *Total $n$ of participants who experienced parental divorce is 473, however available data for 13 participants indicated that a divorce occurred in the family, but the wave at which the event occurred is unknown.
5.5.2 Mixed Effects Regression Models

Of the nine possible waves of internalizing/depressive symptoms, participants completed, on average, 6.6 waves of measurement. There was no variation in the random intercept for any of the models that were estimated ($p>0.05$).

The full list of overall chi-square tests, degrees of freedom and $p$-values for each of the main effects and two- and three-way interaction effects for the seven different regression models under examination are reported in supplementary material (see Appendix F). Notably, there were no significant main effects of time-varying family dissolution for any of the models. That is, in their respective models, concurrent divorce, negative lagged divorce occurring two, four or six years prior and positive lagged divorce occurring two, four, or six years into the future did not independently predict internalizing/depressive symptom scores. There was, however, a significant interaction between experiencing parental divorce two years prior and child sex ($\chi^2(1)=3.99$, $p<0.05$). Post hoc examination of this interaction effect demonstrated that among those who did not experience divorce two years earlier, girls had significantly higher depression scores ($M=0.06$, CI[0.01, 0.10], $p<0.01$) than boys ($M=-0.05$, CI[-0.09, -0.01], $p<0.05$; $d=-0.11$), however, there was no sex difference in depressive symptoms in those who experienced divorce two years earlier. There were no other significant two-way interactions between child sex and parental divorce (i.e., either concurrent, two or six years prior, or two, four, or six years into the future). Additionally, there were no significant divorce x wave x child sex interactions for any of the regression analyses.

Investigation of marginal estimates

The two-way interaction between child sex and divorce two years prior is presented graphically in Figure 1. For comparison, we also present the marginal mean internalizing/depressive symptoms for each of the regression analyses stratified
by sex (boys/girls) and timing of divorce (concurrent divorce at each wave, negative lagged divorce occurring two, four or six years prior and positive lagged divorce occurring two, four, or six years into the future).
Figure 5.1. Marginal mean estimates of internalizing/depressive symptoms for boys and girls who did (‘Yes’) and did not (‘No’) experience negative lagged divorce occurring two (‘NEG1’), four (‘NEG2’) or six (‘NEG3’) years prior, concurrent divorce (‘CON’) at each wave, and positive lagged divorce occurring two (‘POS1’), four (‘POS2’), or six (‘POS3’) years into the future. Large confidence intervals are likely a consequence of lower precision due to small cell sizes.

*Two-way interaction between child sex and lagged divorce at NEG1.
As shown in Figure 5.1, girls were generally found to have higher mean depression scores than boys, however, the significant two-way interaction between child sex and divorce one wave (i.e., two years) prior suggests that the significant sex difference in depressive symptoms was dependent on whether divorce had occurred in the wave prior (i.e., girls were no longer found to have significantly higher depressive symptoms). On crude inspection of the mean estimates, it appears that there is reversal in the sex bias for this interaction whereby boys with a divorce event one wave prior had higher depressive symptoms than girls. However, we note that these estimates have large confidence intervals and thus more precision is required before firm conclusions can be made.

5.6 Discussion

The purpose of this study was to use mixed effects regression modelling with longitudinal, prospective data, to indicate whether timing of divorce is important, whether child age is important, and whether child sex is relative to this effect. It was hypothesized that participants would be at increased risk for depressive symptoms in the immediate pre- and post-separation period. Finally, moderation effects of child sex and age were hypothesized to occur, whereby boys would be at increased risk for depression in the context of parental divorce before puberty and girls after puberty.

As evidenced by marginal mean estimates, girls who do not experience parental divorce are shown to be at higher risk for depression than boys; however, for those who experienced parental divorce in the previous two years, there is no difference between boys’ and girls’ depressive risk. There were no effects of age in these analyses.

The current study demonstrated that two years following a divorce event, the consistently found sex discrepancy for depressive risk in the general population,
whereby girls are greater risk than boys, was no longer evident. This interaction was not found to be dependent on child age. Therefore, our hypothesis that child sex and age would moderate the impact of parental divorce on depressive symptoms, specifically, boys would be at increased depressive risk before puberty and girls after puberty, was not supported. Despite evidence of greater susceptibility to interpersonal stressors amongst adolescent females (Hankin, Mermelstein, & Roesch, 2007), in the context of parental divorce in the previous two years, it cannot be assumed that females of any age up to 18 years will be at higher risk for depressive symptoms compared to males. Parental divorce is associated with the threat of reduced contact, actual reduced contact, or complete lack of contact with the non-residential parent (Kalmijn, de Graaf, & Uunk, 2000), who is typically the biological father (de Graaf & Fokkema, 2007). A meta-analysis conducted by Amato and Gilbreth (1999) examined the relationship between non-residential father contact and child outcomes and concluded that gender did not appear to moderate the relationship. However, examinations of differential child sex effects conducted since, provide evidence for boys’ specific vulnerability for poor psychosocial outcomes (e.g. Cooper, Osborne, Beck, & McLanahan, 2011; King & Sobolewski, 2006; Størksen, Røysamb, Holmen, & Tambs, 2006; Størksen, Røysamb, Moum, & Tambs, 2005). Increased vulnerability for boys has been explained by the loss of a same-sex role model as the family shifts from intact to separated and the biological father typically leaves the family home. In the present analysis, wide confidence intervals around marginal means limits the precision with which we can conclude that moderation by sex is driven by increased risk for either sex in particular. Rather, it suggests that sex differences in depression seen in the general population, cannot be assumed in those who have experienced parental divorce two years earlier. Future
research could explore whether the closing of this gender risk gap is driven by levels of post-divorce father contact.

One explanation for the moderation effect is that the closing of the sex difference in depressive symptoms two years after parental divorce is a function of the combination of elevated male risk and decreased female risk, with neither individually driving the effect. This effect was not present at four, or six years following parental divorce suggesting that the period immediately following the divorce environment is of critical importance. Furstenberg, Nord, Peterson, and Zill (1983) found the rate of father contact immediately post-divorce decreased; however, after two years post-divorce, contact frequency did not continue to decrease, instead remaining fairly constant. It is plausible that the period from divorce to two years after is characterized by instability, before which a consistent post-divorce family routine is established. In prior research, the formation of a stable home environment, including a sense of predictability has been associated with positive child adjustment to divorce (Curtner-Smith, 1995).

In part, our results are in line with those of (Kasen et al., 1996) who examined a sample of 648 boys and girls from pre-puberty to late adolescence (9-18 years) and found that following parental divorce, boys were at greater risk of depression than girls. The effect size reported in the (Kasen et al., 1996) study was large (OR=5.19); however, wide confidence intervals (CI [24.88, 1.08]) raise doubt about the effect. In our study, the effect size estimate was small (d=-0.11) and unlike Kasen et al.’s (1996) finding, boys were not clearly at greater risk than girls, rather, the sex discrepancy for risk of depression closed. This conclusion was made possible by the current study design, which enabled assessment of the temporal sequence of parental divorce and depressive symptom risk (i.e. parental divorce occurred two years after)

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4Kasen et al. (1996) report the upper CI before the lower CI.
years prior to the assessment of depressive symptoms), whereas Kasen et al. (1996) controlled for time since divorce in their analysis. Also, unlike Kasen et al. (1996) the current study assessed depressive symptoms via parent- and self-report rather than clinical diagnoses and at nine time points (compared to two), across a larger duration of child and adolescent development (age 3-4 to 19-20 years). Assessment of subsyndromal symptoms is considered important as higher levels of depressive symptoms predict clinically significant depression later in life (Fergusson et al., 2005; Pine et al., 1999).

