Life After Sudden Partner Loss: Health and Economic Consequences for Sole Parents in New Zealand

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Abstract

Sudden partner death in mid-life is a major shock with potential long-term consequences for survivors' health and economic well-being, especially for those who raise children. However, most bereavement research has focused on older widowed spouses, leaving a gap in assessing its influence on younger families. This research investigates the long-term physical health, mental health, and economic effects of partner loss on surviving parents in New Zealand. Using integrated administrative microdata from Statistics New Zealand's Integrated Data Infrastructure, 312 surviving fathers and 1,380 surviving mothers (ages 18–54 with dependent children) are identified whose partners died of exogenous causes between 2006 and 2019. The difference-in-differences model developed by Callaway and Sant'Anna (2021) is employed to estimate average treatment effects on several life outcomes: annual wages and salaries, benefit uptake, ACC compensation, and prescription medication use (with medications classified into cardiovascular and mental health categories, e.g., antidepressants, anxiolytics, sedatives). Mortality records from the Ministry of Health are conditioned on ICD-10 codes to ensure the deaths are sudden and exogenous, and parental characteristics and pre-loss incomes are drawn from an administrative census and Internal Revenue Data.

The findings reveal a sharp and persistent decline in earnings for surviving parents, with fathers experiencing a larger and more prolonged income loss. Benefit receipt rises sharply following partner loss for surviving fathers and remains elevated for many years; mothers see a brief increase immediately after loss, but their reliance on benefits subsides in later years. ACC uptake increases notably in the post-loss years for both mothers and fathers. Prescription medication use rises across both mental and cardiovascular health domains, with the largest sustained increases observed among mothers (especially in sedative and antidepressant prescriptions). These results demonstrate that the death of a partner imposes a multifaceted and enduring socioeconomic and health burden on surviving parents.

Attestation of Authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor used artificial intelligence tools or generative artificial intelligence tools (unless it is clearly stated, and referenced, along with the purpose of use), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

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ACC	Accident Compensation Corporation – New Zealand's injury and compensation scheme
APC	Administrative Population Census – longitudinal population register from Stats NZ
ATT	Average Treatment Effect on the Treated – causal effect estimate for treated individuals
CSDiD	Callaway and Sant'Anna Difference-in-Differences – staggered difference-in-differences treatment estimator
DIA	Department of Internal Affairs – New Zealand agency for birth and death registration data
DSM	Diagnostic and Statistical Manual of Mental Disorders, classification manual produced by the American Psychiatric Association
HPA	Hypothalamic-Pituitary-Adrenal – neuroendocrine stress response axis
ICD	International Classification of Diseases – World Health Organization diagnostic coding standard
IDI	Integrated Data Infrastructure – linked administrative microdata from Stats NZ
MDD	Major Depressive Disorder – depressive disorder with persistent low mood
OECD	Organisation for Economic Co-operation and Development – international forum of 37 countries with market-based economies that collaborate to develop policy and economic standards
PAYE	Pay As You Earn – New Zealand's system of withholding tax from wages and salaries, reported by employers to Inland Revenue
PHARMAC	Pharmaceutical Management Agency – New Zealand's government agency responsible for deciding which medicines and related products are subsidised and funded through the public health system
PTSD	Post-Traumatic Stress Disorder – trauma-induced anxiety disorder
Stats NZ	Statistics New Zealand – national statistics office of New Zealand that collects data, produces surveys and censuses
TWFE	Two-Way Fixed Effects – model accounting for both individual and time-specific effects

1 Introduction

The sudden loss of a partner or spouse represents one of the most psychologically debilitating events that an individual can face in their lifetime. It involves a multitude of emotional, behavioural, physiological, and social consequences, many of which can persist well beyond the initial aftermath of the loss. Although the terms *bereavement* and *grief* are often used interchangeably in colloquial language, researchers and professionals differentiate between the two: *bereavement* refers to the state of having lost a loved one and includes the longer process of adjustment and adaptation, while *grief* is the emotional response to that loss (Zisook et al., 2014). In life-course theory, such a loss is understood as a significant disruption that can alter an individual's life trajectory, not merely a transient period of mourning[1](Wanka & Walsh, 2025).

This thesis focuses on sudden and exogenous bereavement, such as death resulting from accidents or unforeseen events. These forms of loss tend to be more disruptive than deaths resulting from chronic illness or old age, as they often occur without psychological preparation, financial planning, or caregiving transitions (Kristensen, Weisæth, & Heir, 2012; Mirzaei et al., 2019). For individuals raising dependent children, particularly those with limited access to external support systems and community resources, such an event can lead to acute emotional suffering and also persistent socioeconomic stress. In this study, sudden partner loss is found to create two significant challenges for the surviving partner: coping with the emotional toll of grief while also taking on the full weight of parenting, earning an income, and running a household. The death of a spouse in a household with children is also the death of a parent. Therefore, the effects of bereavement permeate throughout the affected family network. Children who experience the death of a parent often face elevated risks of adverse outcomes as well. For example, Finnish register data shows that early parental death is associated with long-term reductions in education, employment, and adult mental health (Böckerman, Haapanen, & Jepsen, 2023), illustrating the inter-generational ramifications of bereavement. In sum, sudden partner bereavement is not only a personal tragedy for the surviving partner, but a family-level disruption with potential inter-generational effects on dependants.

The term *widowhood effect* is a prominent concept in bereavement literature used to describe the increased risk of morbidity and mortality among surviving partners in the aftermath of their partner's death. As Moon et al. (2014) found, the widowhood effect is most intensely

[1]Life-course theory frames individual lives as shaped by the timing and sequence of life events, social context, and linked lives.

felt by affected individuals in the first three months after a spouse's death, with the mortality risk nearly doubling for men (odds ratio = 1.87) and substantially increasing for women (odds ratio = 1.47), even after socioeconomic and health factors were controlled for. Some residual effects persisted for men after one year, although they were less pronounced. Likewise, in a meta-analysis of over 500 million individuals, (Shor et al., 2012) found a 23% increase in mortality risk among widowed individuals (after adjusting for demographic and health covariates). These findings emphasise the connection between bereavement and physical health, beyond the more commonly studied psychological outcomes of grief and depression.

This connection between bereavement and physiology is a key topic explored in bio-psychosocial literature. Recent studies in psychobiology and translational health sciences have provided evidence that bereavement can disrupt the behaviour of key physiological systems, including the autonomic nervous system, the hypothalamic-pituitary-adrenal axis, and immune function. There are a considerable number of consequences that follow the disruption of these systems, including unbalanced cortisol patterns, elevated sympathetic nervous system activity, reduced heart rate variability, and impaired immune response (Buckley et al., 2012). These consequences are particularly significant for individuals dealing with complicated grief symptoms (Fagundes & Wu, 2020). They can be further exacerbated by behavioural changes common amongst the bereaved, such as disrupted sleep schedules, poorer diets, reduced physical activity, and increased use of alcohol or substances (Stahl & Schulz, 2014).

Not all bereaved individuals are affected equally. One's psychological resilience and the availability of social and economic resources influence the extent to which bereavement translates into adverse outcomes. Individual variation can be partially explained by attachment styles, pre-existing mental health conditions, quality and access to social networks, and the nature of the death itself (e.g., sudden vs. anticipated) (Boelen & Lenferink, 2020; Stroebe, Schut, & Stroebe, 2007; Wayment & Vierthaler, 2002). The loss of a partner can lead to a complete reconfiguration of daily life for parents with dependent children, such as they may have to assume sole caregiving duties, face reduced participation in the labour market, and experience decreased household income (Anderson et al., 2022). These pressures may amplify stress pathways and reduce the capacity for recovery. In effect, partner loss is not just an emotional blow but also a shock to the family's financial and caregiving structure.

Bereaved sole parents must often navigate immediate and severe changes in household economics: in dual-income households, one entire source of earnings is eliminated overnight, while in single-earner households, the family loses not only income but also the non-market labour that the deceased partner contributed to childcare and homemaking. Consequently, widowhood frequently triggers a sharp decline in material well-being. Empirical studies

have found, for instance, that newly widowed women experience around a 22% reduction in household income on average (along with a 10% loss of wealth), reflecting the substantial financial toll of spousal death (Streeter, 2019). Men, on average, tend to incur more minor proportional income losses (often having been primary earners), but those who suddenly assume the caregiving responsibilities can face difficulties in balancing work and family life (Streeter, 2019). Regardless of gender, the sudden shift to solo parenthood commonly brings financial anxiety and heightened economic insecurity, burdens that compound the direct emotional stress of bereavement (Liang, Berger, & Brand, 2019). In fact, due to the economic strain, solo parents are more likely to experience higher levels of psychological distress than their partnered counterparts (Dhungel et al., 2023; Hallerbäck et al., 2025; Liang, Berger, & Brand, 2019). For example, studies have observed that single mothers of young children are about twice as likely to report high levels of stress or depression compared to married mothers in the same age group (Hallerbäck et al., 2025; Liang, Berger, & Brand, 2019). These aligning bodies of evidence show how the dual burden of sole parenting and income generation after partner loss can jeopardise both mental health and economic stability, especially in the absence of robust support systems.

Despite the fact that the widowhood effect has been extensively researched, bereavement literature has historically focused on older populations, such as retirees or elderly couples, with much less known about the impacts of partner loss among younger adults (Morris, Souza, & Fasciano, 2021). The few studies that do explore younger bereaved populations tend to concentrate on mental health or short-term grief responses, rather than long-term physiological health (Holmgren, 2021; Lancaster & Johnson, 2020). Furthermore, economic burden and the strain of sole parenting are rarely examined as deterministic factors in outcomes among bereaved individuals (Holmgren, 2021). Qualitative evidence suggests that widowed parents often face significant work-family conflict and lasting financial hardship; for instance, over 80% of widowed parents in one study reported major changes to their employment following the death of a co-parent (e.g. taking extended leave, reducing work hours, or leaving jobs) (Holmgren, 2021). Likewise, families of individuals who died in workplace accidents have been found to suffer long-term financial insecurity in the majority of cases (Matthews et al., 2022). Yet, to date, there have been virtually no large-scale, population-based studies that follow bereaved parents over time to quantify such effects.

Aotearoa New Zealand offers a distinctive institutional setting for studying bereavement outcomes. The government provides universal access to healthcare and modest welfare safety nets for its citizens, such as the Accident Compensation Corporation (ACC), which can offer financial support to surviving family members if a death is attributable to an injury or

accident. However, New Zealand lacks the necessary long-term support systems for bereaved parents, like extended parental leave or targeted income assistance (Hodson & Jerram, 2023). Instead, bereaved parents must generally rely on standard welfare programmes (for example, the Sole Parent Support benefit (Dwyer, 2015)), their own resources, or philanthropy from their communities (Taua'i & Yang, 2024). The statutory bereavement leave from employment in New Zealand is limited to just three days (New Zealand Parliament, 2003), which is a period considered insufficient for processing grief, and handling funeral arrangements and caregiving plans (Rosenberg, 2015). Additionally, the broader social support infrastructure is modest. Beyond an entitlement of 20 hours per week of free early childhood education for preschoolers, affordable childcare options in New Zealand remain limited (Benison & Sin, 2023), and net childcare costs rank among the highest in the Organisation for Economic Co-operation and Development (OECD) relative to average wages (Organisation for Economic Co-operation and Development, 2025). This means that a surviving parent who needs to return to work faces major financial and practical challenges to find childcare, potentially restricting their participation in the labour market. Although the universal healthcare system ensures access to essential medical services, the economic and practical burdens following bereavement can be severe. For example, families in hardship can apply for a one-off funeral grant from Work and Income, but this payment (around $2,445 NZD at present) covers only a fraction of typical funeral costs and is received by fewer than 5,000 people each year (Funeral Directors Association of New Zealand, 2023). Thompson and Yeung (2015) have noted that the limited scope of such assistance disproportionately harms the most vulnerable New Zealanders, particularly Māori and Pacific peoples. Young widowed parents juggling full-time employment, childcare, and grief in this policy environment may thus find themselves at risk of prolonged economic hardship and associated health decline in the absence of more robust support.

Māori and Pacific communities comprise a significant portion of the population, with distinct traditions and social structures that influence both the experience of grief and the available support mechanisms. Māori, the indigenous people of Aotearoa New Zealand, observe *tangihanga* (funeral rites) as a cultural funeral practice. A tangihanga typically involves several days of mourning on a marae (communal meeting place), where extended *whānau* (family) and friends gather to pay respects and support the bereaved family (Moeke-Maxwell, Robinson, & Gott, 2024). This approach means a supportive network surrounds the bereaved, and the practical responsibilities of mourning (such as food preparation, ceremony, and burial arrangements) are shared across the community. Pacific Island cultures similarly emphasise communal support during bereavement. For instance, Samoan families practice *fa'alavelave*, a mutual aid system where relatives and community members provide money, food and gifts

to help with funeral expenses and support the immediate family of the deceased (Enari & Rangiwai, 2021). These cultural practices can provide critical emotional and financial support, alleviating some immediate burdens on widowed parents by distributing the tasks and costs of mourning. Furthermore, Māori and Pacific communities in New Zealand experience higher rates of poverty and health inequities, and they are more likely to face the death of family members at younger ages compared to Pākehā (New Zealand Europeans) (Aho et al., 2019). Culturally responsive state support is therefore crucial. Any policy measures or interventions for bereaved parents must be attuned to these cultural practices and ensure that families who traditionally rely on collective help are not left without a safety net in the long run.

Against this backdrop, this study draws on an innovative data source to address many of the limitations in prior research and provide evidence on the long-term outcomes of bereaved parents affected by sudden and exogenous loss. Specifically, linked administrative microdata from Statistics New Zealand's Integrated Data Infrastructure (IDI) is used to track cases of sudden partner bereavement among parents nationwide over more than a decade. The IDI contains longitudinal, de-identified information on individuals' health, income, benefit receipt, and other domains, drawn from government records. Using administrative data in this analysis allows for the mitigation of the risk of selection bias, a common issue in survey-based studies (where only those who seek support or enrol in studies are observed), thereby allowing the capture of the full population of bereaved parents, including those who are typically overlooked in research. The sample focuses on 1,692 bereaved parents whose partners died of exogenous causes between 2006 and 2019, including 312 surviving fathers and 1,380 surviving mothers. The Callaway and Sant'Anna Difference-in-Differences (CSDiD) framework (Callaway & Sant'Anna, 2021) is employed to account for dynamic treatment timing and staggered bereavement onset. The outcomes examined include annual employment earnings, welfare benefit uptake, ACC compensation receipt, and prescription medication use (particularly medications related to mental health and cardiovascular health). The nature of this longitudinal research design enables the tracking of how widowhood affects the dynamics of a survivor's life over time, allowing for the estimation of differing effects for survivors based on gender, age, and caregiving responsibilities (e.g., whether the surviving parent is caring for very young children).

This study seeks to answer the following research questions:

1. What are the long-term physical health consequences of sudden parenthood loss for surviving parents (as indicated by sustained changes in health-related behaviours and prescription medication usage)?

2. How do the effects of bereavement on health and socioeconomic outcomes vary by characteristics such as the surviving parent's gender, age, and caregiving burden (for instance, the age of the youngest child)

3. What role does the household's socioeconomic status prior to bereavement play in moderating the impact of partner loss? In particular, are low-income or otherwise disadvantaged families more adversely affected in the long run?

4. To what extent are changes in health outcomes (e.g. increased use of medications for mental or cardiovascular health) associated with changes in economic outcomes such as income loss, greater reliance on government benefits, or ACC support?

This thesis offers novel insights into the long-term effects of sudden and exogenously-attributed partner loss, particularly in a younger parent population. The findings have implications for public policy expansion, particularly by identifying vulnerable subgroups of widowed parents who may require additional support after losing their partner. By integrating longitudinal data on health, income, and social support within New Zealand's institutional framework, this study offers insights with direct implications for bereavement-related policy and family wellbeing.