Prior longitudinal research that has not found evidence of interactions between child sex and parental divorce differ from the current study on a number of methodological factors. Dunlop and Burns (1995) and Summers et al. (1998) examined interaction effects in small samples, 78 and 285 participants, respectively. Despite this limitation and the absence of a moderation effect, of note is that Dunlop and Burns (1995) report that at age 14-years, boys from divorced families had higher mean depressive symptoms than girls from divorced families and all those from intact families. In contrast to the British National Child Development Study (NCDS) 1958 birth cohort (N=16,496; Rodgers et al., 1997), the current study examined depressive symptoms from childhood to emerging adulthood, while Rodgers et al. (1997) assessed the moderating impact of parental divorce and sex on outcomes during adulthood only, at ages 22 and 33 years. Thus, the absence of a two-way interaction between divorce and child sex in the Rodgers et al. (1997) may be due to depression being examined only at assessments during young adulthood.

Contrary to expectations, the current analysis did not reveal any main effects of divorce on depressive symptoms in the pre-divorce period. Evidence for pre-divorce effects within the literature is mixed. Prior longitudinal studies have been unable to demonstrate robust pre-divorce differences on internalizing problems (e.g.
Strohschein, 2005). Contrastingly, individuals whose parents will subsequently divorce have been shown to significantly differ from those whose parents remain married on other indicators of wellbeing, such as low self-esteem (Sun & Li, 2002). For example, it may be that the pre-divorce period is associated with declines in specific mental health domains (e.g. self-esteem) and not others (e.g. depressive symptoms). The National Education Longitudinal Study from which Sun and Li (2002) examined pre-divorce differences did not examine depressive or internalizing outcomes. Therefore, differences in outcome measurement among studies may account for the varied findings. In order to determine this, more studies that examine a range of mental health domains are needed.

Simultaneous assessment of both family structure and depressive symptoms from childhood through to emerging adulthood allowed for an assessment of the effect of concurrent divorce. In this study, no main effect of concurrent divorce on depressive risk was revealed. Prior longitudinal examinations of divorce have predominantly investigated child outcomes in those from intact and already divorced families where parental divorce occurred prior to the assessment of depressive symptoms (Amato, 2001; Amato & Keith, 1991b). Differences in study methodology therefore make it difficult to ascertain the consistency between the current study’s null finding for a main effect of concurrent divorce and the findings of prior literature.

5.6.1 Limitations and strengths.

By assessing family structure and depressive symptoms at multiple time points across childhood, adolescence and early adulthood, this study builds on previous research which has either assessed only one developmental period (e.g. adolescence) or did not examine the pre-divorce period in addition to outcomes post-divorce. Furthermore, accurate assessment of the interval between parental divorce
and depression provides useful information regarding the most appropriate time at which to target prevention and intervention efforts. Nevertheless, the current analysis is not without its limitations.

It was necessary to employ four separate measures of depressive symptoms that were developmentally appropriate across childhood (3-4 years) to emerging adulthood (19-20 years). It was therefore inappropriate to make between-wave comparisons on depression scores. Each wave was measured categorically and considered to be independent from all others so as to interpret depressive symptoms at each stage of development. This was considered to be the most prudent interpretation of the available longitudinal data.

While the parent- and self-reported measures of depressive symptoms used in the study were based on well-accepted measures (PBQ, CBQ, SMFQ and DASS), reliability coefficients of the PBQ and CBQ ranged from $\alpha=0.63$ to $\alpha=0.70$. This indicated lower reliability when depressive symptoms were measured via parent-report in early- to mid-childhood in comparison to subsequent self-report measures. In addition, the impairment associated with the reported depressive symptoms is unknown. Overall in our sample, as is typical of community cohorts, depressive symptom scores were positively skewed. Although the analytic procedure used was robust to non-normality, scoring in the low range on depressive symptoms suggests a lower representation of participants with clinically significant levels of depression and consequently, less power than “at risk” samples to detect significant effects.

An advantage of examining the current research question in a longitudinal study design was that the temporal sequence of divorce and occurrence of depression could be ascertained. However, attrition is a common concern for most longitudinal studies and was evident at the rate of 1% per year in the current study. While the ATP began as a large representative cohort of Australian participants, by the time
participants had reached age 19-20 years, there was a decrease in the proportion of participants from lower socio-economic backgrounds and participants whose parents were not born in Australia. It is also possible that, due to the circumstances of divorce, e.g. moving house, the current sample under-identified participants from dissolved families. However, the incidence of under-identification is likely to have been extremely small, given that occurrence of divorce in our sample aligned with the Australian population rates. We also used best practice maximum likelihood approach to fit the models and estimate missing data on the repeated measures outcome, depressive symptoms (Graham, 2009).

Examining interaction effects were of special interest in the current study as the divorce literature consistently suggests that the effect of parental divorce varies across individuals, between groups, and over time (Amato, 2010; Di Manno et al., 2015). Mixed effects regression models testing main effects as well as interaction effects were therefore considered to be the best approach to analyzing the data. As outlined by Elwert and Winship (2010), a common problem in the social sciences overall, of which the current study was not exempt, is that sample sizes are often too small to investigate effect heterogeneity. Despite the advantages of the ATP data for a longitudinal analysis of parental divorce, including its reasonably large overall sample (analytic $n=1,943$), the subgroup of participants who experienced parental divorce at each wave is relatively modest in comparison to the reference group (i.e. those who did not experience parental divorce at each wave). By investigating the moderating effects of parental divorce x child sex x age at assessment, subgroups of participant’s averaged only 25 participants per cell. Based on prior research conducted by Oldehinkel et al. (2008) in a slightly larger sample of 2,230 participants (518 of whom experienced parental divorce), there might be reason to expect three-way interactions in further analyses with more power. Future studies
will require large samples, specifically so that there is a higher frequency of those who experience parental divorce, in order to gain precision in estimated marginal mean depression scores.

5.6.2 Implications and future research directions.

Overall, it is established that after puberty females are at increased risk of depressive symptoms, compared to males (Friedman et al., 2011). This sex differentiation is reiterated in the current study’s investigation of marginal mean estimates whereby females who did not experience parental divorce had higher mean depressive symptoms than males. In conjunction with the two-way interaction between child sex and the occurrence of parental divorce two years prior, the findings from the current study suggest that in the context of divorce, depressive risk in the post-divorce period differs by sex. As the analysis employed by this study was novel, and the difference between male and female marginal mean estimates was small in magnitude, the lagged effect of divorce and its interaction with child sex would benefit from further examination in order to formulate recommendations translatable into clinical practice. Replication of this study design in other large cohort studies with multi-decade life course data is recommended to provide an understanding of individual differences in depressive symptoms preceding and following divorce.

The findings from the current study reveal the need for further research investigating moderators of the relationship between parental divorce and depressive symptoms. Prospective longitudinal studies with multiple waves of data that identify higher numbers of parental divorce may be better placed to find robust effects of timing at separation, for which the current study was underpowered to detect. Furthermore, the focus of the current study was on depressive symptoms assessed within a normative sample. Future studies may extend their scope to examine clinical
samples, in order to detect clinically significant depressive symptoms. Focus could also be broadened to risk for other psychosocial outcomes that have been associated with parental divorce, such as externalizing problems.

5.6.3 Conclusion.

Findings from this study provide new insights into differential risk for depression on parental divorce. In the post-divorce period this sex gap in depressive risk appears to close. While the effects are small and it is not yet possible to draw inferences on how these findings translate to clinical practice, this information raises the prospect that in the wake of divorce, the expectation that females would be at increased risk of depressive symptoms, by virtue of their normative heightened risk in the general population, may be erroneous. Rather, it may be particularly important to assume equivalent deleterious outcomes for males. Such a conclusion would have important implications for practitioners and families in efforts to recognize vulnerability and mitigate risk. Future studies with larger numbers of participants from dissolved families are encouraged to continue investigating the moderating effects of child sex and age at parental divorce in both the pre- and post-divorce period, in order to establish differential depressive risk patterns.
CHAPTER SIX  Discussion

6.1 Summary of Findings

The overall aim of this thesis was to examine heterogeneity in depressive symptom outcomes among individuals who have experienced parental separation or divorce. This was done with the view to extend on prior research spanning over 49 years, demonstrating the main effects of family dissolution on offspring outcomes, such as internalising and depressive symptoms (Amato, 2001; Amato & Keith, 1991b). Family dissolution increases risk of depressive psychopathology, including subclinical depressive symptoms but also clinically diagnosed depressive disorders (Culpin et al., 2013; Kasen et al., 1996; Oldehinkel et al., 2008). Despite this, it is acknowledged that the main effects of parental divorce on depressive symptoms are small (Amato, 2001; Amato & Keith, 1991b). Additionally, main effects fail to capture the wide variation in outcomes among children and adults, as evidenced by wide confidence intervals (e.g. Kasen et al., 1996). As such, examinations of the varying trajectories of children from dissolved families have been encouraged (Amato, 2010).

6.1.1 Explanatory mechanisms.

Mechanisms that explain the differences between children from dissolved and intact families have been proposed and empirically investigated. The economic hardship perspective highlights the financial consequence of divorce, as the family’s income is no longer shared between two parents. Such financial difficulty experienced by the single parent, has implications for the investments that are able to be made in the child’s education as well as extra-curricular opportunities (Votruba-Drzal, 2003). The quality of parenting perspective acknowledges that factors such as stress and relational conflict may influence a single parent’s capacity to provide
effective support to their child following divorce. Empirical evidence supports the proposal that the immediacy of a single parent’s own interpersonal difficulties and mental health explains deleterious outcomes for children (Pruett et al., 2003). The process of parental separation also exposes the child to a number of stressors, which may be condensed within a short period of time and are likely to be associated with adverse mental health outcomes (Pearlin et al., 2005). This perspective is especially important to consider in the context of parental separation where children may not only be exposed to the initial divorce of their parents, but also the commencement of their parent’s new partnerships (Amato & Sobolewski, 2001). Additionally, genetic explanations describe a social selection process that increases depressive risk among young people from divorced families (Amato, 2005). Findings reported in prior literature, while mixed, suggest that parents who divorce, may be at increased risk for psychopathology which contributes to the likelihood of divorce, and these biological traits are then inherited by the child, who display increased risk for psychopathology themselves (Amato & DeBoer, 2001). Finally, the Interactionist Model takes into account both the social selection and social causation perspective, describing that exposure to stressful life circumstances may reveal underlying genetic vulnerability for depressive symptoms (Conger & Donnellan, 2007). The perspectives described within the literature assist in framing divorce within a wider family context and highlight the importance of understanding influential factors aside from parental divorce itself, that contribute to offspring depression outcomes.

Despite the availability of informative explanatory theories and supporting empirical evidence for these theories, no single perspective, due to their focus on only certain aspects of the family dissolution environment, adequately accounts for the varying trajectories of young people from dissolved families. As such, identifying factors related to heterogeneity in child depression outcomes was considered to be
Characterising diversity in the risk for depression was the main aim of the current thesis, allowing for identification of individuals particularly vulnerable to depression in the context of family dissolution.

6.1.2 Summary of presented studies.

In the first step towards this aim, the findings of a systematic literature review of factors that moderate (i.e. amplify or weaken the association of interest) was presented in Chapter Two. A comprehensive search of scientific, medical and psychological databases was conducted. Longitudinal research that evaluated any moderator/s of the relationship between parental separation or divorce and offspring depression or depressive symptoms were reviewed. A number of dynamic and stable factors that moderated the relationship between parental divorce and offspring depressive risk, including gender, age, genotype, preadolescent temperament, intelligence, emotional problems in childhood and maternal sensitivity were found. Overall, the review findings revealed that investigations of moderation effects within longitudinal studies were still limited (i.e. only 14 studies met the study’s inclusion criteria). Furthermore, there were certain moderators (e.g. preadolescent temperament) that had only been examined by one study making it difficult to discern the robustness of the moderation effect. Findings highlighted the need for assessments of multiple variables that interact to confer differential risk for depression in the context of family dissolution. Person-centred analytic models such as latent profile, class and cluster analyses were considered to be a useful approach to utilise in future studies in order to further understand individual differences in the relationship between parental divorce and offspring depressive symptoms.

The first empirical study of this thesis therefore examined multiple variables in a person-centred analysis to characterise individual differences in depressive risk. This subset of young people from dissolved families was derived from a larger
sample of participants from the Australian Temperament Project, a longitudinal cohort study. A number of demographic, intrapersonal and interpersonal factors examined during adolescence, were included in the LCA. The decision to include each of the factors in the latent class model was grounded in empirical evidence demonstrating their association with both the divorce context, and depressive risk. The LCA presented in Chapter Four demonstrated that three latent classes existed within the sample of adolescents from divorced families, each demonstrating differential risk of depression in the next stage of life, emerging adulthood. Over half (56.3%) of the adolescents were characterised by positive adjustment and low depressive risk, while the remaining two classes demonstrated differential risk for psychopathology in emerging adulthood. The participants that were classified into the *Moderate Risk* class demonstrated internalising symptomatology in adolescence and subsequently had the highest depressive symptoms in emerging adulthood. The *High Risk* class, on the other hand, also characterised by internalising symptoms in adolescence, scored high on additional indicators capturing externalising and conduct problems. These adolescents were not at risk for elevated depressive symptoms, but rather, post hoc analysis revealed significant risk for antisocial behaviours within this class. This study was the first to extensively describe within-group differences among a sample of individuals from divorced families. The LCA provided further understanding that adolescent sub-populations exist, characterised by unique patterns of demographic, inter- and intra-personal factors. Despite this, age at parental divorce, an indicator included in the LCA, was not found to be a distinguishing characteristic between classes. The lack of differences among the classes according to the age of the child at parental separation, raised questions regarding the importance of timing. As such, a key focus of the final empirical analysis, presented
in Chapter Five, was to examine the interaction effects of age and parental divorce, in the pre- and post-divorce period.

The impact of a child’s age at parental divorce has been examined in prior literature, yet mixed findings are presented. In order to determine the importance of a child’s age at the time of separation, and whether depressive risk occurs prior to and/or following family dissolution, longitudinal mixed effects regression models were conducted. Chapter Five presents the final empirical analysis, which again utilised the ATP’s multi-decade longitudinal data. These data were used to examine two poorly understood possibilities regarding the importance of timing; first, that there might be developmentally sensitive periods for risk of depression associated with family dissolution; and, additionally, that risk for depression might be heightened before and/or after parental separation. The ATP longitudinal data allowed for an examination that spanned from early childhood to emerging adulthood. Specifically, it was possible to assess the interval between the event of separation and assessments of pre- and post-depressive symptoms and whether depressive risk was transient or persistent. The findings from this study revealed a significant two-way interaction whereby overall, females were at greater risk of depressive symptoms than males; however, two years following the occurrence of divorce, this gender difference dissipated. There was no specific time of divorce during childhood or adolescence that appeared to increase risk of depressive symptoms. Post hoc analyses demonstrated males may be particularly at risk for depressive symptoms as a result of no longer living with their fathers two years after parental divorce.