The following sections comprise the remainder of this thesis. Chapter 2 reviews bereavement literature through theoretical frameworks of life-course disruption and physical health outcomes, socioeconomic burdens, and caregiving strain in spousal loss. Chapter 3 explains the research methodology together with the CSDiD estimation approach. Chapter 4 explains the IDI sample development process and presents statistical information about the research participants. Chapter 5 presents the primary empirical findings, which are followed by Chapter 6, where the results are discussed and given broader interpretation. The thesis concludes with Chapter 7, which summarises the research findings and their limitations and provides recommendations for future research and policy development.

2 Literature Review

2.1 Psychological Impacts of Bereavement

The death of a spouse or partner is universally understood as one of the most psychologically destabilising events that any individual can face in their lifetime, with the potential to impair one's emotional, cognitive, and physiological functioning (Infurna et al., 2017; Keyes et al., 2014). Bereavement literature identifies partner loss as a significant risk factor for developing a litany of clinical mental health disorders: major depressive disorder (MDD), generalised anxiety disorder (GAD), post-traumatic stress disorder (PTSD), and prolonged grief disorder (PGD) (Keyes et al., 2014; Prigerson et al., 2009; Zisook, Chentsova-Dutton, & Shuchter, 1998). These psychological consequences are often compounded by related problems, such as insomnia, social withdrawal, and reduced social support (Fried et al., 2015; Redican et al., 2024; Spallek et al., 2020). Notably, the context of the death, such as whether it was sudden or expected, has been shown to influence the onset and duration of grief symptoms (Djelantik et al., 2017; Scott et al., 2020).

Major depressive disorder is especially prevalent among individuals who have lost a partner, with rates spiking in the initial months of bereavement (Kristiansen et al., 2019). In a foundational study of bereavement literature, Clayton and Darvish (1979) revealed that MDD symptoms appeared in more than 35% of bereaved spouses during the first month following loss and about one-third of these individuals maintained clinical depression one year after loss. A more recent study conducted by Kristiansen et al. (2019) similarly found that MDD affects approximately 40% of bereaved people during the first month after partner loss and persists in about 10% of bereaved individuals during the two to five-year period following loss. These findings emphasise that depressive symptoms after partner loss can be both intense and enduring. In light of this research, psychiatric diagnostic guidelines have evolved. Whereas the DSM-IV once employed a "bereavement exclusion" [1], recent research has shown that bereavement-related depression is severe and not clinically distinguishable from other depressive episodes in terms of the prescribed treatment response (Zisook et al., 2012).

The death of a loved one creates the risk for affected individuals to develop anxiety-related disorders. These disorders accompany feelings of helplessness, hyperawareness, and an existential fear resembling trauma-related stress (Kaltman & Bonanno, 2003). Keyes et al.

[1] As Iglewicz et al. (2013) explains, the DSM-IV "Bereavement Exclusion" prevented professionals from diagnosing MDD in the first two months of grief unless specific pathological features were present, unintentionally implying that grief should resolve within that period.

(2014) found in their United States-based study that unexpected partner loss was found to be associated with the onset of panic disorder, PTSD, and depression for all affected age groups. This risk is exceptionally high following violent or accidental deaths, where bereaved spouses frequently report restlessness, intrusive memories, and emotional detachment after the loss (Kaltman & Bonanno, 2003; Rodger et al., 2006), indicating a combination of acute stress and grief-related trauma symptoms.

Historically, PTSD following bereavement was overlooked by professionals because traditional PTSD definitions required diagnoses of life-threatening trauma. However, this has since changed, as studies have consistently documented trauma symptoms in bereaved individuals after the death of their partner. For example, Zisook, Chentsova-Dutton, and Shuchter (1998) found that 36% of people who lost their partner through means of suicide or accident met the criteria for a PTSD diagnosis two months post-loss. Notably, the observed individuals harboured a dual diagnosis pattern, where PTSD cases overlapped with cases of depression, along with the behaviours of persistent hyperarousal, avoidance of death reminders, and reliving the experience (especially among those who witnessed the death occur or discovered the body of their partner). Consistent with this, Keyes et al. (2014) also reported that sudden, unexpected loss was a strong predictor of first-onset PTSD and other psychiatric disorders.

In addition to depression and anxiety, a distinct syndrome known as Prolonged Grief Disorder (PGD) or complicated grief has been increasingly recognised by researchers and clinicians. PGD is characterised by persistent yearning for the deceased, difficulty accepting loss, and functional impairment that lasts well beyond one year. The prevalence of PGD is estimated to affect roughly 4–8.2% of bereaved individuals [2] (Boelen, Lenferink, & Smid, 2019; Rosner et al., 2021). Whereas typical bereavement allows individuals to cope over time slowly, individuals with PGD have a longer and comparatively more disabling duration of bereavement. Bonanno et al. (2002) described this pattern as a "chronic grief" trajectory, in which individuals never fully adapt after loss. Risk factors for chronic grief include high relational dependency on the deceased, insecure attachment styles, and the unexpected nature of the death. The formal inclusion of PGD in both the DSM-5-TR and ICD-11 reflects the clinical agreement on its distinct symptom structure and the need for targeted interventions by professionals (Prigerson et al., 2009).

Sleep disturbances are another significant yet often underemphasised consequence of bereavement. Problems such as insomnia, frequent waking, and nightmares are common during

[2]Prevalence rates vary: 4.2% under ICD-11, 3.3% under DSM-5-TR, and 8.2% under DSM-5 PCBD criteria (Boelen, Lenferink, & Smid, 2019; Rosner et al., 2021).

acute grief (Hardison, Neimeyer, & Lichstein, 2005; Lancel, Stroebe, & Eisma, 2020). Lancel, Stroebe, and Eisma (2020) found consistent evidence that bereaved individuals report longer sleep onset latency, more nighttime awakenings, and poorer sleep quality compared to non-bereaved controls. These sleep problems tend to be worse in those who exhibit concurrent depression or more intense grief symptoms. Disrupted sleep has important health implications: it alters circadian rhythms, heightens inflammatory responses, and impairs emotional regulation (McEwen & Karatsoreos, 2015). Persistent insomnia may prolong depressive and grief symptoms, making sleep an important target for bereavement interventions.

Social and occupational functioning often declines after partner loss. Bereaved individuals may struggle with maintaining work performance, household responsibilities, and social roles. For example, a Danish study of 1,622 relatives of terminally ill patients found that 27% reported significant functional impairment six months after bereavement, and 19% still reported such impairment three years later (M. K. Nielsen et al., 2020). These difficulties can stem from emotional exhaustion or a sense of isolation. Stroebe, Schut, and Stroebe (2006) note that supportive social networks can mitigate intense or prolonged grief, but support is not universally adequate- mismatched support may feel intrusive or unhelpful for the bereaved. Younger surviving partners may feel especially isolated, since partner loss is rarer in their age group and peer support is harder to find.

The nature of the death has a decisive impact on psychological outcomes. Sudden and unexpected deaths generally produce more severe grief and trauma symptoms than anticipated deaths following a prolonged illness (Bottomley, Campbell, & Neimeyer, 2022). An unanticipated loss leaves little room for psychological preparation or coping, unlike an expected death, where anticipatory grief allows some degree of emotional adjustment and planning. That said, even expected deaths carry risks. M. K. Nielsen et al. (2017) found that caregivers who experienced high levels of depression or grief before their partner's death were more likely to develop prolonged grief afterwards. Overall, those who suffer sudden partner loss typically experience more prolonged emotional strain than those whose loss was anticipated.

In sum, the psychological consequences of losing a partner are complex and heterogeneous, shaped by individual factors and the circumstances of the death (M. K. Nielsen et al., 2017). While many bereaved individuals eventually show resilience (Bonanno et al., 2002), a substantial proportion experience persistent depression, anxiety, PTSD, or prolonged grief over time that significantly impair their functioning (Keyes et al., 2014; Zisook, Chentsova-Dutton, & Shuchter, 1998). The body's neuroendocrine and inflammatory pathways are activated by these enduring psychological stressors, highlighting the link between mental

health and physical health outcomes.

2.2 Physical Health Outcomes and Stress Responses

The psychological effects of bereavement only represent a portion of the total burden that surviving partners can suffer from. A growing body of interdisciplinary literature has begun to shed light on the biological impacts of grief, providing evidence that partner loss activates a plethora of stress-related physiological responses. These responses, most notably involving the hypothalamic-pituitary-adrenal axis, sympathetic-adrenal-medullary system, and immune functioning, are increasingly recognised as contributors to elevated risks of cardiovascular disease, immune dysregulation, and all-cause mortality (Fagundes et al., 2019; Seiler, von Känel, & Slavich, 2020). The consequences become most severe for individuals who experience unexpected or traumatic loss, lack social support, and must care for dependent children.

The hypothalamic-pituitary-adrenal axis is central to the stress response. Bereavement has been shown to alter its normal functioning, leading to elevated and dysregulated cortisol secretion (Fagundes & Wu, 2020; Seiler, von Känel, & Slavich, 2020). While cortisol is critical for regulating inflammation and mobilising energy during acute stress, persistent elevation can become pathogenic. Chronic hypercortisolemia has been associated with metabolic dysregulation, immune suppression, and increased cardiovascular risk (Cesari et al., 2003; Miller, Chen, & Parker, 2011). With these effects, prolonged stress exposure can desensitise glucocorticoid receptors, diminishing anti-inflammatory feedback mechanisms and stimulating systemic inflammation (Rohleder, 2019).

Complementing hypothalamic-pituitary-adrenal dysregulation is activation of the sympathetic-adrenal-medullary system, which releases catecholamines such as adrenaline and noradrenaline. The release of these hormones elevates the heart rate and blood pressure, readying the body for acute threats; for bereaved individuals, this sympathetic hormonal activation can lead to short-term cardiovascular stress (Buckley et al., 2012). Renownedly, Kaprio, Koskenvuo, and Rita (1987) established that myocardial infarction and stroke risks become significantly higher during the first month after losing a partner. In a more recent study by Buckley et al. (2012), grieving individuals exhibited raised 24-hour systolic blood pressure during the initial weeks post-loss, which makes those affected susceptible to cardiac complications. The research from Kaprio, Koskenvuo, and Rita (1987) and Buckley et al. (2012) substantiates the connection between emotional shock and acute cardiac outcomes.

Grief also undermines immune function. Bereaved individuals often exhibit diminished lym-

phocyte proliferation and natural killer cell activity—biomarkers of immunosuppression [3] (Irwin et al., 1987; Knowles, Ruiz, & O'Connor, 2019). Importantly, Schleifer et al. (1983) demonstrated that it was not just the stress of caregiving, but the loss itself, that drove this decline in immunity. These impairments may leave survivors more vulnerable to infection, prolonged illness, and exacerbation of chronic conditions. For those managing childcare or work responsibilities, limited recovery time may amplify the toll on immune health.

Low-grade inflammation is another key biological indicator that links bereavement to poor health. Several studies observe that inflammatory markers (such as interleukin-6 and C-reactive protein) are particularly increased among grieving individuals (Fagundes et al., 2019; Seiler, von Känel, & Slavich, 2020). These markers are strongly associated with cardiovascular pathology and metabolic dysfunction. Additionally, when paired with poor sleep and reduced physical activity (both of which are common during early bereavement), inflammation may compound physical health risks (Cesari et al., 2003).

These physiological disruptions likely contribute to the consistently observed "widowhood effect," where surviving spouses experience increased mortality. Kaprio, Koskenvuo, and Rita (1987) documented a 40% rise in all-cause mortality among widowers within six months of their partner's death, which was later extended by Elwert and Christakis (2008), who found that spousal bereavement was associated with persistently elevated mortality risks over time (particularly from cardiovascular disease).Moon et al. (2014) observed a doubling of acute cardiovascular events in the thirty days following spousal death, suggesting that both immediate stress responses and longer-term dysregulation contribute to bereavement-related health decline.

As discussed earlier, physiological outcomes depend on the nature of the loss (whether sudden or expected). Mason and Duffy (2019) found that individuals experiencing sudden losses had more irregular cortisol patterns and elevated sympathetic arousal compared to individuals experiencing anticipated losses from chronic illness. Demographic characteristics also play a role in moderating risk. Older adults face more severe immune declines because their ageing immune system weakens (Prigerson et al., 1997). Men, who often face greater social isolation, show higher post-loss mortality, while women may be more prone to prolonged grief symptoms and the accompanying inflammatory profile (Elwert & Christakis, 2008; Seiler, von Känel, & Slavich, 2020). Additional moderators include the presence of dependent children, the quality of available social support, and access to bereavement interventions.

[3] Lymphocyte proliferation reflects the immune system's ability to produce white blood cells in response to threats, while natural killer cell activity measures the body's capacity to destroy virus-infected or malignant cells. Reduced levels of either indicate weakened immune function.

Together, these findings emphasise the fact that bereavement—particularly sudden partner loss—extends well beyond the emotional domain, with serious and sometimes fatal implications for physical health. These biological mechanisms help explain why surviving partners are not only psychologically vulnerable but also physically at risk in the months and years following loss.

2.3 Socioeconomic Strain and Caregiving Burdens

Although the physiological consequences of bereavement have recently received more attention from researchers, the socioeconomic and caregiving impacts of bereavement remain comparatively underexplored, especially for surviving partners with dependent children (Holmgren, 2021; Lancaster & Johnson, 2020). The loss of a partner creates both emotional and biological stress for the affected family unit while simultaneously disrupting the surviving partner's financial stability and caregiving responsibilities (Holmgren, 2021; Matthews et al., 2022). Survivors, under psychological stress, must navigate the sudden changes in household income, employment, and domestic obligations. These sudden changes can be especially overwhelming for sole parents who must multitask economic stability and care for their children on their own (Dhungel et al., 2023; Hallerbäck et al., 2025).

An immediate consequence faced by surviving partners is the decline in household income, where the death of a partner can eliminate a source of earnings overnight. Even for single-earner households, the death of a partner leads to a substantial loss of non-market labour (such as childcare and household management).[4] From an economic perspective, the death of a partner can cause a shock to the household production function,[5] reducing a family's capacity to uphold its standard of living (Becker, 1965). Research indicates that widowed individuals, especially women, often encounter existing structural challenges prior to their partner's death, often due to household caregiving responsibilities (Streeter, 2019; Weir, Willis, & Sevak, 2002; Zick & Holden, 2000).

Surviving women tend to experience larger economic losses than men, reflecting the historical systemic gender inequalities in both the labour market and caregiving responsibilities. Women are more likely to have been secondary earners, to work part-time, or to have exited the labour force prior to their partner's death—all factors that substantially impair their financial recovery (Kapelle & Winkle, 2024; Streeter, 2019). Empirical estimates show that

[4] In economics, non-market labour refers to unpaid activities that contribute to household welfare, such as caregiving, cooking, or elder care.

[5] The household production function models the home as a productive unit that combines time, labour, and resources to generate overall wellbeing.

newly widowed women experience around a 22% drop in household income and a 10% decline in wealth. In contrast, men typically experience comparatively smaller financial losses but may experience greater disruption to their emotional wellbeing (Streeter, 2019). Social insurance programmes rarely fully address these financial losses. Young widows, in particular, face persistent income shortfalls despite access to survivor benefits (Streeter, 2019; Weir, Willis, & Sevak, 2002). When the caregiving responsibilities are suddenly completely transferred to bereaved men of partner loss, such as those with young dependants, these individuals often experience a distinct psychological burden. While men may be more likely to outsource care, those in traditional "breadwinner" roles can face heightened vulnerability to stress and socioeconomic disruption (Halleröd, 2013). Regardless of one's gender, financial anxiety affects bereaved parents across different income brackets, which demonstrates how gendered and systemic inequalities shape loss consequences (Halleröd, 2013).