6.1.3 Overall summary of findings.

The series of three studies within this thesis – the systematic review of moderation effects, the LCA of adolescents from dissolved families conferring risk
for depression in emerging adulthood, and the longitudinal mixed effects regression models – add to the weight of evidence demonstrating that there exists considerable variability in depressive symptoms among young people from dissolved families. The systematic review highlighted that a number of factors, including child (e.g. preadolescent temperament) and family (e.g. maternal sensitivity) characteristics account for the variation in individual depressive symptom outcomes. The LCA then modelled a number of child and family factors that illuminated clusters of individuals from dissolved families that share common characteristics. Clear delineation between classes characterised by adjustment, internalising problems and externalising problems resulted. The final study, then sought to explain the importance of timing by utilising nine waves of data pertaining to family structure change and internalising/depressive symptoms. All of the studies presented in this thesis contrast previous examinations of single variables that focus on main effects.

6.2 General Discussion, Strengths and Limitations

6.2.1 Systematic Review.

Upon examination of the prior literature, a number of factors were identified that moderate the relationship between parental divorce and offspring depressive symptoms. However, as evidenced by the systematic review presented in Chapter Two, results were not always consistent. For example, the interaction between gender and parental divorce was demonstrated by some studies (Kasen et al., 1996; Rodgers, 1994) but not others (Chase-Lansdale et al., 1995; Dunlop & Burns, 1995; Rodgers et al., 1997; Summers et al., 1998). Each of the studies included in the review were longitudinal; however, wide variation in depression measurement-type and sample characteristics may have accounted for inconsistent results. Furthermore, some moderation effects were only illuminated within three-way interactions, where
more than one variable and its impact on the relationship of interest (i.e. parental divorce and its association with depressive symptoms) was examined (e.g. Oldehinkel et al., 2008). These findings presented a persuasive argument for examining multiple variables in combination when exploring effects of parental divorce on depressive symptoms as studying variables in isolation obscured important information regarding vulnerability to depressive symptoms.

6.2.2 Latent Class Analysis.

The findings resulting from the LCA suggested that for the most part, people from separated families are resilient and will function well during their adolescent years. These results were consistent with prior literature demonstrating that parental divorce has a small effect size on depressive risk (Amato, 2001; Amato & Keith, 1991b). Compared to the Adjusted class, the Moderate Risk class demonstrated poorer peer attachment and social skills, known protective factors for depression (Costello et al., 2008; Segrin, 2000). The cluster of risk factors that characterised the Moderate Risk class was then associated with the highest depressive symptoms in emerging adulthood. A minority of participants were found to be characterised by a High Risk profile, where the presence of internalising and externalising symptoms was associated with increased risk for antisocial behaviour, but not depression, in emerging adulthood. The factors that clustered together to characterise the High Risk group were consistent with the developmental perspective on antisocial behaviour posited by Patterson et al. (1989). For example, the group were characterised by major determinants of antisocial behaviour including exposure to parental divorce, male gender, deviant peer affiliations, and problems with attention and conduct (Patterson et al., 1989). These results demonstrated clear and meaningful diversity in temperamental, behavioural and social characteristics of adolescents from dissolved
families that differentiated risk for psychopathology (depressive symptoms or antisocial behaviour) in emerging adulthood.

6.2.3 Mixed Models.

The final empirical study spanned the developmental stages from childhood (age 3-4 years) through to emerging adulthood (age 19-20 years), thus extending on the LCA which examined indicators during adolescence only. Prior family dissolution literature, as well as the systematic review presented in this thesis, consistently suggests that the effect of parental separation varies across individuals, between groups, and over time (Amato, 2010; Di Manno et al., 2015). Despite this, sample size restrictions may have impeded our ability to demonstrate the moderating effect of family dissolution x age. Age at parental separation did not appear to influence depressive risk, neither when examined in the LCA or in the mixed effects regression where age at the occurrence of family dissolution was modelled.

6.2.4 Study strengths and limitations.

A key strength of this thesis is that it draws on multi-decade prospectively measured data from two generations of participants. Parent- and self-report data provided a holistic formulation of individual environmental, interpersonal and intrapersonal factors of relevance. The ATP data allowed for prospective examinations of risk and protective factors that provided explanations for the varying trajectories of depression amongst young people from dissolved families. Furthermore, as outlined in the final empirical study presented in Chapter Five, the longitudinal data collected prospectively across childhood to emerging adulthood addressed a number of methodological restrictions posed by prior studies. While a comprehensive analysis of individual differences was able to be examined, information regarding relevant family (e.g. inter-parental conflict) and parenting (e.g. custody arrangements) factors were limited. Thus, conclusions drawn from the
empirical analysis presented in the thesis are necessarily person-centred, rather than family-centred.

Attrition is also a common concern for longitudinal studies, particularly studies like the ATP that have continued over decades. As a result of attrition, when participants were aged 19-20 years, the remaining sample under-represented participants from low socio-economic backgrounds and families where the parents were not born in Australia. While it is possible that the ATP lost families to attrition, who subsequently separated or divorced, this is considered to be unlikely as identification of participants from dissolved families in the sample at participant age 19-20 years (24.34%) was comparable to the Australian rate of young people aged 0-17 years who experience family dissolution (25%).

6.3 Theoretical Implications, Clinical Implications, and Future Directions

In line with the principle of multifinality, the body of work presented in this thesis explored the wide variation in depression outcomes among young people from dissolved families. Individual reactions to the non-normative life event, parental divorce, may be adaptive for some and maladaptive for others (Cicchetti & Rogosch, 1996). In the LCA, while all participants in the analytic sample had experienced the same event, individual functioning varied widely. In the mixed effects regression model, the wide confidence intervals that were illuminated by marginal mean estimates demonstrated that among young people from dissolved families, variation among individual depression outcomes was greater than for those from the non-divorced group. As outlined by prior literature, following family dissolution, depressive symptoms may decrease, increase in the short-term, or persist in the long-term (Hetherington, 1989). Our findings from the mixed effects regression model,
presented in Chapter Five, strengthen existing evidence that depressive symptoms increase in the short-term period, two years post-divorce, particularly for males.

To our knowledge, this thesis is the first to present a person-centred analysis examining subgroups of adolescents from dissolved families. Despite the ability for person-centred analyses to examine interdependent relationships between factors that may drive differential susceptibility to outcomes of interest, such as depression, LCA approaches have seen very little attention in the divorce literature (see Modecki, Hagan, Sandler, & Wolchik, 2015, for an exception). Due to the novelty of this study, and its exploratory nature, the pattern of associations between demographic, intrapersonal and interpersonal factors would benefit from further disentangling. Further research focusing on the at-risk sample of young people from dissolved families, may contribute to a substantial basis from which recommendations that are translatable into clinical practice can be formed. In the LCA presented in Chapter Four, as most adolescents from dissolved families were found to be well-adjusted, preventative efforts and intervention for clinically significant depressive symptoms may not be necessary. It is suggested that rather, a focus on subclinical psychological distress specific to the circumstances surrounding parental divorce (e.g. Laumann-Billings & Emery, 2000) may be more appropriate. However, differences between the remaining two classes, the Moderate Risk and High Risk classes, provided clear signals of risk for two differentiated pathways. These findings underscore the importance of developing and evaluating interventions that are tailored to individual adolescent presentations. Such information would be relevant for clinicians working with this population, so that action toward mitigating the risk for future psychopathology may be taken. However, latent class models with other samples of individuals from dissolved families are needed to further explore the factors that are associated with future risk.
The mixed effects regression model, presented in Chapter Five, provided a unique insight into the role of the post-divorce period highlighting the utility of longitudinal data sets with prospectively measured family structure and psychosocial outcomes. While the results of the final study are interpreted with caution due to its small effect size, this study has added to the weight of evidence suggesting that the post-separation period is of importance for increased risk of depressive symptoms. Future research attempting to replicate these findings may provide the robustness needed to offer suggestions for clinical practice. For instance, it may be that clinicians are mindful that in the wake of separation, the expectation that females would be at increased risk of depressive symptoms, may not apply. Furthermore, discerning the impact of both the pre- and post-divorce period is a critical step to be able to provide timely prevention efforts or intervention for depressive risk.

The findings of the research presented herein suggest that gender and father absence may be areas to consider in future divorce research. The systematic literature review of studies that had examined moderation effects revealed seven studies that assessed offspring gender as a moderator of the association between parental divorce and depression or depressive symptoms (Chase-Lansdale et al., 1995; Dunlop & Burns, 1995; Kasen et al., 1996; Oldehinkel et al., 2008; Rodgers, 1994; Rodgers et al., 1997; Summers et al., 1998) and results were mixed. Together with the two-way interaction found in the second empirical analysis of this thesis, three longitudinal studies offer the suggestion that gender is an important factor to consider in the context of parental divorce. However, due to differences in methodological factors, future research may aim to confirm the differential risk posed by gender.

Prior literature demonstrates that non-residential father status, a common outcome of divorce (Kalmijn et al., 2000), has a deleterious impact on children’s wellbeing (Amato, 1993) and this vulnerability has been shown to be amplified for
The findings from this thesis are consistent with prior literature, whereby not living with the biological father, significantly predicted depressive symptoms for males two years later. This, however, was not the case for girls. This raises the prospect that for boys, the negative effects of divorce may be partly attributed to changes in father-residential status. Future research may explore the potentially explanatory effect of father’s residential status in outcomes of internalising and depressive symptoms.

6.4 Conclusion

Overall, the aim of this thesis was to examine variation in depression outcomes among young people from dissolved families. By examining moderation effects (i.e. factors that amplify or attenuate the relationship between family dissolution and offspring depression) and utilising a person-centered approach to analysis, the findings from this thesis revealed factors that are associated with the wide variation in depressive risk. This thesis, in particular the LCA, highlighted the importance of examining within-group differences in order to provide nuanced information that between-group analyses cannot capture. Furthermore, the critical importance of gender in differentiating young people from divorced and non-divorced groups was highlighted, specifically in the short-term post-divorce period. Age at parental divorce presents mixed findings within the literature and in this thesis age was not found to predict depressive risk. This thesis provides a platform from which researchers and clinicians may recognise the heterogeneity among individuals who share the common life event, family dissolution, and clarifies patterns of risk across multiple psychosocial risk and protective factors and across multiple life stages.


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moderation effects. *Journal of Affective Disorders, 188*, 68-79.

doi: [http://dx.doi.org/10.1016/j.jad.2015.08.017](http://dx.doi.org/10.1016/j.jad.2015.08.017)


doi: [http://dx.doi.org/10.1016/0165-0327(94)90147-3](http://dx.doi.org/10.1016/0165-0327(94)90147-3)


doi:10.1111/1467-8624.00525


doi:10.1111/j.1741-3737.2006.00274.x


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doi:10.1037/0012-1649.36.4.429


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doi:10.1007/s10964-005-8841-8


doi:10.1037/a0012800


APPENDICES

Appendix A

Authorship Statement

1. Details of publication and executive author

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<th>Publication details</th>
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<td>Family dissolution and offspring depression and depressive symptoms: A systematic review of moderation effects.</td>
<td><em>Journal of Affective Disorders</em>, 2015, vol. 188, pp. 68-79. doi: <a href="http://dx.doi.org/10.1016/j.jad.2015.08.017">http://dx.doi.org/10.1016/j.jad.2015.08.017</a></td>
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<tr>
<td>Laura Di Manno</td>
<td>School of Psychology</td>
<td><a href="mailto:lmdi@deakin.edu.au">lmdi@deakin.edu.au</a></td>
</tr>
</tbody>
</table>

2. Inclusion of publication in a thesis

| Is it intended to include this publication in a higher degree by research (HDR) thesis? | Yes | If Yes, please complete Section 3 If No, go straight to Section 4. |

3. HDR thesis author’s declaration

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<th>Name of HDR thesis author if different from above. (If the same, write “as above”)</th>
<th>School/Institute/Division if based at Deakin</th>
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<td>As above</td>
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<td>Variation in depressive symptom outcomes among young people from dissolved families.</td>
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If there are multiple authors, give a full description of HDR thesis author’s contribution to the publication (for example, how much did you contribute to the conception of the project, the design of methodology or experimental protocol, data collection, analysis, drafting the manuscript, revising it critically for important intellectual content, etc.)

Ms Di Manno conceptualised the review, conducted the literature search, identified included studies, drafted the manuscript and revised the manuscript for critical intellectual content.

I declare that the above is an accurate description of my contribution to this paper, and the contributions of other authors are as described below.  

| Signature and date | 25/03/2017 | **Signature Redacted by Library** |

4. Description of all author contributions

<table>
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<th>Name and affiliation of author</th>
<th>Contribution(s) (for example, conception of the project, design of methodology or experimental protocol, data collection, analysis, drafting the manuscript, revising it critically for important intellectual content, etc.)</th>
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<tr>
<td>Dr Jacqui Macdonald, Deakin University, School of Psychology.</td>
<td>Dr Macdonald contributed to the conceptualisation of the review, study design, interpretation of results and revised the manuscript for critical intellectual content.</td>
</tr>
<tr>
<td>Associate Professor Tess Knight, Deakin University, School of Psychology.</td>
<td>Associate Professor Knight contributed to the study design and revised the manuscript for critical intellectual content.</td>
</tr>
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</table>
5. Author Declarations
I agree to be named as one of the authors of this work, and confirm:

i. that I have met the authorship criteria set out in the Deakin University Research Conduct Policy,

ii. that there are no other authors according to these criteria,

iii. that the description in Section 4 of my contribution(s) to this publication is accurate,

iv. that the data on which these findings are based are stored as set out in Section 7 below.

If this work is to form part of an HDR thesis as described in Sections 2 and 3, I further

v. consent to the incorporation of the publication into the candidate’s HDR thesis submitted to Deakin University and, if the higher degree is awarded, the subsequent publication of the thesis by the university (subject to relevant Copyright provisions).

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<td>Associate Professor Tess Knight</td>
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6. Other contributor declarations

I agree to be named as a non-author contributor to this work.

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* If an author or contributor is unavailable or otherwise unable to sign the statement of authorship, the Head of Academic Unit may sign on their behalf, noting the reason for their unavailability, provided there is no evidence to suggest that the person would object to being named as author

7. Data storage

The original data for this project are stored in the following locations. (The locations must be within an appropriate institutional setting. If the executive author is a Deakin staff member and data are stored outside Deakin University, permission for this must be given by the Head of Academic Unit within which the executive author is based.)

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This form must be retained by the executive author, within the school or institute in which they are based.

If the publication is to be included as part of an HDR thesis, a copy of this form must be included in the thesis with the publication.
Appendix B

Journal permissions

*Journal of Affective Disorders*

**Personal use**

Authors can use their articles, in full or in part, for a wide range of scholarly, non-commercial purposes as outlined below:

* Use by an author in the author’s classroom teaching (including distribution of copies, paper or electronic)
* Distribution of copies (including through e-mail) to known research colleagues for their personal use (but not for Commercial Use)
* Inclusion in a thesis or dissertation (provided that this is not to be published commercially)
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Appendix C
Supplementary material for Chapter Two
Systematic Literature Review

Supplementary table. Excluded papers and reasons for exclusion.