Sole parents comparatively experience more psychological risks than partnered parents, as they must manage economic pressure, loneliness, and their work and household responsibilities simultaneously. Dhungel et al. (2023) found that 8.5% of single Japanese fathers experienced high psychological distress, often attributed to coping with job insecurity. Similarly, a Sweden-based study found that sole parents were at more than double the risk of distress than partnered parents, primarily due to financial difficulties and insufficient support systems in their lives (Hallerbäck et al., 2025). Similar patterns are observed in Germany, where Liang, Berger, and Brand (2019) found that single mothers of children under three years of age were twice as likely to report stress, anxiety, and or depression symptoms compared to partnered mothers. These studies collectively showcase that the dual burden of sole caregiving and income generation imposes significant strain in the absence of institutional support.

This strain can also lead to a reduction in one's commitment to the labour force and career stability. Dziak, Janzen, and Muhajarine (2010) reported that single mothers experienced more work-family conflict than partnered mothers, leading to burnout and long-term employment stagnation. Furthermore, more than 80% of widowed parents experience significant disruptions in their employment after losing their partner through increased sick leave, reduced working hours, part-time employment, and job loss (Holmgren, 2021). These disruptions are often not short-term for the bereaved; rather, they serve as signs of the structural challenges they face in balancing their trauma, childcare, and financial survival. Matthews et al. (2022) found in their study on workplace fatalities that 60% of individuals often faced long-term financial insecurity years after the loss of their partner. According to the findings expressed in Matthews et al. (2012), traumatic workplace deaths create financial uncertainty and dis-

tress in bereaved individuals, which extends beyond the duration of available compensation programmes.

The financial hardship that follows bereavement tends to exist for multiple years, especially for young widows or adults. In Lancaster and Johnson (2020), 69% of bereaved individuals who were surveyed up to five years post-bereavement were reportedly unprepared (financially or practically) for their partner's death, with women and younger adults reporting the greatest adversity. Furthermore, participants often reported feelings of abandonment by both financial institutions and social services. Those feelings of abandonment stem from the fact that governmental compensation payments rarely match the lost income of households, forcing many families to rely on informal support and under-funded welfare systems (Matthews et al., 2022). Housing instability is another consequence of economic loss experienced by the bereaved. Egsgaard (2022) found that widowed individuals were more likely to move house after the loss of their partner, especially for women, who often are forced to downsize or relocate to more affordable housing.

Children affected by parental loss are vulnerable to enduring long-term consequences. Compared to their peers in two-parent households, children who lose a parent at a young age experience lower academic performance and reduced school attendance, which can lead to poor long-term academic outcomes (Andriessen et al., 2020). A population-level study from Finland found that early parental death strongly predicted lower educational success, reduced employment rates, and decreased earnings by age 30 (Böckerman, Haapanen, & Jepsen, 2023). The long-run effects in this study were partially attributed to the increased risk of mental illness and substance use that follows early parental death in children.

A common theme across these aforementioned studies is that the death of a partner triggers a reconfiguration of economic and caregiving responsibilities, with severe complications for surviving parents and their dependants (Holmgren, 2021; Lancaster & Johnson, 2020). Sole-parent households experience increased risks of psychological anguish, employment instability, housing disruption, and financial insecurity (Liang, Berger, & Brand, 2019; Matthews et al., 2022). These outcomes are particularly acute in the absence of robust institutional supports and are further exacerbated by the suddenness of the partner's death (Hallerbäck et al., 2025; Matthews et al., 2012).

2.4 New Zealand's Institutional Context

The analysis of partner loss effects in Aotearoa New Zealand requires knowledge of the country's institutional framework and policy structure. The welfare and health systems of New

Zealand combine universal and means-tested support programmes, yet research indicates that bereaved families often experience administrative and policy shortfalls, especially when they experience the loss of a loved one or take on sole caregiving responsibilities (Ministry of Social Development, 2018). Unlike New Zealand, a few high-income OECD countries have begun to create formal bereavement support systems at the national level. The Republic of Ireland has led policy development through the establishment of a national model that outlines the levels of bereavement care offered and specifies staff competencies and training requirements (Aoun et al., 2020). New Zealand's closest neighbouring country, Australia, provides bereavement services through palliative care programmes "often regardless of risk or need" (Aoun et al., 2012, 2020). Although Australian citizens are still heavily reliant on informal support networks to meet their bereavement needs, the country has implemented a "compassionate communities" strategy to enhance community-based support (Aoun et al., 2020). Despite their inconsistent services and professional care challenges (Aoun et al., 2020), both countries offer a clearer bereavement structure than what New Zealand currently offers for its bereaved citizens. In contrast, the bereavement support system in New Zealand operates without a specific national organisation or policy framework, and its publicly funded services remain scarce and disorganised while depending on volunteer efforts (Bellamy et al., 2014; Ministry of Social Development, 2018).

The healthcare system in New Zealand operates at two levels of service for its citizens, where public healthcare is available to all residents (funded mainly through general taxation), while private healthcare provides additional services for those who can afford it (Henriquez et al., 2024). The public system formally covers mental health services, but in practice, the public faces barriers to access due to wait times, insufficient services, and regional disparities (Te Hiringa Mahara Mental Health and Wellbeing Commission, 2025). A 2018 government inquiry revealed that the bereaved (especially parents) struggled in obtaining timely grief counselling, due to heavily delayed specialist referrals and the limited availability of culturally appropriate care for Māori and Pacific families (Government Inquiry into Mental Health and Addiction, 2018)

The welfare system of New Zealand provides some financial assistance to bereaved people, but the coverage is limited. Orphan's Benefit and Unsupported Child's Benefit are available to caregivers of bereaved children, while Sole Parent Support offers income-tested benefits to sole parents (Ministry of Social Development, 2025). However, these payments are often insufficient to offset the loss of a second income fully, and uptake is hindered by bureaucratic complexity or a lack of awareness of these payments (Taua'i & Yang, 2024). The Accident Compensation Corporation (ACC) provides compensation to eligible individuals through

lump sum payments, funeral grants, and survivor benefits in cases of accidental death. Yet qualitative studies suggest that navigating the ACC process can be emotionally taxing and poorly suited to the needs of traumatised families, particularly for older Māori people (Hikaka et al., 2025). The duration of payments is also limited (Hikaka et al., 2025), which might not be sufficient to address extended economic losses.

Bereavement leave is protected under New Zealand employment law, which guarantees up to three days of paid leave following the death of a close relative (Rosenberg, 2015). While deemed progressive in comparison to many OECD countries (Organisation for Economic Co-operation and Development, 2025), this duration is often insufficient for the bereaved, particularly for sole parents managing grief alongside the full-time caregiving of their children (Benison & Sin, 2023; Macdonald et al., 2015). Surveys suggest that many survivors take unpaid leave or exit the workforce entirely, highlighting the gap between formal protections and lived realities (Holmgren, 2021).

The availability of childcare services determines how well surviving parents can maintain their employment. Although New Zealand provides 20 hours of free early childhood education (ECE) per week for children aged three to five, this provision often falls short for parents of younger children, those needing extended care hours, or those outside urban centres (Ministry for Regulation, 2024). Limited access to flexible or affordable childcare may exacerbate labour force withdrawal among bereaved parents, particularly mothers (Morrissey, 2017).

Housing instability is another vulnerability. The social housing system of New Zealand provides some assistance to low-income families, but the demand for housing vastly exceeds the available supply (Barker, 2019). Bereaved families—especially single mothers—often experience difficulties securing affordable rental housing after the loss of a partner's income (Egsgaard, 2022). The effects of these changes are particularly severe for Māori and Pacific families, as their communities experience disproportionate rates of poverty and homelessness, due to New Zealand's history of colonisation and societal changes (Aho et al., 2019).

In sum, while the institutional framework of New Zealand offers a basic level of support to bereaved individuals, it fails to address the policy gaps that affect surviving partners, particularly those with dependent children. The lack of mental health services, along with the insufficient benefits, inadequate childcare options and unstable housing, creates long-term risks for many families. The adverse effects of partner loss may worsen when structural conditions combine with psychological and physiological stressors.

3 Methodology

3.1 Causal Estimation (CSDiD): Group-Time ATT

This study makes use of the difference-in-differences estimator of Callaway and Sant'Anna (2021), referred to as CSDiD, which is employed by researchers to estimate causal effects in settings where units receive treatment at multiple different time intervals. Two-way fixed-effects (TWFE)[1] difference-in-differences models use homogeneous treatment effect assumptions, which can lead to biased or counterintuitive findings when treatment effects differ between cohorts (or change over time). The CSDiD method, on the other hand, allows for the estimation of separate treatment effects for each treated cohort of units during each time period; this ultimately allows for the analysis of heterogeneous treatment effects while avoiding the common errors of TWFE estimates. The main parameter of interest of in this research is the group-time average treatment effect (ATT)[2], denoted $ATT(g,t)$, which is the effect for units first treated in period g, observed at time t.

3.2 Treatment and Control Groups

For every unit (the surviving parent), let $G = g$ indicate the first period in which it receives the treatment (in this context, the sudden loss of their partner). Let Y_t represent the observed outcome for that unit at time t. The group-time average treatment effect is denoted as

$$ATT(g,t) = E[\, Y_t(g) - Y_t(0) \mid G = g \,] \tag{3.1}$$

where $Y_t(g)$ is the expected outcome at time t if the unit is treated in period g, and $Y_t(0)$ is the outcome at time t in the absence of treatment (or in other words, the counterfactual). To estimate $ATT(g,t)$, a difference-in-differences comparison is utilised to compare the change in outcomes from period $g-1$ to period t for $G = g$ (the treated cohort) to the change in outcomes for a control group. This can be written as

$$ATT(g,t) = E[\, Y_t - Y_{g-1} \mid G = g \,] \; - \; E[\, Y_t - Y_{g-1} \mid C = 1 \,] \tag{3.2}$$

[1] TWFE refers to a regression model with two sets of fixed effects. One set of fixed effects for each unit and one set for each time period, as in the standard panel data DiD format.

[2] ATT is the average treatment effect on the treated, that is, the average causal effect for those units that receive the treatment.

where $C = 1$ indicates control units. The control group represents units that are not yet treated by time t (i.e., units that will eventually receive the treatment but have not as of time t). Each choice of control group requires a different assumption to identify causal effects. The analysis depends on not-yet-treated units as controls, so it is necessary to apply the identification assumptions discussed below.

3.3 Identification Assumptions

Two essential identification assumptions are required to estimate $ATT(g,t)$. These assumptions include limited treatment anticipation and conditional parallel trends. First, the *limited treatment anticipation* condition states that treatment does not affect outcomes before its implementation. Formally, there exists a lead time $\delta \geq 0$ such that for all $t < g - \delta$, the treatment has no impact on outcomes. As the deaths of partners are conditioned to be sudden and exogenous, the analysis sets $\delta = 0$, as surviving partners are expected not to alter their behaviours prior to the partner's death significantly.

Second, a *conditional parallel trends* assumption is assumed in this analysis. This ultimately means that, absent treatment, the expected change in outcomes between the pre-treatment period $g-1$ and a later period t is the same for both the treated and control groups (after conditioning on the covariates X). The expression for using never-treated units as controls is:

$$E[\, Y_t(0) - Y_{g-1}(0) \mid G = g, X \,] \;=\; E[\, Y_t(0) - Y_{g-1}(0) \mid C = 1, X \,] \tag{3.3}$$

where $Y_\tau(0)$ represents the estimated outcome in period τ with no treatment. The parallel trends assumption, after incorporating not-yet-treated units as controls, becomes:

$$E[\, Y_t(0) - Y_{g-1}(0) \mid G = g, X \,] \;=\; E[\, Y_t(0) - Y_{g-1}(0) \mid D_{t+\delta} = 0, X \,] \tag{3.4}$$

where $D_{t+\delta} = 0$ represents units that have not received the treatment by time $t+\delta$. In other words, this analysis assumes that in the absence of partner death, the outcomes of surviving parents (the treated cohort) would have followed a similar trajectory to those of similar parents who had not yet lost a partner. Since the control group consists of individuals who have not yet been treated, the latter version of the parallel trends assumption is applied to this analysis.

3.4 Estimation Procedure

The `csdid` command (Rios-Avila, Sant'Anna, & Naqvi, 2021) is used in the statistical software package, Stata, which allows for the employment of the doubly-robust DiD estimation procedure as developed by Callaway and Sant'Anna (2021). The Rios-Avila, Sant'Anna, and Naqvi (2021) the `csdid` command uses the following steps in its computation of ATT:

1. **Propensity Score Estimation:** The propensity score $p_g(X)$ is estimated first for each unit, which is essentially the probability of being treated first in group g, given the covariates X.

2. **Doubly-Robust ATT Calculation:** With the estimated propensity scores, $ATT(g,t)$ can be calculated using a doubly-robust approach, which combines inverse-probability weighting and regression adjustment. Each observation is then weighted by the inverse of its propensity score and includes covariates in the outcome regression. This ensures that the resulting $ATT(g,t)$ estimate is consistent if either the propensity score model or the outcome model is correctly specified.[3]

3. **Inference via Bootstrap:** To obtain the robust standard errors and confidence intervals for the estimated $ATT(g,t)$, a multiplier bootstrap procedure is applied by the command. The bootstrap repeatedly resamples the input data by assigning random weights to observations and approximating the sampling variability of the estimator.

3.5 Aggregating Treatment Effects

Summary measures (estimands) are calculated from the cohort-specific estimates to combine treatment effects across different groups. For example, the computation of an overall average treatment effect is achieved by taking a weighted average of $ATT(g,t)$ across all cohorts and time periods. *Dynamic effects* (how impacts evolve over time) are also examined by plotting $ATT(g,\, g+s)$ against the event time $s = t - g$, where s denotes the number of periods since the cohort received the treatment.

Each cohort-time observation receives weights that correspond to its frequency in the data to represent the actual distribution of cohort sizes and observation windows. In other words, larger cohorts or those observed over more time periods receive more weight in the aggregated results. In practice, $ATT(g,t)$ is calculated only for cohort–time combinations where a

[3] A doubly-robust estimator remains unbiased as long as either of the two models is correctly specified.

suitable control group is available. If all units eventually receive the treatment, the last cohort to be treated has no remaining untreated units to serve as a control in periods after its treatment. As a result, the post-treatment effects for that cohort cannot be separately identified.

3.6 Limitations of Two-Way Fixed Effects

Traditional TWFE DiD regressions impose the assumption of a constant treatment effect across all groups and time periods, along with additional restrictive conditions. If treatment effects do vary by cohort or over time, TWFE estimates can be biased, and in some cases, the TWFE approach even assigns negative weights.[4] This can lead to overall impact estimates that fall outside the range of the true cohort-specific effects, resulting in specific group-time comparisons that are misleading (Callaway & Sant'Anna, 2021). The CSDiD estimator produces separate effect estimates for each cohort and time period, which prevents aggregation bias from averaging heterogeneous effects and delivers direct causal interpretations for each $ATT(g,t)$.

[4]Under staggered treatment timing, TWFE regressions can effectively give some later-treated groups a negative weight in the overall estimate, causing those groups' outcomes to pull the combined effect in the opposite direction.

4 Data and Descriptive Statistics

4.1 Integrated Data Infrastructure

The basis of this research is Statistics New Zealand's Integrated Data Infrastructure (IDI), which is a large-scale longitudinal data repository that links individual and household microdata in New Zealand over extended periods of time. The IDI compiles administrative and survey data from a multitude of sources maintained by Stats NZ, covering a range of life events–such as births, deaths, demographic attributes, medication prescriptions, employment, income, and welfare benefits (Atkinson & Blakely, 2017). The IDI's ability to integrate and store this data allows authorised researchers to analyse individuals' life trajectories across multiple life events. To ensure that no person can be identified after the publication of research, all data in the IDI is de-identified and personal information such as names, dates of birth, and addresses of citizens has been removed (Atkinson & Blakely, 2017).