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*Note: There may have been multiple reasons for a study’s exclusion, but only the first identified reason is listed.*
Appendix D

Scale items and response options

The full items and response options of the measures used as part of this thesis and the overall Australian Temperament Project are presented in this appendix. For further details regarding the measures used in empirical analysis one, the LCA, refer to Chapter Four and empirical analysis two, the mixed effects regression models, Chapter Five.

Infant Behaviour Problems, parent-reported

Response options:
1 = none
2 = mild
3 = moderate
4 = severe

Items:

My baby has:
Colic
Sleep Problems
Excessive Crying

The mean of these 3 items provides a behaviour problems composite score
Infant easy-difficult temperament, parent-reported


Response options:

1 = almost never
2 = rarely
3 = variable, usually does
4 = variable, usually does not
5 = frequently
6 = almost always

Items:

Infant Approach
accepts straight away any change in place or position of feeding, or person giving the feed ®
is shy (turns away or clings to mother) on meeting another child for the first time
is pleasant (smiles, laughs) when first arriving in unfamiliar places (friend’s house, shop) ®
for the first few minutes in a new place or situation (new shop or home) is fretful
first reaction (at home) to approach by strangers is acceptance ®
accepts within a few minutes a change in place of bath or person giving the bath ®
first reaction to seeing doctor or infant welfare sister is acceptance (smiles, coos) ®

Co-operation
continues to fret during nappy change in spite of efforts to distract with game, toy, singing etc
makes happy sounds (coos, smiles, laughs) when being changed or dressed ®
accepts regular procedures (hair brushing, face washing etc) at any time without protest ®
is content (smiles, coos) during interruptions of milk or solid feeds ®
can be distracted from fretting or squirming during a procedure (nail cutting, hair brushing etc)
by a game, singing, TV etc ®
lies still during procedures like hair brushing or nail cutting ®

Irritability
is fretful on waking up and/or going to sleep (frowns, cries)
amuses self for ½ hour or more in cot or playpen (looking at mobile, playing with toy etc)
continues to cry in spite of several minutes of soothing
cries when left to play alone
is irritable or moody throughout a cold or stomach virus

® reverse coded
Pre-school Behaviour Questionnaire/Child Behaviour Questionnaire
Anxious Fearful subscale – Child report of internalising symptoms


Response options:
0 = Does not apply
1 = Sometimes applies
2 = Frequently applies

Items:
I feel worried, I worry about lots of things
I am on my own a lot
I feel sad or unhappy
I am fearful or afraid of new things or new situations
I am fussy or particular about how I do things
Content of Life Events Scale – Parent Report


Response options:
1 = good effect
2 = no effect
3 = bad effect

Items:
Loss of health, e.g. illness, accident
Loss of job
Death of loved one
Loss of money or possessions, e.g. theft, debt
Loss of partner through separation or divorce
Absence of partner, e.g. through work
Other loss
Change of house
Change of job
Change of child’s school
Pregnancy
Change in number of people at home
Other changes
Long illness, disability
Loneliness, isolation
Money worries
Drug or alcohol problems
Problems with children (e.g. at school)
Relationship with partner (wife, husband)
Other problems
School-Aged Temperament Inventory - parent reported shyness


Response options:
1 = never, almost never
2 = rarely
3 = half the time
4 = frequently
5 = always, almost always

Items:
approaches children his/her own age even when s/he doesn’t know them ®
smiles or laughs with new adult visitors at home ®
is shy with adults he/she doesn’t know
seems nervous or anxious in new situations (visiting relatives, new playmates)
shy when meeting new peers
moves straight into new social situations ®
prefers to play with someone s/he already knows rather than meeting someone new
avoids (stays away from, doesn’t talk to) new guests or visitors in the home
seems uncomfortable when at someone’s house for the first time

® denotes items that are reverse-coded
School-Aged Temperament Inventory - parent reported negative reactivity


Response options:
1 = never, almost never
2 = rarely
3 = half the time
4 = frequently
5 = always, almost always

Items:
gets upset when can’t find something
when disagrees, speaks in a quiet and calm manner ®
gets angry even when mildly criticised
reacts strongly (cries or complains) to a disappointment or failure
gets angry when teased
gets very frustrated when makes a mistake
yells, snaps at others when angry
moody when corrected for misbehaviour
responds intensely to disapproval (shouts, cries etc)
makes loud noises when angry (slams doors, bangs objects, shouts etc)
gets upset when there is a change in plans
has off days when is moody and cranky

® denotes items that are reverse-coded
Short Mood and Feelings Questionnaire – Teenager report of depressive symptoms


Response options:
0 = rarely or never
1 = sometimes
2 = very often

Items:
I am restless, find it hard to sit still
I feel miserable or unhappy
I don’t enjoy anything at all
I feel so tired I just sit around and do nothing
I feel I am no good anymore
I cry easily
I hate myself
I think I can never be as good as other kids
I feel lonely
I think nobody really loves me
I am a bad person
I do everything wrong
I feel down or sad most days
Revised Behaviour Problems Questionnaire, Anxiety subscale – Parent report of child’s symptoms


Response options:
0 = no problem
1 = mild problem
2 = severe problem

Items:
self-conscious; easily embarrassed
feels inferior (‘to others’ added in 1998 & 2000)
shy, bashful
lacks self-confidence
hypersensitive; feelings are easily hurt
generally fearful, anxious (‘generally’ dropped in 1998 & 2000)
depressed, always sad
says nobody loves him/her
has difficulty making choices, can’t make up mind (dropped in 2000)
afraid to try new things for fear of failure
feels he/she can’t succeed
Revised Behaviour Problems Questionnaire, Attention problems subscale – Parent report of child’s symptoms


Response options:
0 = no problem
1 = mild problem
2 = severe problem

Items:
lacks self-confidence
inattentive to what others say
irresponsible, undependable
passive, suggestible, easily lead by others
distractible, easily diverted from the task at hand
sluggish, slow-moving, lethargic
drowsy, not wide-awake
answers without stopping to think
unable to work independently, needs constant help and attention
impulsive, starts before understanding what to do; doesn’t stop and think
slow, not accurate in doing things
does not finish things; gives up easily; lacks perseverance
absent-minded; forgets simple things easily
acts like he/she were much younger; immature, childish
has trouble following directions
school work is messy, sloppy
Revised Behaviour Problems Questionnaire, Socialised aggression subscale – Parent report of child’s symptoms


Response options:
0 = no problem
1 = mild problem
2 = severe problem

Items:
- stays out late at night
- steals in company with others
- belongs to a gang
- loyal to delinquent friends
- truants from school, usually in company with others
- deliberately skips going to school or work
- has ‘bad’ companions, ones who are always in some kind of trouble
- uses drugs in company with others
- steals from people outside the home
- expresses disrespect for moral values and laws
- is part of a group that rejects school activities e.g. team sports, clubs, projects to help others
- cheats
- seeks company of older, more experienced companions
- lies to protect his/her friends
- uses alcohol in company with others
- admires and seeks to associate with ‘rougher’ peers
- runs away; is truant from home
- openly admires people who operate outside the law
Revised Behaviour Problems Questionnaire, Conduct problems subscale – Parent report of child’s symptoms


Response options:
0 = no problem
1 = mild problem
2 = severe problem

Items:
seeks attention, shows off
disruptive, annoys and bothers others
fights
has temper tantrums
disobedient, difficult to control
uncooperative in group situations
negative, tends to do the opposite of what is requested
impertinent, talks back
irritable, hot-tempered, easily angered
argues, quarrels
sulks, pouts
persists and nag, can’t take ‘no’ for an answer
tries to dominate others; bullies, threatens
picks at other children as a way of getting their attention; seems to want to relate but doesn’t
know how
brags, boasts
teases others
selfish, won’t share, always takes the biggest piece
not liked by others, is a ‘loner’ because of aggressive behaviour
cannot stand to wait, wants everything right now (dropped in 2000)
refuses to take directions; won’t do as told (‘what is asked’ in 2000)
blames others; denies own mistakes
deliberately cruel to others
Inventory of Peer and Parent Attachment short-form, Peer subscale – Teenager report


Response options:
1 = almost always true
2 = often true
3 = sometimes true
4 = seldom true
5 = almost never true

In 2000 items were rated as follows:
1 = always/almost always
2 = often
3 = seldom
4 = never/almost never

Items:
1. My friends sense when I’m upset about something
2. Talking with my friends about my problems makes me feel ashamed or foolish ®
3. My friends encourage me to talk about my difficulties
4. My friends don’t understand what I’m going through these days ®
5. My friends listen to what I have to say
6. My friends respect my feelings
7. It seems as if my friends are irritated with me for no reason ®
8. I tell my friends about my problems and troubles

Additional items in 2000
2. My friends accept me as I am
6. I feel they are good friends
8. I trust them
9. I get upset a lot more than they know
12. If they know something is bothering me, they ask me about it

® denotes items that are reverse coded
ATP devised Parenting Practices Questionnaire – Warm parenting subscale

Parent reported

Response options:
1 = always/almost always
2 = often
3 = about half the time
4 = occasionally
5 = never/almost never
6 = don’t know

Items:
How often do you talk with your teenager about his/her plans for the coming day?
1 = almost every day; 2 = most days; 3 = some days; 4 = hardly ever; 5 = almost never

Most of the time, how well do you get along with your child?
1 = very well; 2 = well; 3 = okay; 4 = not too well, 5 = not at all well

In general, how easy or comfortable is it to spend time with your child?
1 = very easy; 2 = easy; 3 = average; 4 = not very easy; 5 = not at all easy

How much time in a week do you have a chance to sit around and talk with your child?
1 = usually no time; 2 = 1 to 2 hours per week; 3 = 2 to 3 hours per week; 4 = 3 to 7 hours per week; 5 = 8+ hours per week ®

My child talks with me about his/her problems or troubles

I enjoy listening to, and doing things with, my child

® denotes items that are reverse coded
ATP devised Parenting Practices Questionnaire – Parental monitoring subscale
Parent reported

Response options:
1 = always/almost always
2 = often
3 = about half the time
4 = occasionally
5 = never/almost never
6 = don’t know

Items:
It is difficult for me to know where my child is and what he/she is doing
How often do you find out where s/he is going when s/he goes out with friends?
When s/he visits friends, how often are adults present?
My child tells me when s/he will be back before going out
How often does your child do things on the weekends without telling you where s/he will be? ®

Additional items for 1998
How often does s/he go out in the evening without adults being present?

® denotes items that are reverse coded
ATP adapted Deviant Peer Associations scale – participant self-report


Participants had the opportunity to respond to the items on the basis of three different friends.

Response options:
1 = never
2 = sometimes
3 = often

Items:
He/she gets into lots of fights
He/she smokes cigarettes
He/she gets into serious trouble at school, wags, suspended
He/she drinks alcohol
He/she has broken the law (eg. shoplifts, vandalism, steals cars)
He/she smokes marijuana
Social Skills Rating System – Parent reported


Response options:
1 = rarely or never
2 = sometimes
3 = very often

Items:

Cooperation subscale
Uses free time at home in an acceptable way
Keeps room clean and neat without being reminded
Puts away belongings or other household property
Volunteers to help family members with tasks
Helps you with household task without being asked
Attempts household tasks without being asked
Completes household tasks within a reasonable time
Uses time appropriately while waiting for your help with homework or some other task
Attends to your instructions

Assertion
Joins group activities without being told to
Invites others to join in social activities
Makes friends easily
Shows interest in a variety of things
Starts conversation rather than waiting for others to talk first
Is self-confident in social situations such as parties or group outings
Introduces herself/himself to new people without being told
Acknowledges compliments or praise from friends
Appears self-confident in social interactions with opposite sex kids
Participates in school sports team(s)
Participates in community sports club(s)
Seems confident when going out in dates

Responsibility
Reports accidents to appropriate persons
Says nice things about himself/herself when appropriate
Shows concern for friends or relatives of his or her own age
 Appropriately expresses feelings when wronged
Follows rules when playing games with others
Waits turns in games or other activities
Informs you before going out with friends
Follows household rules
Is liked by others

Self-control
Speaks in an appropriate tone of voice at home
Responds appropriately when hit or pushed by other children
Politely refuses unreasonable requests from others
Avoids situations that are likely to result in trouble
 Receives criticism well
 Controls temper when arguing with other young people
 Ends disagreements with you calmly
 Controls temper in conflict situations with you
 Responds appropriately to teasing from peers of his or her own age
 Compromises in conflict situations by changing own ideas to reach agreement
Depression, Anxiety and Stress-21 scales, Depression subscale

Participant self-report


Response options:
0 = Did not apply to me at all
1 = Applied to me to some degree, or some of the time
2 = Applied to me to a considerable degree or a good part of time
3 = Applied to me very much or most of the time

Items:
I couldn’t seem to experience any positive feeling at all
I found it difficult to work up the initiative to do things
I felt that I had nothing to look forward to
I felt down-hearted and blue
I was unable to become enthusiastic about anything
I felt I wasn’t worth much as a person
I felt that life was meaningless
Appendix E

Supplementary material for Chapter Four

Latent Class Analysis

Supplementary table 1. *Comparison of retained sample and original cohort on characteristics at recruitment in 1983 (Wave 1).*

<table>
<thead>
<tr>
<th>Domain</th>
<th>Original cohort 4-8 months (Wave 1)</th>
<th>Divorced sample 4-8 months (Wave 1)</th>
<th>Retained sample 19-20 years (Wave 13)</th>
<th>Retained divorced sample 19-20 years (Wave 13)</th>
<th>Known lost* divorced sample 4-8 months (Wave 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=2443</td>
<td>n=449</td>
<td>n=1958</td>
<td>n=396</td>
<td>n=53</td>
</tr>
<tr>
<td><strong>SES tertiles at birth</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highest</td>
<td>31.5%</td>
<td>32.3%</td>
<td>33.6%</td>
<td>33.1%</td>
<td>26.4%</td>
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<tr>
<td>Medium</td>
<td>34.1%</td>
<td>30.5%</td>
<td>34.8%</td>
<td>31.6%</td>
<td>22.6%</td>
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<tr>
<td>Lowest</td>
<td>34.3%</td>
<td>33.6%</td>
<td>31.5%</td>
<td>31.6%</td>
<td>49.1%</td>
</tr>
<tr>
<td><strong>Mother’s country of birth</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australia</td>
<td>79.6%</td>
<td>82.2%</td>
<td>81.9%</td>
<td>82.1%</td>
<td>83.0%</td>
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<tr>
<td>UK</td>
<td>6.0%</td>
<td>6.0%</td>
<td>5.6%</td>
<td>6.3%</td>
<td>3.8%</td>
</tr>
<tr>
<td>Other</td>
<td>14.0%</td>
<td>7.3%</td>
<td>12.2%</td>
<td>7.3%</td>
<td>7.5%</td>
</tr>
<tr>
<td><strong>Father’s country of birth</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>Australia</td>
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<td>74.4%</td>
<td>74.3</td>
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<td>UK</td>
<td>7.1%</td>
<td>7.8%</td>
<td>6.6</td>
<td>7.8%</td>
<td>7.5%</td>
</tr>
<tr>
<td>Other</td>
<td>19.0%</td>
<td>12.2%</td>
<td>17.3</td>
<td>13.1%</td>
<td>5.7%</td>
</tr>
<tr>
<td><strong>Infant behavior problems</strong> †</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td></td>
<td>n=2434</td>
<td>n=430</td>
<td>n=1951</td>
<td>n=378</td>
<td>n=52</td>
</tr>
<tr>
<td>Infant behavior problems † Mean (SD)</td>
<td>1.73 (.69)</td>
<td>1.78 (.69)</td>
<td>1.72 (.68)</td>
<td>1.79 (.69)</td>
<td>1.66 (.64)</td>
</tr>
<tr>
<td><strong>Infant easy-difficult temperament</strong></td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
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<tr>
<td></td>
<td>n=2443</td>
<td>n=443</td>
<td>n=1958</td>
<td>n=381</td>
<td>n=52</td>
</tr>
<tr>
<td>Infant easy-difficult temperament † Mean (SD)</td>
<td>2.46 (.63)</td>
<td>2.47 (.65)</td>
<td>2.45 (.63)</td>
<td>2.47 (.65)</td>
<td>2.41 (.61)</td>
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</tbody>
</table>