Each person in the IDI is assigned a unique identifier (`snz_uid`), which can be used to link them across all datasets they are affiliated with.[1]Figure 4.1 illustrates my approach to linking my target IDI tables. After applying the chosen sampling criteria, the final study population includes 1,380 surviving mothers and 312 surviving fathers. These linked data form the basis of this empirical analysis of how sudden and exogenously-attributed partner loss affects surviving parents.

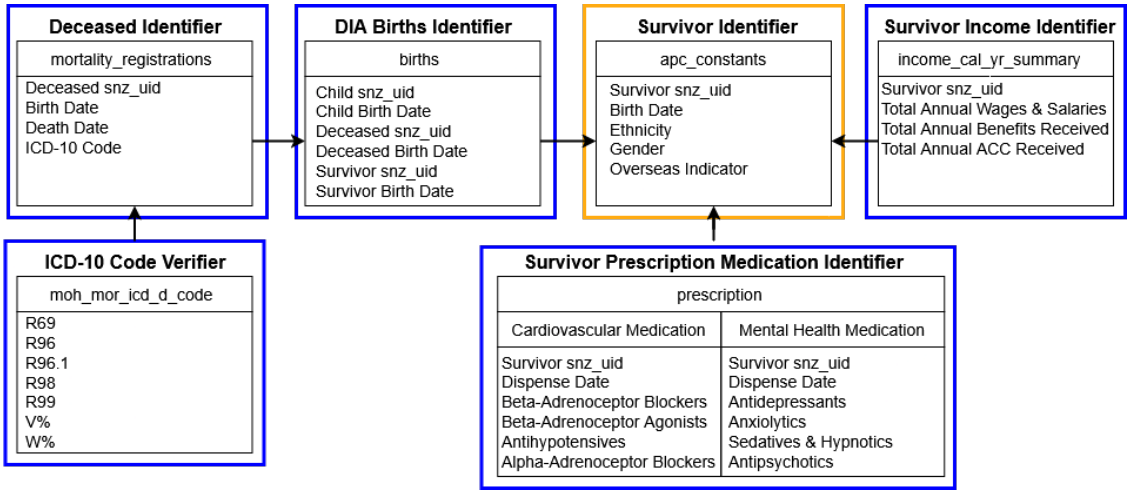


Figure 4.1: This illustrates the linkages between the datasets used in this study. The purpose of each dataset is explained in the sections that follow.

[1]The `snz_uid` allows the linking of records while preserving the anonymity of individuals in the dataset.

4.2 Administrative Population Census Data

The Administrative Population Census (APC) functions as my main connecting element, which unites all my target datasets within the IDI. In this study, the `apc_constants` table[2] acts as an anchor for identifying surviving partners and capturing their baseline demographics. The APC is maintained by Stats NZ using integrated administrative data from multiple government agencies, including the Department of Internal Affairs (DIA), Inland Revenue, the Ministry of Health, and the Ministry of Education. Whereas the New Zealand census is conducted by the government every five years, the APC is assembled entirely from administrative records and is designed to support the analysis of longitudinal population-level data (Bycroft, Morgan, & Matheson-Dunning, 2020).

Individuals are identified across all IDI datasets by the universal unique identifier (`snz_uid`), which allows the APC to be linked with event-specific data (e.g., mortality, income, health records). The APC also provides this research with key covariates such as sex, date of birth, ethnicity, and migration status, which are fixed at their pre-bereavement values to avoid any endogeneity bias. Ethnicity is recorded using Stats NZ's prioritised system (which assigns each citizen to Māori, Pacific Peoples, Asian, Middle Eastern/Latin American/African, other or European in priority order) (Stats NZ, 2020). Sex is classified as a legal designation recorded in official documents and treated as a binary variable in this analysis, due to limitations in the administrative data. This study acknowledges that the data may not accurately represent how the individuals in the research identify with their gender, especially for transgender and nonbinary individuals.

The APC offers a flexible and comprehensive picture of the New Zealand population over time, and it allows researchers to observe individuals who might not respond to the census. Prior studies note that fixed census snapshots are not adequate for analysing events like sudden bereavement (Jutte, Roos, & Brownell, 2011; Spallek et al., 2020). In contrast, the APC's longitudinal nature allows for an uninterrupted observation of each individual over the whole 2008–2019 study window. This continuity is essential for the difference-in-differences approach, which models partner death events in a staggered-timing framework (Callaway & Sant'Anna, 2021).

This thesis focuses on how sudden and exogenously-attributed partner loss affects the surviving parent's physical health and economic well-being, with an emphasis on families with dependent children. The APC spine is crucial for this analysis: by linking to mortality

[2]The `apc_constants` table is the core population register in the IDI, created by Stats NZ by linking administrative records to provide a base population for longitudinal research.

records from the Ministry of Health (to timestamp the death), birth records from the Department of Internal Affairs (to identify dependent children and parents), income data from the Internal Revenue (wages, benefit uptake, ACC compensation), and health data from the Ministry of Health (prescription records), each family's trajectory can be tracked before and after they experience partner loss.

Furthermore, control variables can be created from the APC, based on an individual's fixed attributes, such as gender, ethnicity, and migration status, and to anchor them prior to bereavement, which strengthens the causal inference of the analysis. Controlling for these baseline covariates follows the recommended practice in quasi-experimental design (Blumberg, 2016), and helps account for subgroup differences (e.g., between men and women). Finally, New Zealand's APC approach mirrors the growing international trends towards creating administrative population registers for research purposes (United Nations, 2019). The APC's integrated linkage system is similar to the Scandinavian population registers, often cited as a gold standard (Fadlon & Nielsen, 2021; Pedersen, 2011), but it is still evolving and is released in iterations rather than continuously.

4.3 Validation of Recorded Deaths

To focus on sudden and exogenously-attributed partner deaths, official mortality records from the Ministry of Health are linked to the APC-based sample using the unique identifiers. The mortality data include ICD-10 cause-of-death codes (World Health Organization, 2016), which were used to select sudden, unexpected causes. Specifically, the sample is restricted to deaths coded as R69 (ill-defined), R96 (sudden death, unspecified), R98 (unattended death), R99 (other ill-defined), or any code beginning with "V" (transport accident) or "W" (other external unintentional injury).[3] All of these ICD codes were thoroughly examined to truly identify the deaths that are exogenous and sudden, aligning with the goal of isolating the impacts of unexpected partner loss.

This classification follows the standard practice in bereavement research, which distinguishes between sudden and anticipated losses (Kristensen, Weisæth, & Heir, 2012; Whitehead et al., 2020). For example, unexpected or violent deaths tend to produce greater psychological and physiological disruption in survivors than expected deaths. Similarly, unexpected causes of death amplify the widowhood effect: when one loses a partner to an accident or violence, their mortality risk is significantly increased compared to losing a partner to natural causes

[3]ICD-10 codes were selected based on their classification of sudden or externally caused deaths and adapted to reflect the types of unexpected bereavement relevant to this analysis.

or foreseen circumstances (Ennis & Majid, 2019; Shah et al., 2013).

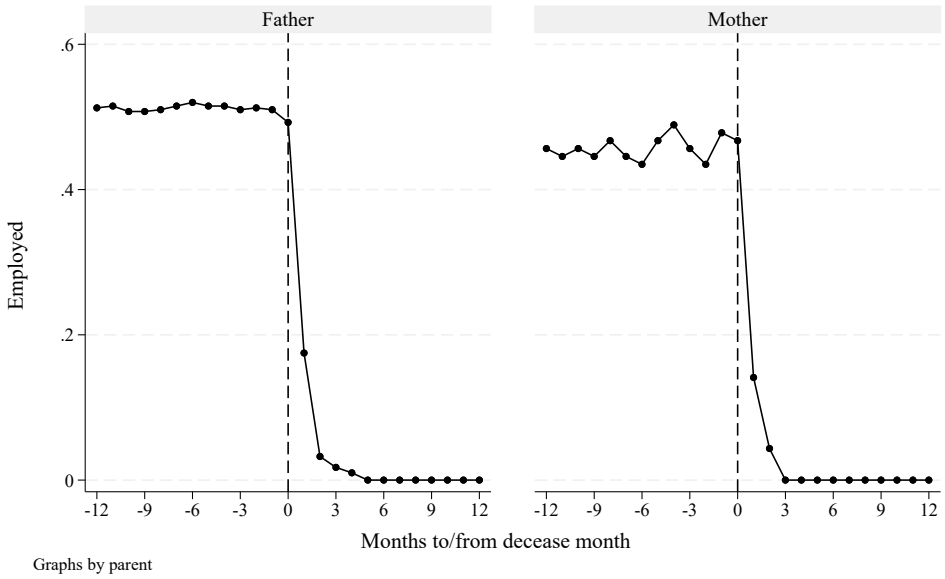


Figure 4.2: Monthly employment-linked income for individuals identified as deceased. The sharp drop in earnings following the recorded month of death supports the validity of the death classification. Residual employment records existing post-loss most likely represent administrative delays rather than actual labour force participation.

The timing of death was further validated by examining labour market outcomes. By using IDI income data, wage and salary earnings of each deceased individual were extracted for the 12 months preceding and following the recorded death listed on the individual's mortality record. The employment income of both fathers and mothers, as indicated by Figure 4.2, shows a significant decline during the first month after death (month 0). This discontinuity in employment income provides strong evidence that these individuals indeed stopped working at the recorded month of death, adding credibility to the death identification method.

Focusing on these unexpected causes strengthens the causal design. Sudden, unanticipated deaths are less likely to have been preceded by a chronic illness or caregiving period, so changes in the surviving partner's outcomes can be more plausibly attributed to the bereavement itself. This assumption of exogeneity with no prior trends is crucial for the difference-in-differences analysis (Callaway & Sant'Anna, 2021). Furthermore, excluding deaths from chronic illness or self-harm reduces confounding from any prior decline in the deceased's health or finances. In other words, the surviving partners in the sample were unlikely to have experienced long-term hardship due to their partner's condition before the loss. In sum, the ICD-10 selection criteria and the employment-drop validation together provide

both validity and empirical credibility for treating sudden partner death as the "treatment" event in the study.

4.4 Linking Birth Records to Identify Partnerships

To identify surviving parents, each deceased person's `snz_uid` was linked to the DIA births records in the IDI. The births dataset records every birth in New Zealand, including the unique identifiers for both legal parents. If a deceased individual appears on a birth record, the other parent listed on the record is taken as the surviving partner (provided they are alive during the observation window). Since this method relies on official birth registrations, it captures only biological parent partnerships.[4] Although this approach overlooks informal unions or families without a jointly registered child, focusing on verified biological connections adds accuracy to the analysis, as false matches are extremely unlikely given the legal nature of birth registration (Harper, 2018). The age of the sample was capped at 54, which is consistently defined as the upper bound of "prime working age" across multiple labour-force analyses and demographic studies (Coile & Duggan, 2019; Dinku & Hunt, 2019; Tuzemen, 2018). The lowest age, 18, was set in line with the legal age of adulthood in New Zealand.

Each partnership is anchored on the youngest shared child, as this focuses on the period when caregiving and financial demands are especially intense among younger sole parents (Park et al., 2021). The death of a parent in a family with a very young child can give rise to intense burdens, as the surviving parent typically assumes full responsibility for childcare, household income, and family wellbeing (Park et al., 2021). Furthermore, very young children can limit parents' employment flexibility, along with substantial childcare costs and the need for constant supervision (Martin et al., 2024). Evidence also shows that parents of infants and toddlers have lower labour force participation and higher financial strain (Stack & Meredith, 2018). The magnitude of these burdens is greatly intensified after bereavement for a surviving partner, as they must navigate both their emotional trauma and the challenges of sole parenthood (Dias, Docherty, & Brandon, 2017; Yopp et al., 2019). Consistent with this, younger widowed parents report higher levels of grief distress than older or childless counterparts (Nolen-Hoeksema & Ahrens, 2002; Park et al., 2021; Zisook et al., 1993). Anchoring on the youngest child, therefore, helps to identify cases under the great emotional and financial strain, and ensures comparability across partnerships at similar life stages.

As mentioned, all data linkages were performed securely within the IDI using deterministic

[4]The DIA births database includes only children registered to two legal parents at birth.

matches on `snz_uid`. Since both mortality and birth records come from DIA, their anonymity aligns, giving very minimal risk of linkage error (Statistics New Zealand, 2014). The resulting linked sample contains one record per bereaved parental partnership, indexed by the youngest child. Structuring the data by partnership aligns with the event-study design: the timing of the partner's death defines the treatment event, while baseline family characteristics (like child age and family composition) remain fixed (Callaway & Sant'Anna, 2021). In sum, this linkage strategy allows for the identification of widowed parents with dependent children and focuses the analysis on families experiencing significant caregiving and economic stress. These verified linkages form the foundation for studying how unexpected partner loss affects surviving partners' health and socioeconomic outcomes.

4.5 Annual Income Measures for Surviving Partners

Using the IDI's `income_cal_yr_summary` table, which reports total taxable income per individual per calendar year, was used to measure each surviving partner's annual income. This table combines multiple income streams that cover wages and salaries reported through Pay-As-You-Earn taxation[5] taxable government benefits from MSD, and taxable earnings-loss compensation from the ACC. Together, these components capture the primary sources of formal taxable income in New Zealand.

The PAYE component tracks regular earnings from formal employment, representing one of the biggest and most reliable income streams for most employed citizens. The PAYE component does not account for income from self-employment, investments, rental properties, foreign earnings, or untaxed fringe benefits. These items are not visible in the `income_cal_yr_summary` and therefore are not reflected in my income measure.

The Ministry of Social Development (MSD) component records income-tested welfare payments that are taxed at source, including Jobseeker Support, Sole Parent Support, and Supported Living Payment. Since only taxable portions are included, most non-taxable assistance (such as hardship grants, housing supplements, and one-time grants) is excluded.

The ACC component refers to weekly compensation for lost earnings, including payments to partners of deceased workers. Lump-sum ACC grants (e.g., the Funeral Grant or Survivor's Grant) do not appear here because they are non-taxable; those can be identified separately through ACC's claims data.[6]

[5]PayAsYouEarn (PAYE) is a system of withholding income tax at source, where employers deduct tax from employees' wages or salaries as they are earned and remit these amounts directly to the tax authority

4.6 Descriptive Statistics

The cohort consists of 1,692 surviving partners and 1,476 deceased partners (aged 18–54) who experienced a sudden, exogenous partner death between 2008 and 2019, and had at least one dependent child at the time of death. Table 4.1 shows the baseline characteristics of this cohort, broken down by the surviving partner's gender and by survival status. Notably, the sample is heavily gender-skewed: among the deceased partners, 1,200 were fathers and 276 were mothers, whereas among the survivors, 1,380 are mothers and 312 are fathers.

Table 4.1: Descriptive statistics

	Mothers		Fathers	
	Survived	Deceased	Survived	Deceased
Age				
<25	0.124	0.076	0.077	0.100
25–45	0.691	0.652	0.635	0.718
>45	0.185	0.272	0.288	0.183
Ethnicity				
European	0.509	0.533	0.510	0.515
Else	0.491	0.467	0.490	0.485
Birthplace				
New Zealand	0.872	0.880	0.885	0.868
Outside	0.128	0.120	0.115	0.133
Age of youngest child				
<5 years	0.400	0.359	0.356	0.408
5–14 years	0.461	0.467	0.462	0.460
>14 years	0.139	0.174	0.183	0.133
Employed	0.580	0.674	0.654	0.795
Benefit Recipient	0.389	0.446	0.327	0.450
Annual earnings from Wages & Salaries (if employed)				
≤ $20k	0.464	0.837	0.538	0.380
> $20k	0.536	0.163	0.462	0.620
N	1,380	276	312	1,200

Note: Source: Authors' calculations using data from the IDI.