*Lost divorce sample was identified by absence from wave 10 (participant age 13-14 years) onwards.

T-test and chi-square analyses demonstrated that the retained divorced and known lost divorced samples did not significantly differ on mother or fathers country of birth ($p>0.05$), infant behavior problems ($p>0.05$) or infant easy-difficult temperament factor ($p>0.05$), but significantly differed on SES ($\chi^2=6.008$, $df=2$, $p=0.05$), with a higher proportion of participants in the lost sample falling in the lowest SES tertile.
As the retained divorced sample and known lost divorced sample differed significantly on SES at birth, an LCA was tested that included the SES at birth variable as an indicator. Mean estimates did not differ, so the final model includes both the retained divorced sample and known lost divorced sample (n=449).

†Infant behavior problems were measured using a composite of ATP devised items enquiring about the severity of colic, sleep problems, excessive crying. Response options were, 1=none, 2=mild, 3=moderate, 4=severe.

+Infant easy-difficult temperament was measured utilizing a study-devised scale where the mean was taken from subscales: infant approach, co-operation and irritability. Scores range from 1-5 with higher scores indicating higher difficulty.

Percentages reported for categorical data may not equal 100% as a result of missing data on variable.
### Supplementary Table 1
Contrast estimates from fixed longitudinal regression models assessing the main and interaction associations between family dissolution and internalizing/depressive symptoms (n=1,943).

<table>
<thead>
<tr>
<th>Parameter</th>
<th>“Neg3”</th>
<th>“Neg2”</th>
<th>“Neg1”</th>
<th>“Con”</th>
<th>“Pos1”</th>
<th>“Pos2”</th>
<th>“Pos3”</th>
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<tbody>
<tr>
<td>Main effect of Divorce</td>
<td>$\chi^2(1)$=1.20</td>
<td>$\chi^2(1)$=2.28</td>
<td>$\chi^2(1)$=0.07</td>
<td>$\chi^2(1)$=0.21</td>
<td>$\chi^2(1)$=0.83</td>
<td>$\chi^2(1)$=0.33</td>
<td>$\chi^2(1)$=0.94</td>
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<tr>
<td>Assessment Wave (Age)</td>
<td>$\chi^2(5)$=3.70</td>
<td>$\chi^2(6)$=3.71</td>
<td>$\chi^2(7)$=3.14</td>
<td>$\chi^2(8)$=8.83</td>
<td>$\chi^2(7)$=6.23</td>
<td>$\chi^2(6)$=8.34</td>
<td>$\chi^2(5)$=3.04</td>
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<tr>
<td>Child Sex (Boys [ref group]; Girls)</td>
<td>$\chi^2(1)$=4.89*</td>
<td>$\chi^2(1)$=2.28</td>
<td>$\chi^2(1)$=0.00</td>
<td>$\chi^2(1)$=0.55</td>
<td>$\chi^2(1)$=2.78†</td>
<td>$\chi^2(1)$=0.02</td>
<td>$\chi^2(1)$=0.00</td>
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<td>Assessment Wave (Age) x Child Sex</td>
<td>$\chi^2(5)$=14.03*</td>
<td>$\chi^2(6)$=5.53</td>
<td>$\chi^2(7)$=22.86*</td>
<td>$\chi^2(8)$=12.32</td>
<td>$\chi^2(7)$=8.26</td>
<td>$\chi^2(6)$=4.44</td>
<td>$\chi^2(5)$=6.07</td>
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<td>Assessment Wave (Age) x Divorce</td>
<td>$\chi^2(5)$=4.92</td>
<td>$\chi^2(6)$=2.99</td>
<td>$\chi^2(7)$=3.58</td>
<td>$\chi^2(8)$=9.20</td>
<td>$\chi^2(7)$=6.58</td>
<td>$\chi^2(6)$=9.22</td>
<td>$\chi^2(5)$=3.75</td>
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<td>Child Sex x Divorce</td>
<td>$\chi^2(1)$=0.38</td>
<td>$\chi^2(1)$=0.91</td>
<td>$\chi^2(1)$=3.99*</td>
<td>$\chi^2(1)$=1.54</td>
<td>$\chi^2(1)$=0.11</td>
<td>$\chi^2(1)$=1.80</td>
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<tr>
<td>Assessment Wave (Age) x Child Sex x Divorce</td>
<td>$\chi^2(5)$=5.23</td>
<td>$\chi^2(6)$=9.80</td>
<td>$\chi^2(7)$=5.83</td>
<td>$\chi^2(8)$=11.21</td>
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<td>$\chi^2(6)$=3.88</td>
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<tr>
<td>Intercept</td>
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<td>.02 (.03)</td>
<td>.03 (.03)</td>
<td>-.00 (.03)</td>
<td>.00 (.03)</td>
<td>-.00 (.03)</td>
<td>.00 (.03)</td>
</tr>
</tbody>
</table>

**Note:** All analyses were bootstrapped (1,000 repetitions) and a robust estimator was used on the bootstrapped sample to model the data.  
* $p<0.05$, †Sig $p<0.10$
Appendix G

Evidence of journal submission

Submission Confirmation

Thank you for your submission

Submitted to
Journal of Marriage and Family

Manuscript ID
JMF-2017-6784-MS

Title
Profiles of Adolescents from Dissolved Families and Depressive Risk in Emerging Adulthood

Authors
Di Manno, Laura
Macdonald, Jacqui
Youssef, George
Little, Keriann
Olsson, Craig

Date Submitted
31-Mar-2017
Dear Ms Di Manno,

Your submission "A Longitudinal Investigation of Child, Adolescent and Young Adult Depression Risk Pre- and Post-Family Dissolution," has been received by Developmental Psychology.

You will be able to check on the progress of your submission by logging on to Editorial Manager as an author. The URL is http://dx.doi.org/10.1037/edc.2017.03.01.

Your manuscript will be given a reference number once an Editor has been assigned.

Please note that you may also confirm or Authenticate your ORCID by clicking here http://dx.doi.org/10.1037/edc.2017.03.01.

Best regards,

Editorial Office
Developmental Psychology

APA asks that you please take a moment to give us your feedback on the submission process, by completing a short survey, available at http://aco.psych.org/forms/52/g5/5k.