Across all subgroups, the majority of individuals were in the 25–45 age range. For example, 69.1% of surviving mothers were aged 25–45, compared to 65.2% of deceased mothers. Among the fathers, 63.5% of surviving fathers and 71.8% of deceased fathers were in this age range. Deceased mothers were more likely to be over 45 than surviving mothers (27.2% vs. 18.5%), whereas the opposite was true for fathers (28.8% of surviving fathers vs. 18.3% of deceased fathers over 45).

About half of each subgroup is European (around 51–53%), with the remainder classified as "Else" (combining Māori, Pacific, Asian, MELAA, and other ethnicities). The ethnic composition is very similar between survivors and decedents within each gender, suggesting no major differences by survival status. Similarly, approximately 87% of each group was born in New Zealand, with nearly identical shares across both the survivors and the deceased, as well as across genders.

Many surviving parents were caring for very young children at the time of loss. For instance, 40.0% of surviving mothers and 35.6% of surviving fathers had a child under five years old when the death of their partner occurred. These shares are similar among the deceased partners. This indicates that a substantial fraction of bereaved parents were responsible for very young children in the aftermath of their loss, which may suggest an intense caregiving burden.

Prior to bereavement, a majority of partners were employed, but with notable gender differences. Among the surviving mothers, 58.0% were employed, compared to 67.4% of mothers who died. Among the fathers, 65.4% of surviving fathers and 79.5% of deceased fathers were employed; this suggests that men were often the primary earners in these households, so the death of a father likely imposed a larger financial burden on surviving mothers.

Government benefit receipt was also common in the sample. Before bereavement, among the survivors, 38.9% of mothers and 32.7% of fathers received a core welfare benefit. Benefit uptake was similarly high among those who died (44.6% of deceased mothers and 45.0% of deceased fathers), indicating that many families relied on social assistance even before the loss. Surviving mothers had slightly higher rates of benefit receipt than surviving fathers.

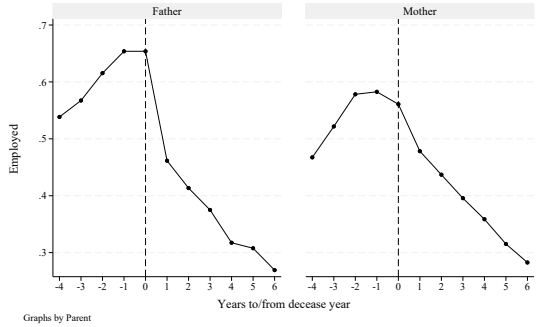
Among the employed, income levels differed by gender and survival status. The majority of deceased mothers had low earnings before their death: 83.7% of deceased mothers earned $20,000 NZD or less in wages and salaries in the year prior to death, compared to 46.4% of surviving mothers. In contrast, deceased fathers were more often employed in higher-earning jobs: 62.0% of deceased fathers earned above $20,000 NZD, versus 46.2% of surviving fathers. This likely reflects that many deceased fathers were employed (often as the primary earner)

at the time of death, whereas a significant share of surviving fathers were not working prior to the loss. This pattern likely reflects the inclusion of deaths classified under workplace-related ICD-10 codes, which capture individuals who were employed at the time of death.

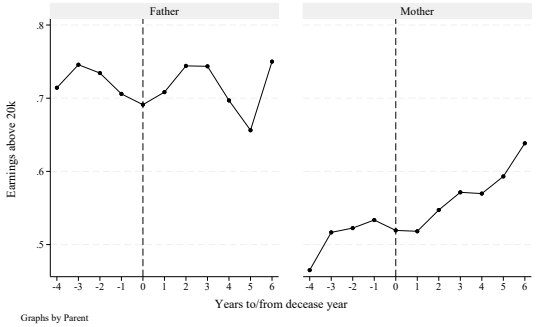
4.7 Labour Market Dynamics of Surviving Parents

To visualise survivors' economic trajectories, Figure 4.3 plots four labour market indicators for surviving mothers and fathers from four years before to six years after the partner's death: (a) the employment rate, (b) the share with annual earnings above $20,000 NZD, (c) the share receiving any government benefits, and (d) the share receiving ACC compensation. Each panel contrasts mothers and fathers over time relative to the loss event.

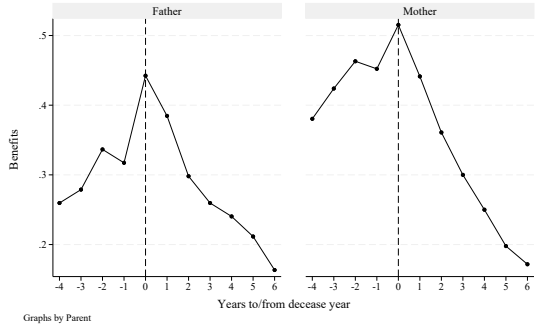
Figure 4.3: Labour market dynamics of surviving parents



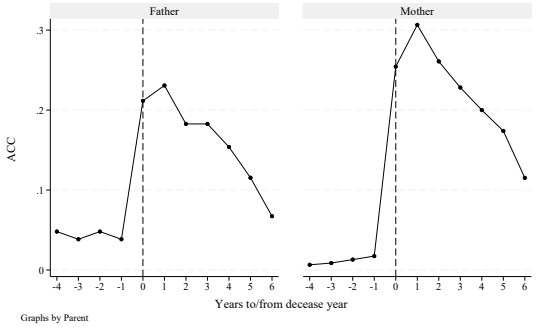
(a) Income from Wages & Salaries



(b) Annual earnings above $20k



(c) Benefit uptake



(d) ACC payment

Notes: IDI data; authors' calculations.

Employment (Panel a.) classifies an individual as employed if they earn at least $1,000 NZD in a given year, which filters out negligible jobs. In the pre-loss years, employment was rising for both groups. About 54% of surviving fathers had wage or salary income four

years before the loss, increasing to roughly 65% by the year of the loss. Surviving mothers' employment rose from about 47% to 58% over the same period (with a slight dip to 56% in the loss year). Throughout, a higher share of surviving fathers were employed than mothers, reflecting traditional gender roles. After the partner's death, employment rates fell sharply for both genders. One year after the loss, surviving fathers' employment dropped to about 46%, and continued to fall to roughly 27% by six years post-loss. Surviving mothers saw a more gradual decline, to around 48% in the first year after loss and about 28% by year +6. These patterns indicate substantial long-term reductions in workforce participation for widowed parents, with fathers initially more likely to work but also experiencing a steeper post-loss decline.

High Earnings (Panel b). Among those who remained employed, a consistently larger share of surviving fathers earned above $20,000 NZD per year compared to surviving mothers. Before bereavement, roughly 70–75% of employed fathers were above this threshold, whereas only about 47–53% of employed mothers were. These proportions changed little around the time of loss. In the post-loss period, about 66–75% of employed fathers continued to exceed $20,000 NZD (reaching 75% by year +6). Employed mothers actually saw an increase in this measure, from roughly 52% in the first year after the loss to about 64% by year +6. By the end of the study window, roughly three-quarters of surviving fathers and two-thirds of surviving mothers who remained in work earned above $20,000 NZD. In other words, a persistent gender gap in high-wage employment remained among those survivors who stayed employed.

Benefit Receipt (Panel c). Welfare benefit uptake was consistently higher for mothers than for fathers. In the four years leading up to the loss, the share of surviving mothers receiving any core benefit rose from about 38% to 45%, while for fathers it rose from roughly 26% to 32%. In the year of partner death, benefit receipt spiked to about 51.5% for mothers and 44.2% for fathers. Thereafter, benefit use gradually declined, remaining elevated relative to pre-loss levels for several years. By six years post-loss, around 17% of surviving mothers and 16% of surviving fathers were still receiving benefits. These trends suggest a temporary surge in dependence on social assistance following bereavement, more pronounced for mothers, with a slow return toward baseline as families adjust financially over time.

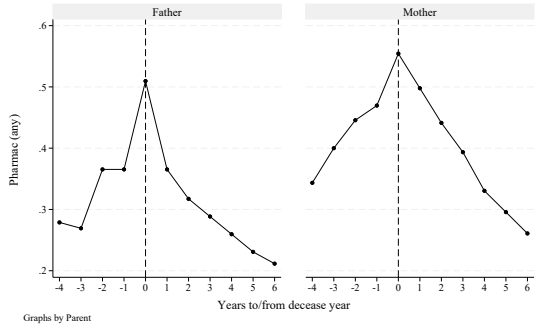
ACC Compensation (Panel d). Very few survivors received ACC weekly compensation before the loss (well under 5% for both genders). In the year of the partner's death, ACC uptake jumped significantly to about 21% of surviving fathers and 25% of surviving mothers. Elevated ACC receipt persisted in the short to medium term of the study window: roughly 18–23% of fathers and up to 30% of mothers had ACC payments in the first few years after

the loss. By six years post-loss, these rates had fallen back to about 6–7% for fathers and approximately 12% for mothers. This pattern indicates that a notable minority of survivors (especially women) accessed ACC support in the immediate aftermath of bereavement, perhaps due to injury or stress-related health issues, but that this reliance largely declined over time.

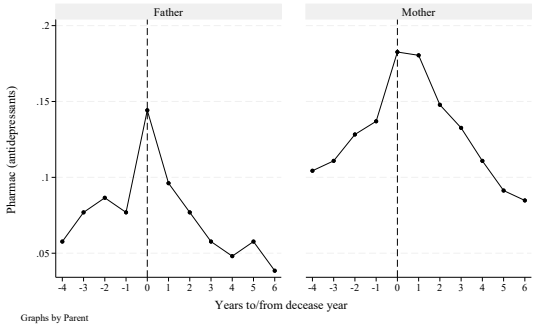
4.8 Health Markers for Surviving Parents

Figure 4.4 provides a visual summary of three health-related indicators for surviving partners: (a) the share who filled at least one prescription of any kind in each year, (b) the share who filled at least one antidepressant prescription, and (c) the share who filled at least one cardiovascular-related prescription. Each series is shown separately for surviving mothers and fathers from four years before to six years after the partner's death.

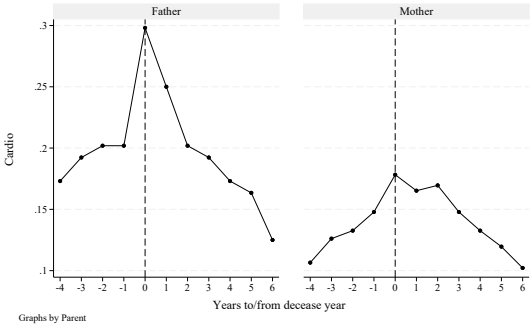
Figure 4.4: Health markers for surviving parents



(a) PHARMAC – any prescriptions



(b) PHARMAC – antidepressant prescriptions



(c) PHARMAC – cardiovascular prescriptions

Notes: IDI data; authors' calculations.

Any Prescription (Panel a). Before bereavement, surviving mothers consistently had

higher medication use than fathers. Four years before the loss, about 34% of mothers and 28% of fathers filled at least one prescription; by the year before the death, these rates had risen to roughly 47% for mothers and 37% for fathers. In the year of the partner's death, prescription use spiked for both groups: 55.4% of surviving mothers and 51.0% of surviving fathers filled at least one prescription. After the loss, the proportion obtaining any prescription gradually declined, though it remained above pre-loss levels for some time. By six years post-loss, about 26% of surviving mothers and 21% of surviving fathers had filled any prescription that year. Overall, mothers had higher prescription rates throughout, but both groups show an apparent surge around the year of the loss, followed by a slow return to baseline.

Antidepressants (Panel b). A higher proportion of surviving mothers used antidepressants in every year observed. Prior to the loss, antidepressant use among mothers grew from about 10.4% to 13.7%, peaking at 18.3% in the year of the death. Use among fathers was lower, rising from roughly 5.8% to 7.7% pre-loss and then doubling to about 14.4% in the bereavement year. After the loss, antidepressant usage remained elevated for a period but gradually declined. By six years later, around 8.5% of surviving mothers and 3.8% of surviving fathers were on antidepressants, down from the immediate post-loss highs but still somewhat above pre-loss baselines. These data indicate a pronounced increase in mental health treatment (especially among the mothers) following partner death, followed by a gradual easing of usage over the subsequent years.

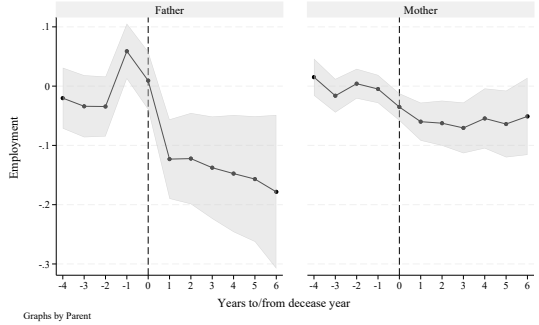
Cardiovascular Medications (Panel c). In contrast to overall prescriptions, surviving fathers had higher cardiovascular medication use at baseline. Four years before the loss, about 17.3% of fathers and 10.7% of mothers had a cardiovascular prescription; by the year prior to death, these were roughly 20.0% and 14.8%, respectively. In the year of the partner's death, these rates jumped to 29.8% for fathers and 17.8% for mothers. After the loss, cardiovascular medication use gradually declined toward pre-loss levels for both groups. By six years post-loss, about 12.5% of surviving fathers and 10.2% of surviving mothers had any cardiovascular medication. In summary, while fathers were more likely to use these drugs at baseline, both genders exhibited a notable increase around the time of bereavement, followed by a return to near-baseline usage in the longer run.

5 Results

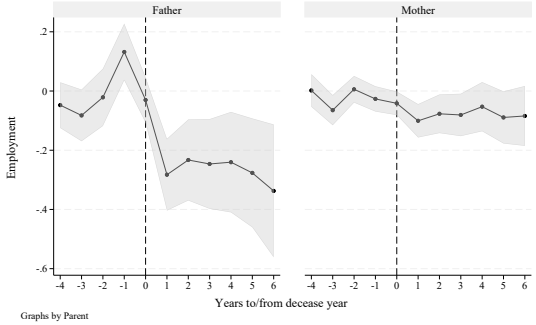
5.1 Employment Effects

This section presents the estimated ATT results to assess the impact of sudden partner bereavement on employment. The outcome is a binary indicator for employment, with all deaths assumed to be exogenous and unanticipated. The results are disaggregated by gender of the surviving parent and by the age of the youngest child at the time of loss (<5 years vs. 5–14 years). The effects are expressed in percentage point changes relative to the counterfactual and indexed by event time, where year 0 refers to the year of partner death. See Table A.1 in the appendix for the regression results.

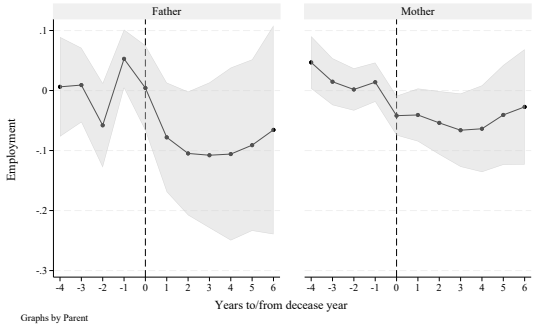
Figure 5.1: Estimated effects of partner loss on employment across child age groups



(a) All ages



(b) Child aged 0–4



(c) Child aged 5–14

Notes: Estimates from CSDiD models using IDI data; outcome is binary indicator for employment. Each graph shows estimated average treatment effects by event year relative to partner death.

Panel (a) of Figure 5.1 displays estimates for the full sample of bereaved parents. Among

surviving fathers, employment remains stable and statistically indistinct from zero in the pre-treatment period (years –4 to –2). There is, however, a modest increase in year– -1 (5.9 p.p., $p = 0.013$), which may reflect anticipatory behaviour. This is followed by a pronounced and sustained decline from year +1 onward, with employment falling by 12.3 p.p. ($p < 0.001$) and continuing to deteriorate through year 6, reaching –17.8 p.p. ($p = 0.007$).

Surviving mothers in the same panel show an immediate response: employment drops by 3.5 p.p. in year 0 ($p = 0.003$), with further reductions in year 1 (–6.0 p.p.,$p < 0.001$) and a peak decline in year 3 (–7.0 p.p., $p = 0.001$). The magnitude is smaller than it is for fathers, and by year 6, the effect is no longer statistically significant (–5.1 p.p., $p = 0.124$). See Figure A.1 in the appendix for a more detailed view of the graph.

Panel (b) focuses on families where the youngest child was under five years old at the time of bereavement. Fathers in this group exhibit a sharp rise in employment in year –1 (13.2 p.p., $p = 0.007$), followed by a sharp fall in year +1 (–28.3 p.p., $p < 0.001$). This decline persists, remaining large and statistically significant through to year 6 (–33.7 p.p., p = 0.003), suggesting that the partner loss led to prolonged disruption of labour force attachment among surviving fathers of young dependants.

Mothers in the same category also show considerable declines, though with a different trajectory. Employment decreases by 4.2 p.p. in year 0 ($p = 0.041$) and 10.1 p.p. in year 1 ($p < 0.001$), with effects continuing into years 2 and 3. However, by years 5 and 6, estimates taper off and lose statistical significance. An earlier dip appears in year –3 (–6.5 p.p., $p = 0.013$), though no consistent pre-trend is evident. See Figure A.2 in the appendix for a more detailed view of the graph.

Panel (c) presents results for parents with a youngest child aged 5–14. Among fathers, employment rises slightly in year –1 (5.3 p.p., $p = 0.034$), then declines modestly post-bereavement. The largest reduction occurs in year 2 (–10.5 p.p., $p = 0.046$), with estimates becoming statistically indistinct by year 4. By year 6, the decline is smaller and no longer significant (–6.6 p.p., $p = 0.460$).

The mothers in this group exhibit a more gradual reduction of employment. Employment falls by 4.2 p.p. in year 0 ($p = 0.013$), followed by similar declines through year 3. These effects are statistically significant in the initial post-event window but fade after year 4. A pre-treatment increase in year –4 (4.7 p.p., $p = 0.036$) is observed, although no strong upward trend is present before the event. See Figure A.3 in the appendix for a more detailed view of the graph.

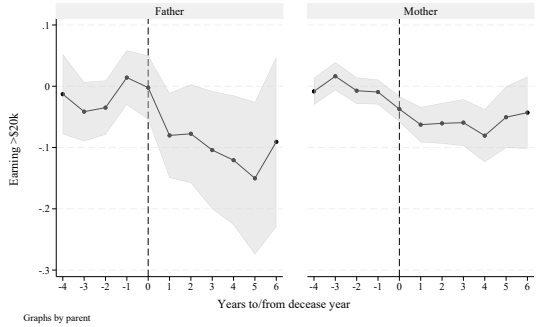
Across all the specifications analysed, it is evident that both surviving mothers and surviving

fathers experienced employment losses after partner death, with larger effects shown among the surviving fathers. The most severe declines in employment occurred among the fathers with children under five years old, while the mothers tended to sustain smaller and shorter-lived effects. The variation by gender and child age ultimately highlights differences in the timing and extent of post-bereavement employment disruption.

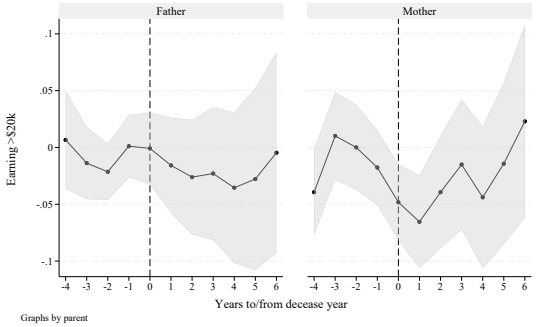
5.2 Wages and Salaries Effects

This section examines how sudden partner death affects the likelihood that a surviving parent earns more than $20,000 NZD in wages or salary in a given year. Estimates are drawn from CSDiD models and presented as average treatment effects, indexed by time relative to the bereavement event (event year 0). Results are disaggregated by gender and by the age of the youngest child. See Table B.1 in the appendix for the regression results.

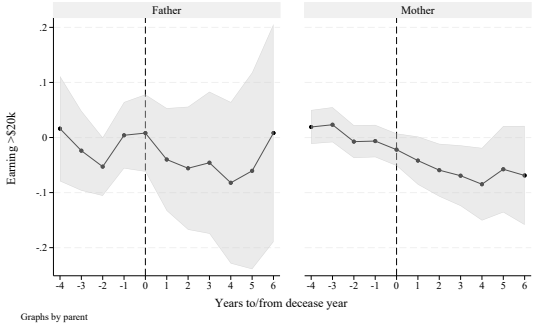
Figure 5.2: Estimated effects of partner loss on wage and salary income ($20,000 NZD) across child age groups



(a) All ages



(b) Child aged 0–4



(c) Child aged 5–14

In the full sample (Figure 5.2, **Panel (a)**, income among surviving fathers remains relatively stable before bereavement. Starting in year 1, however, there is a noticeable decline, with the share earning over $20,000 NZD falling by 8.0 percentage points ($p = 0.023$), deepening to 15.0 p.p. below the counterfactual by year 5 ($p = 0.018$). Mothers also experience a significant drop, beginning in year 0 (–3.7 p.p., $p < 0.001$) and intensifying through year 4 (–8.1 p.p., $p < 0.001$), before effects begin to ease in later years. See Figure B.1 in the appendix for a more detailed view of the graph.

Among those with a youngest child under five years old **(Panel b)**, fathers show a downward trend post-bereavement, though estimates lack statistical precision. Point estimates remain negative through year 5, suggesting reduced income levels despite the absence of consistent significance. Mothers in this subgroup display a more immediate impact, with a 4.8 p.p. drop in year 0 ($p = 0.005$) and a further decline to –6.5 p.p. in year 1 ($p = 0.002$). The effect size narrows over time, with later years showing more muted differences. See Figure B.2 in the appendix for a more detailed view of the graph.

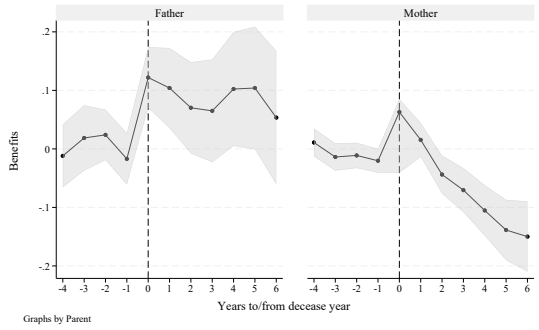
For surviving parents with children aged 5–14 **(Panel c)**, patterns diverge by gender. Fathers again show limited response, with a marginally significant effect in year 2 (–5.3 p.p., $p = 0.050$) but no consistent trend across the period. Mothers, however, face more persistent reductions: earnings above the $20,000 NZD threshold fall by 5.9 p.p. in year 2 ($p = 0.015$), 6.9 p.p. in year 3 ($p = 0.013$), and 8.5 p.p. in year 4 ($p = 0.012$), before tapering thereafter. See Figure B.3 in the appendix for a more detailed view of the graph.

Overall, earnings above the $20,000 NZD mark decline for both groups of surviving mothers, with stronger effects observed in the years following bereavement—particularly for those with school-aged children. For fathers, income effects are more subdued, emerging clearly only in the full sample over the longer term.

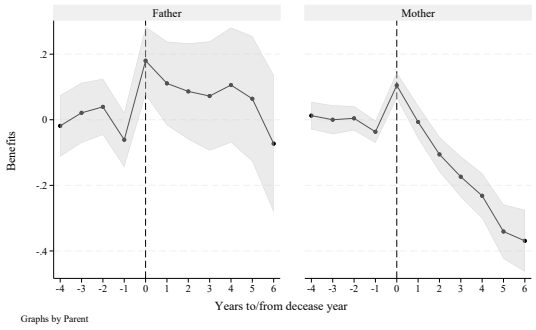
5.3 Benefit Receipt Effects

This section presents estimates of how partner loss affects the probability that a surviving parent receives any taxable government benefit income, as recorded in the IDI's integrated income dataset. The outcome is a binary indicator equal to 1 if the individual received any taxable benefit in a given year. All estimates are ATT, calculated from CSDiD models. Results are presented by parent gender and the age of the youngest child at the time of bereavement, indexed relative to the year of death (event year 0). See Table C.1 in the appendix for the regression results.

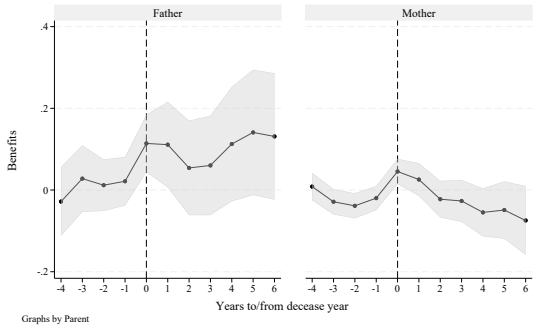
Figure 5.3: Estimated effects of partner loss on benefit receipt across child age groups



(a) All ages



(b) Child aged 0–4



(c) Child aged 5–14

Notes: Estimates from CSDiD models using IDI data. Outcome is a binary indicator for receipt of any taxable government benefit. Each graph displays average treatment effects by event year relative to partner death.

In the overall sample (Figure 5.3, **Panel a)**, benefit uptake increases sharply in the year of bereavement among surviving fathers, rising by 12.2 percentage points ($p < 0.001$). This elevated rate continues in the following years, remaining 10.4 p.p. above baseline in year 1 ($p = 0.003$) and still significantly elevated in year 4 (10.2 p.p., $p = 0.039$). For mothers, the initial year also sees an uptick (6.3 p.p.,$p < 0.001$), but this reverses over time: by year 5, benefit use is 13.9 p.p. below the counterfactual ($p < 0.001$), and declines further to –15.0 p.p. by year 6 ($p < 0.001$). See Figure C.1 in the appendix for a more detailed view of the graph.

Looking at parents of children under five years old **(Panel b)**, fathers again show a notable increase at event time (18.0 p.p., $p = 0.001$), with elevated but less precise effects continuing into year 1 (11.1 p.p., $p = 0.088$). The pattern remains upward in later years, though estimates lose precision. Mothers in this subgroup follow a different trajectory: benefit

receipt jumps by 10.5 p.p. in year 0 ($p < 0.001$), but subsequently declines sharply, dropping 10.6 p.p. below baseline by year 2 and widening to –34.1 p.p. in year 5 and –36.9 p.p. in year 6 (both $p < 0.001$). See Figure C.2 in the appendix for a more detailed view of the graph.

Among parents whose youngest child was aged 5–14 **(Panel c)**, a similar divergence appears. Fathers experience an 11.4 p.p. increase at bereavement ($p = 0.002$), followed by a year 1 effect of 11.1 p.p. ($p = 0.038$), with elevated estimates persisting through later years. Mothers, by contrast, show only a modest rise in year 0 (4.5 p.p., $p = 0.004$) before transitioning into gradual declines. While the year 4 estimate is –5.5 p.p. ($p = 0.069$), and year 6 reaches –7.5 p.p. ($p = 0.084$), these fall just outside conventional significance thresholds. See Figure C.3 in the appendix for a more detailed view of the graph.

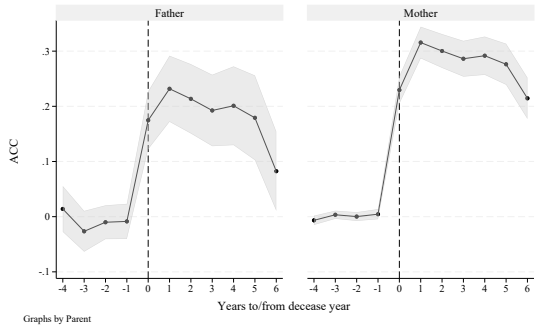
Across groups, fathers consistently show increased reliance on benefits following bereavement, especially in the first two years. For mothers, a temporary rise in benefit use gives way to sustained reductions, particularly among those with younger children. Patterns differ across gender and child age, reflecting variation in post-bereavement income support trajectories.

5.4 ACC Receipt Effects

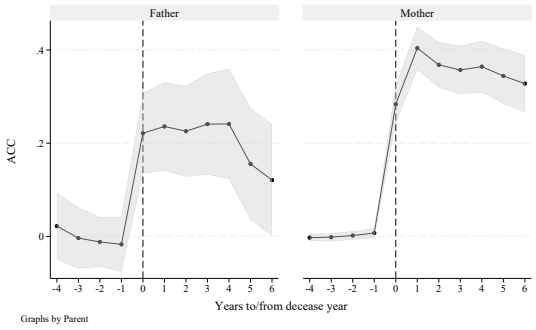
This section presents estimates of the impact of partner loss on the likelihood of receiving compensation from New Zealand's ACC. The outcome is a binary indicator equal to 1 if the individual received any ACC-related income in a given year, derived from the IDI's integrated income data. Estimates come from CSDiD models and are reported as ATT, disaggregated by survivor gender and age of the youngest child at bereavement. Each figure displays changes relative to the year of the bereavement event (event year 0). See Table D.1 in the appendix for the regression results.

Across the full sample (Figure 5.4, **Panel a)**, surviving mothers and fathers both experience substantial increases in ACC receipt beginning in the year of bereavement. For mothers, the effect is immediate and pronounced: a 23.0 percentage point rise in year 0 ($p < 0.001$), peaking at 31.6 p.p. in year 1 before gradually tapering to 21.5 p.p. by year 6—all highly statistically significant. Fathers also show a strong post-event trajectory: a 17.5 p.p. increase in year 0, climbing to 23.2 p.p. in year 1 and remaining elevated through year 5, before falling to 8.2 p.p. in year 6 ($p = 0.025$). See Figure D.1 in the appendix for a more detailed view of the graph.

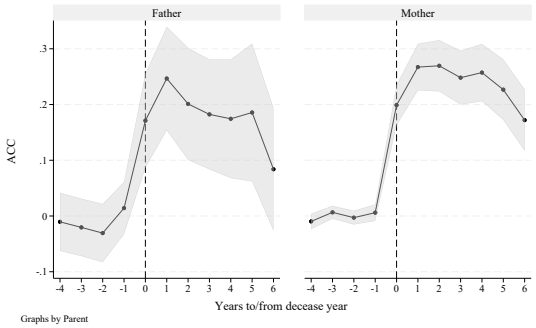
Figure 5.4: Estimated effects of partner loss on ACC receipt across child age groups



(a) All ages



(b) Child aged 0–4



(c) Child aged 5–14

Among families with a child under five years old at the time of loss **(Panel b)**, similar dynamics emerge, though the magnitudes are even larger. ACC uptake among surviving mothers increases by 28.4 p.p. in the event year, reaching a peak of 40.4 p.p. in year 1, and remaining above 32 p.p. through year 6. Fathers in this group also see sustained effects: a 22.1 p.p. increase in year 0, followed by consistent gains across the next five years (e.g., 24.1 p.p. in year 4, $p < 0.001$), though the final year's effect (12.1 p.p.) is only marginally significant ($p = 0.047$). See Figure D.2 in the appendix for a more detailed view of the graph.

For parents with school-aged children (5–14 years; **Panel c**), the effects remain strongly positive. Mothers again show large and lasting increases in ACC income, with effects peaking at 26.9 p.p. in year 2 and still elevated at 17.2 p.p. in year 6. Fathers experience a 17.1 p.p. rise in the event year, followed by a steady upward trend through year 1 (24.7 p.p.), before moderating to 8.4 p.p. by year 6. See Figure D.3 in the appendix for a more detailed view of the graph.

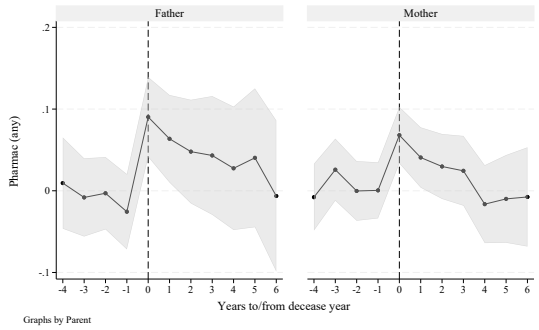
In summary, the probability of receiving ACC payments increases sharply and persistently

for both mothers and fathers following sudden partner loss. The timing and scale of effects suggest an abrupt change in injury-related or bereavement-linked compensable conditions, with larger and longer-lasting impacts observed among mother, especially those with younger children.

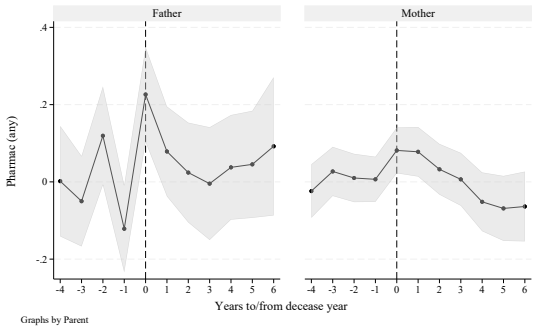
5.5 PHARMAC Medication Intake

Figure 5.5 presents the estimated effects of partner loss on the likelihood of receiving any subsidised pharmaceutical medication, drawing from New Zealand's PHARMAC dataset. The outcome is a binary indicator for whether at least one prescription was dispensed in a given year, covering two categories: cardiovascular and mental health medications.

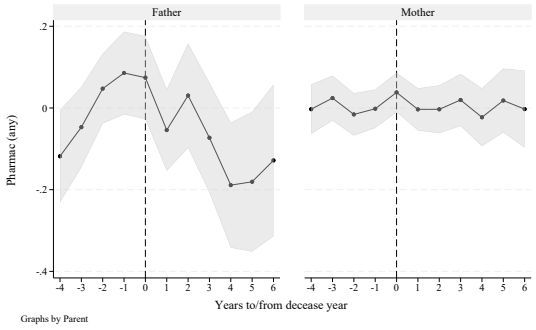
Figure 5.5: Estimated effects of partner loss on overall pharmaceutical prescription uptake across child age groups



(a) All ages



(b) Child aged 0–4



(c) Child aged 5–14

Notes: Estimates from CSDiD models using IDI data. Outcome is a binary indicator for whether at least one subsidised mental health or cardiovascular medication was dispensed in each year. Each panel shows average treatment effects by event year relative to partner death, disaggregated by age of the youngest child.

Cardiovascular medications include beta-adrenoceptor blockers, ACE inhibitors, angiotensin receptor blockers (ARBs), alpha-adrenoceptor blockers, and beta-adrenoceptor agonists. Mental health medications include antidepressants (by type), anxiolytics (e.g., benzodiazepines), sedatives/hypnotics (e.g., zopiclone), and antipsychotics. Estimates are shown separately for surviving mothers and fathers, stratified by the age of the youngest child. See Table E.1 in the appendix for the regression results.

Panel (a) shows that among all surviving fathers, there was a sharp increase in prescription receipt in the year of bereavement, peaking at an average treatment effect of 9 percentage points. This effect was statistically significant ($p < 0.01$) and declined gradually over subsequent years, returning toward baseline by year six.

Among all surviving mothers, a similar increase was observed at the time of partner loss, with a 6.8 percentage point rise in the probability of receiving any medication ($p < 0.01$). However, the pattern differed over time, as a small effect persisted into year one, while the later periods showed no statistically significant differences from the baseline. See Figure E.1 in the appendix for a more detailed view of the graph.

The age of the youngest child moderated these effects. For surviving fathers with a child under 5 **(Panel b)**, prescription uptake spiked by 23 percentage points in the year of death ($p < 0.01$), with no statistically significant increases in most post-event years. Mothers in this group exhibited a smaller but significant rise of 8.2 percentage points at bereavement ($p < 0.01$), followed by modest sustained effects through year one. See Figure E.2 in the appendix for a more detailed view of the graph.

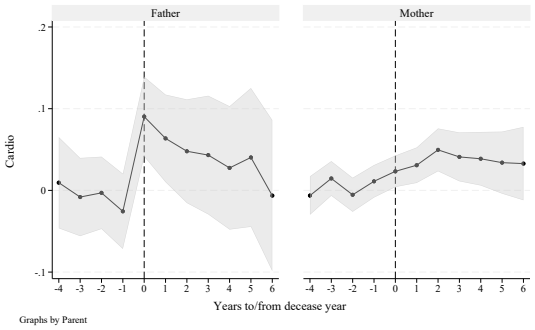
In households with a child aged 5–14 (shown in **Panel c**), treatment effects were more muted. Fathers showed no significant change in prescription uptake in the year of death, and estimates became negative and statistically significant in years four and five. For mothers, estimates around the event were close to zero and not statistically distinguishable from baseline throughout the observed window. See Figure E.3 in the appendix for a more detailed view of the graph.

5.6 Cardiovascular Medication Intake

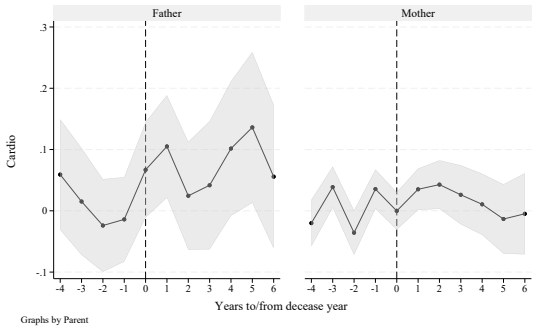
This section presents estimates of the impact of partner loss on the likelihood of receiving subsidised cardiovascular medications, using dispensing data from New Zealand's PHARMAC system. The outcome is a binary indicator equal to 1 if the surviving partner received at least one prescription from the cardiovascular category in a given year. This category includes beta-adrenoceptor blockers, ACE inhibitors, angiotensin receptor blockers (ARBs), alpha-

adrenoceptor blockers, and beta-adrenoceptor agonists. Estimates are derived from CSDiD models and reported as ATT, disaggregated by survivor gender and age of the youngest child at bereavement. Each figure displays changes relative to the year of the bereavement event (event year 0). See Table F.1 in the appendix for the regression results.

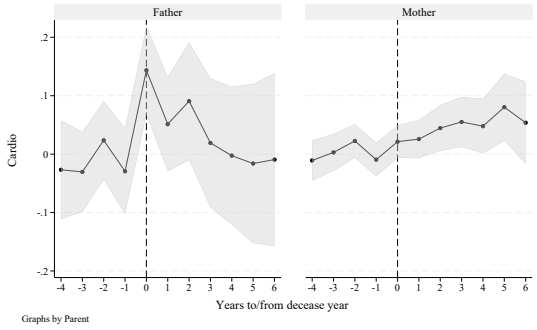
Figure 5.6: Estimated effects of partner loss on cardiovascular medication intake across child age groups



(a) All ages



(b) Child aged 0–4



(c) Child aged 5–14

Notes: Estimates from CSDiD models using IDI data; outcome is a binary indicator for whether at least one cardiovascular medication was dispensed in a given year. Includes beta-adrenoceptor blockers, antihypertensives (e.g., ACE inhibitors, ARBs), alpha-adrenoceptor blockers, and beta-adrenoceptor agonists. Each graph shows estimated average treatment effects by event year relative to partner death.

Across the full sample (Figure 5.6, **Panel a)**, surviving fathers experience a 5.0 percentage point increase in cardiovascular medication use in the year of bereavement ($p < 0.005$), followed by a similarly sized 5.0 p.p. rise in year 1 ($p = 0.020$). Among mothers, effects emerge slightly later, with a 2.3 p.p. increase in year 0 ($p = 0.018$), rising to 5.0 p.p. in year 2 and remaining statistically significant through year 4. See Figure F.1 in the appendix for

a more detailed view of the graph.

Among families with a child under five years old at the time of bereavement **(Panel b)**, cardiovascular dispensing increases significantly for both parents. Fathers experience a 10.5 p.p. rise in year 1 ($p = 0.014$) and a 13.6 p.p. increase in year 5 ($p = 0.030$). Mothers in this group show smaller but consistent effects, with significant increases in years -3, -1, 1, and 2 (e.g., 4.3 p.p. in year 2, $p = 0.035$), suggesting elevated treatment rates both before and after the event. See Figure F.2 in the appendix for a more detailed view of the graph.

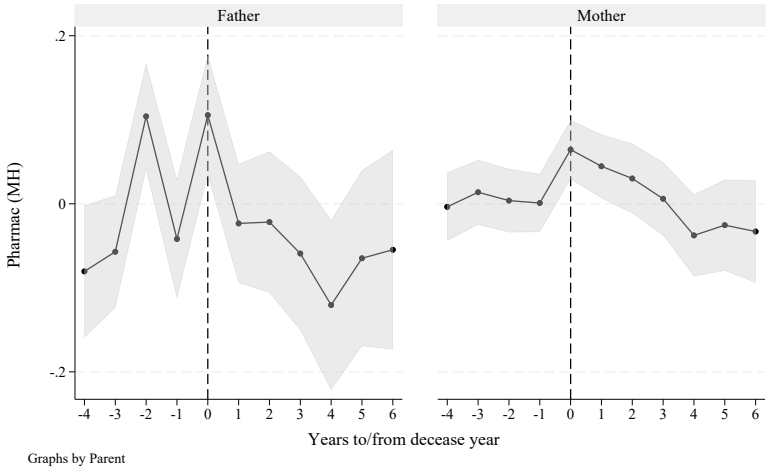
For parents of school-aged children **(Panel c)**, patterns differ slightly by gender. Mothers show steadily rising effects post-event, with significant increases in years 2 through 5—peaking at 8.0 p.p. in year 5 ($p = 0.006$). Fathers show a sharp and immediate increase of 14.4 p.p. in year 0 ($p < 0.001$), with a marginally significant 9.1 p.p. rise in year 2 ($p = 0.078$), before returning to baseline by year 6. See Figure F.3 in the appendix for a more detailed view of the graph.

The likelihood of cardiovascular medication use increases for both mothers and fathers following partner loss, with distinct temporal patterns across subgroups. Fathers tend to show more immediate and pronounced increases around the event year, particularly among those with younger children. For mothers, effects are generally more gradual and persistent over time, with elevated dispensing sustained through later post-bereavement years—especially in households with school-aged children.

5.7 Mental Health Medication Intake

This section presents estimates of the impact of partner loss on the likelihood of receiving subsidised mental health medications. The outcome is a binary indicator equal to 1 if an individual was dispensed at least one medication classified as an antidepressant (including SSRIs, SNRIs, and tricyclics), anxiolytic (e.g., benzodiazepines), sedative/hypnotic (e.g., zopiclone), or antipsychotic in a given month (which were then aggregated annually). These data come from the PHARMAC dataset within New Zealand's IDI and reflect dispensing activity rather than adherence. The results are pooled across all child age groups and presented separately for surviving fathers and mothers, and are displayed visually in Fig 5.7. See Table G.1 in the appendix for the regression results.

Figure 5.7: Estimated effects of partner loss on mental health medication intake (all child age groups)



(a) All ages

Notes: Estimates from CSDiD models using IDI data. The outcome is a binary indicator for the dispensing of any mental health medication (including antidepressants, anxiolytics, antipsychotics, or sedatives/hypnotics) in a given month. Each graph shows average treatment effects by event year relative to partner death, shown separately for surviving mothers and fathers.

Surviving mothers show a marked increase in mental health medication use beginning in the year of partner death (6.4 p.p., $p < 0.001$), with the effect remaining elevated in year 1 (4.5 p.p., $p = 0.021$). These increases are followed by statistically insignificant changes through the post-bereavement period, and no significant differences are detected in the pre-event years. See Figure G.1 in the appendix for a more detailed view of the graph.

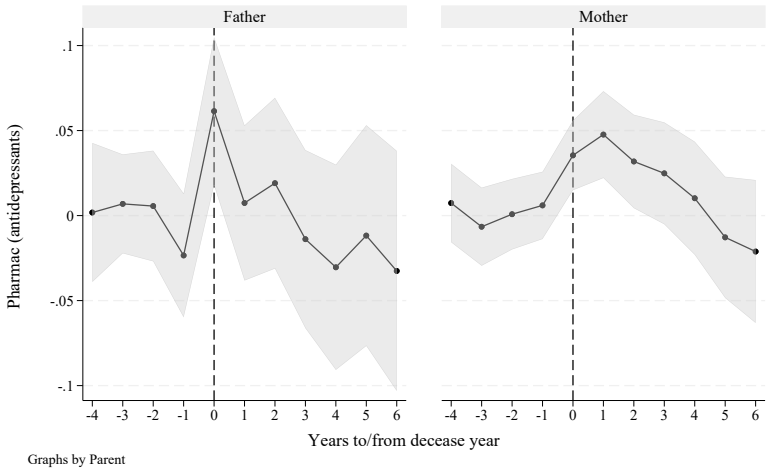
Together, the estimates indicate a sharp and immediate increase in mental health treatment uptake following bereavement for both mothers and fathers, with effect magnitudes peaking at the time of loss.

5.8 Antidepressant Medication Intake

This section presents estimated effects of partner loss on antidepressant medication use, based on CSDiD models using the PHARMAC dataset in the IDI. The outcome is a binary monthly indicator equal to 1 if the individual was dispensed at least one antidepressant medication within a given calendar year. Medications observed include selective serotonin reuptake inhibitors (SSRIs), serotonin-norepinephrine reuptake inhibitors (SNRIs), tricyclic

antidepressants (TCAs), monoamine oxidase inhibitors (MAOIs), and other agents commonly prescribed for depression (e.g., mirtazapine, bupropion, trazodone). The following results are disaggregated by parent gender and are displayed visually in Fig 5.8. See Table H.1 in the appendix for the regression results.

Figure 5.8: Estimated effects of partner loss on antidepressant dispensing (all child age groups)



(a) All ages

Notes: Estimates from CSDiD models using IDI data. Outcome is a binary indicator for antidepressant dispensing in a given year. Results are shown by event year relative to partner death.

In the full sample (Figure 5.8), surviving mothers exhibit a clear increase in antidepressant use beginning in the event year, with an estimated 3.5 percentage point (p.p.) rise in year 0 ($p = 0.001$), followed by a further increase to 4.8 p.p. in year 1 ($p < 0.001$). The effect persists into year 2 (3.2 p.p., $p = 0.023$) before gradually tapering off. Estimates from year 3 onward are no longer statistically distinguishable from zero.

Among surviving fathers, antidepressant uptake also rises significantly in the year of bereavement, with a 6.1 p.p. increase in year 0 ($p = 0.006$). However, no post-event estimates beyond year 0 are statistically significant, and pre-event differences remain small. See Figure H.1 in the appendix for a more detailed view of the graph.

Taken together, these results point to a short-term increase in antidepressant use following bereavement, particularly concentrated in the first year after loss. There is no evidence of sustained long-term increases in dispensing for either mothers or fathers.

6 Discussion

6.1 Overview of Key Findings

The results of this study demonstrate that sudden and exogenously-attributed partner loss can have significant, multifaceted impacts on surviving partners with dependent children in New Zealand. The CSDiD models reveal that surviving partners can experience sharp disruptions in their labour-market attachment, sustain losses in income, increase their dependence on public support, and face spikes in their utilisation of healthcare services. Furthermore, bereavement particularly impacts the employment rates of partners, where rates fall, annual wage and salary earnings contract, and their uptake of government transfers rises abruptly. Partners' prescription drug usage also increases sharply around the time of loss, especially for medications commonly used to treat mental health and cardiovascular conditions. The evidence suggests that these effects are not merely temporary, but rather, they can persist for several years following bereavement. Thus, partner death initiates a long process of adjustment and adaptation rather than a brief shock. As this study leveraged considerable longitudinal IDI data, necessary for the research, and a robust CSDiD design, these patterns can faithfully be attributed causally to the event of partner-loss rather than to pre-existing differences.

The findings expand the classical "widowhood effect" literature (Kaprio, Koskenvuo, & Rita, 1987; Moon et al., 2014), which has focused mainly on mortality or health risks among older couples, by documenting economic and health consequences for a younger population with dependent children. Prior studies conducted in the United States and Europe show that losing a partner elevates risks for morbidity and mortality, especially for men (Elwert & Christakis, 2008; Ennis & Majid, 2019). While much of that research examines older widows and widowers, who often face their own ageing-related health issues, the evidence indicates that even among prime-aged parents, partner loss can serve as the catalyst that precipitates substantial and enduring declines in both economic stability and physiological wellbeing. Moreover, the observed patterns, lower earnings, greater benefit receipt, and elevated medication uptake, support grief theories showing that bereavement can initiate immediate depression and anxiety in bereaved individuals (Fried et al., 2015; Kaltman & Bonanno, 2003; Keyes et al., 2014) while creating new time and income constraints that slow rehabilitation. These patterns also align with the bereavement-trajectory model, which suggests that although many individuals become more resilient to grief over time, a significant minority of individuals can still face prolonged challenges (Bonanno et al., 2002; Kristiansen

et al., 2019). In sum, the shock of partner death impacts not just the surviving partner but also reverberates across the affected family's lives for years at a time, which underscores bereavement as a complex and chronic stressor with cumulative effects (Fried et al., 2015; Kaltman & Bonanno, 2003; Keyes et al., 2014). The findings highlight that surviving parents of young children may face particularly sustained economic and health challenges, given the many pressures of sole parenthood. This evidence provides a broader view of the widowhood effect by documenting how partner loss shapes labour-market attachment, income stability, and healthcare utilisation in a younger demographic.

6.2 Labour Market Trajectories After Bereavement

The estimates show a clear and lasting downturn in survivors' labour market attachment. In the four-year pre-loss window, employment trends were roughly flat; however, immediately after the death, there is a sharp decline. For example, surviving fathers' employment falls by about 12.3 percentage points in the first post-loss year and continues to deteriorate to –17.8 points by year six. Surviving mothers also leave the labour force, though to a lesser extent: their employment drops by roughly 3.5 p.p. in the loss year and reaches a peak decline of –7.0 p.p. a few years later. In baseline terms, around two-thirds of fathers versus about three-fifths of mothers were employed pre-loss, so these declines represent major fractions of the pre-loss workforce. The effects are also broad, affecting both high-wage and low-wage positions, and they do not appear to revert even after six years. In other words, bereavement does not simply cause a transient disruption; rather, it appears to precipitate a shift out of employment for many survivors.

These labour force declines are larger for fathers than mothers, particularly when a young child is involved. Fathers' employment losses are especially severe for those with children under 5 years old (where a 28.3 p.p. drop is observed in year 1) and for parents of school-age children (–10.5 p.p. in year 2). Mothers also see sizeable employment declines when caring for young children (–10.1 p.p. in year 1 for the youngest child < 5) and more gradual losses with older children (–4.2 p.p. in year 0 for the youngest 5–14). In all cases, fathers tend to incur both larger point estimates and longer-lasting effects. This gender gap is consistent with existing evidence on gender roles and caregiving: men are generally socialised as breadwinners and may have had stronger labour attachments pre-loss, so the sudden imposition of primary childcare duties yields a sharper trade-off. In contrast, many mothers were already balancing paid work with childcare, so their relative drop is smaller (though still economically significant). These patterns accord with qualitative findings that

widowed fathers often struggle to reconcile grief with new caregiving burdens (Anderson et al., 2022), and with demographic studies showing that sole parenthood tends to penalise men's employment more strongly than women's (Halleröd, 2013).

Economically, these employment disruptions reflect the classic reallocation of time toward unpaid care. In Becker's time allocation framework, a sudden loss of a spouse forces survivors to redistribute hours formerly spent in paid work into domestic and childcare activities (Becker, 1965). The results provide empirical substance to this theory, as the steep decline in high-earning ($20,000 NZD) employment shares among survivors suggests not only fewer individuals working, but also that those who work are less likely to obtain higher wages. Even where survivors remain employed, they may reduce hours, accept lower-paying roles, or enter more flexible part-time jobs to accommodate their increased caregiving demands. Although the hours or job quality cannot be directly observed, the fall in high-income positions is consistent with an "occupational downgrading" effect where widowed caregivers trade off earnings for time (Hoppes & Segal, 2010). In future work, it would be valuable to examine whether bereaved parents shift into informal or gig work, but evidence clearly indicates a net labour supply contraction.

These labour market trajectories mirror findings from other studies of health or family shocks. For example, Fadlon and Nielsen (2021) document that households respond to severe health shocks by reallocating labour supply across members. A similar dynamic is found in the analysis, where the surviving parent, especially if male, withdraws from the workforce in the medium term. The evidence also resonates with studies of widowhood among younger parents. Lancaster and Johnson (2020) show that the financial and practical impacts of partner loss vary widely, with many caregivers leaving the labour force entirely. Likewise, qualitative work by Dias, Docherty, and Brandon (2017) emphasises that bereaved parents face dual challenges of grief and suddenly increased parenting duties, which can force employment exits. Overall, the sharp, gendered, and persistent labour market fallout observed suggests that partner death acts much like a chronic "job lock" event, where survivors are effectively locked out of the labour force for an extended period. This persistent detachment is likely to have compounding long-run effects on career progression, skills, and earnings capacity, similar to the effects seen after long-term unemployment. It also mirrors evidence taken from older widows and widowers, where partner loss often precipitates premature labour force exit or reduced work intensity (Coile & Duggan, 2019; Holden & Kuo, 1996). In short, the loss of a partner imposes a career penalty on surviving partners observable across different demographics.

6.3 Income Loss and Reliance on Support Systems

Unsurprisingly, the fall in employment rates translates into real income loss and greater reliance on formal support. Surviving parents who had strong pre-loss earnings experience the largest absolute declines in wage and salary income, since they had more to lose. This finding, displayed by Figure 5.2, is consistent with the notion that greater labour attachment yields larger economic exposure to the loss of a co-earner. In the estimates, the share of surviving fathers earning over $20,000 NZD per year falls by roughly 15.0 percentage points by year 5, while the analogous share for mothers declines by about 8.1 points by year 4. Thus, many couples are forced to transition from dual-earner households to single-earner or "no-earner" households, resulting in a corresponding contraction of total family income. These results align with the work of Lancaster and Johnson (2020), who found that bereaved individuals across various socioeconomic groups suffered from substantial losses in income. The magnitude of these income losses suggests that bereavement pushes many households into a substantially lower-income equilibrium. In fact, international research reveals similar long-term financial setbacks, where widowed individuals often experience lasting declines in wealth and income security, particularly without strong social insurance (Kapelle & Winkle, 2024). Furthermore, studies from the United States report that recently widowed individuals often face a significant drop in economic well-being and increased risk of impoverishment, further emphasising the financial toll of spousal loss (Streeter, 2019; Zick & Holden, 2000). The findings confirm that even in a comparatively generous welfare state like New Zealand, partner death can push families into enduring financial hardship.

Government transfers mitigate but do not eliminate this income shock. Receipt of any taxable benefit jumps dramatically in the bereavement year, indicating that most newly widowed parents seek social assistance. In the full-sample estimates, the probability of benefit receipt rises by 12.2 percentage points for fathers in year 0 and by 6.3 points for mothers. The fathers' increase of +12.2 p.p. (from a lower baseline) implies that nearly half of the surviving fathers were on benefits immediately after the loss. This elevated benefit use is not transient; it remains approximately +10 p.p. above the counterfactual in year 1. Mothers' benefit use also rises initially but then declines sharply over the next few years, such that by year 6 it is 15.0 p.p. below the pre-loss trajectory. One possible interpretation is that mothers may return to work, or shift to informal support, after a period, whereas fathers (who often had not accessed such support before) continue relying on the welfare system for an extended period of time.

A child's age further shapes these patterns observed in the analysis. For parents of young

children, the spikes in benefit receipt are largest: surviving fathers with a child under five see an 18.0 p.p. jump in year 0, and mothers see +10.5 p.p. This may suggest that New Zealand's family welfare programmes (such as Sole Parent Support) respond to the immediate needs of sole parents with young kids. However, these support payments typically taper off over time, and as the estimates show, benefit reliance can fall below baseline if the parent remains with young children (perhaps due to eligibility rules or reaching benefit time limits). These results illustrate both the strength and limits of NZ's social safety net: it can absorb a large surge in need, but as the reality of returning to work proves to be difficult, many survivors stay dependent on support for years. Cross-nationally, countries vary in how they support widowed parents, as some provide extended survivor benefits or targeted employment services, while others leave families to rely on personal resources. The findings indicate that even with moderate support, a substantial portion of survivors struggles to regain self-sufficiency, pointing to potential gaps in overall re-employment services or the need for longer-term governmental assistance.

ACC plays a related role as an income buffer. According to the estimates, in the year of partner death, about 25% of mothers and 21% of fathers receive ACC income. This likely reflects death-related survivor payments, for deaths attributed to accidents, and possibly ACC injury claims for stress-related illness. Both parents' ACC receipt rises sharply: for mothers, by +23.0 p.p. in year 0 (peaking at +31.6 in year 1), and for fathers, +17.5 p.p. in year 0 (peaking at +23.2 in year 1). These are very large shifts, consistent with many bereaved individuals having an ACC claim in the immediate aftermath. However, even with ACC payouts, the earlier declines in wage income are not fully offset (consistent with Matthews et al. (2022), who report that compensation payments often do not replace lost earnings in fatal injury cases). By year 6, ACC payment rates have subsided to around +21.5 p.p. above baseline for mothers, while fathers' ACC uptake declined more sharply to about +8 p.p. by year 6, indicating that ACC provides temporary relief but not a permanent income replacement. In sum, both NZ's welfare benefits and ACC serve as important partial safety nets, but survivors face enduring shortfalls.

These financial consequences also align with the literature on trauma and family shock. Families of fatal workplace injuries face long-term financial insecurity, with compensation systems failing to cover complete income loss experienced by the household (Matthews et al., 2022), which is an outcome seen in the results. The sharp rise in benefit use also parallels findings from the social insurance literature, asserting that bereavement often triggers multiple support claims from affected individuals (Lancaster & Johnson, 2020). While New Zealand offers universal healthcare, it provides relatively modest income compensation, which appears to

be quick but incomplete compensation after a loss (Russell & Lessing, 2024). The fact that many survivors remain on benefits years later suggests gaps in re-employment support or the need for more sustained income assistance. From a policy perspective, the evidence suggests that one-off payments and short-term benefits are insufficient to prevent bereaved individuals from experiencing prolonged economic decline. In the absence of a spouse's earnings, many households deplete assets and struggle to maintain their prior standard of living. In the long run, this economic strain can lead to broader adverse societal effects, including higher reliance on public support and reduced consumption and investment by affected families.

6.4 Health Consequences and Pharmaceutical Uptake

Consistent with the well-documented "broken heart" phenomenon, pronounced increases in healthcare utilisation are observed following bereavement. The probability of using any subsidised medication, mental health or cardiovascular, spikes immediately after partner loss for both genders. The CSDiD estimates show that surviving fathers have an increase of about 9.0 percentage points in the likelihood of receiving any cardiovascular medication in the bereavement year, and +6.4 p.p. in year 1. Mothers also increase cardiovascular use (+2.3 p.p. in year 0, +5.0 p.p. in year 2), though more gradually. These rises in cardiovascular prescriptions are large: as previously stated, only about one in five parents had used such meds before loss, so a 9–14 p.p. jump is substantial. The largest increases occur around year 1 – which is consistent with studies linking acute stress from bereavement to elevated risk of heart disease and stroke (Buckley et al., 2012; Ennis & Majid, 2019). In fact, Buckley et al. (2012) reviews the physiological pathways by which grief can precipitate cardiovascular strain (e.g., surges in blood pressure, arrhythmias, and activation of clotting factors), and the findings give epidemiological evidence to these mechanisms in a real-world population. Medical research has documented that the risk of cardiac events (such as myocardial infarction) can increase substantially in the days and weeks following a spouse's death (Mostofsky et al., 2012), underscoring how bereavement can trigger serious acute health episodes. The results, which capture the elevated use of heart medications, likely reflect both preventive care and treatment of emerging cardiovascular issues during this high-risk period of time.

Mental health medication use also surges, reflecting the onset of grief-related depression or anxiety. When all mental health prescriptions are combined, surviving fathers show a +10.6 p.p. increase in the bereavement year (with more minor later fluctuations). Surviving mothers have a +6.4 p.p. rise in year 0 and remain modestly above baseline in year 1. These differences—roughly 6–10 percentage points on top of baseline rates of ∼5–15%—represent

large relative increases in treatment for depression, anxiety, or insomnia. When focused specifically on antidepressant usage, the mothers' use rises by about 3.5 p.p. in year 0 and 4.8 p.p. in year 1, while fathers have a 6.1 p.p. jump in year 0. In other words, the probability of being on antidepressants nearly doubles for men (from approximately 7–8% to approximately 14%) immediately after they experience the loss of their partner. These observations align with clinical literature, as research shows that newly onset or exacerbated depression is very common in individuals after their partner's death (Keyes et al., 2014; Kristiansen et al., 2019), often peaking in the first year. Kaltman and Bonanno (2003) highlight that sudden loss can activate intense trauma symptoms in affected individuals, and the prescription data analyse one aspect of that distress being treated in the population. It should be noted that not every individual suffering from psychological trauma will appear in the PHARMAC prescription records, as some may forego pharmaceutical treatment or seek non-medical or holistic forms of support. Therefore, the medication-based measures likely underestimate the true mental health burden experienced by the observed partners following the death of their partner. Population surveys and qualitative studies find significantly elevated emotional distress among the bereaved, even when it does not translate into drug use or clinical diagnoses (M. K. Nielsen et al., 2020; Stroebe, Schut, & Stroebe, 2007).

In sum, this study finds strong evidence that bereavement has both psychological and physiological health consequences for survivors. The concurrent rises in mental health and cardiovascular medication use suggest that grief triggers cascading effects on the body (Fagundes & Wu, 2020; Stroebe, Schut, & Stroebe, 2007). Stress-related behaviours, such as disruptions in sleep, immune function, and endocrine regulation, likely accompany these patterns. Bereavement often brings prolonged periods of sleep disturbance in affected individuals, which in turn can impair their immune responses and exacerbate concurring mood disorders (Hardison, Neimeyer, & Lichstein, 2005; McEwen & Karatsoreos, 2015). Likewise, bereavement can incite increased systemic inflammation and decreased immune function, which provides a biological link from grief to a vulnerability of illness (Fagundes et al., 2019; Irwin et al., 1987). The finding of sustained medication use reinforces this: it implies ongoing health struggles that may stem from such physiological dysregulation. Importantly, the data shows that medication uptake begins to taper by about year 4–6, which may indicate partial recovery or adaptive coping (consistent with the resilience perspective explored by (Bonanno et al., 2002)). However, the intermediate years show a sustained elevation in treatment: both genders showed persistent increases in heart medication use up to year 5 in some subgroups. In contrast, there is no clear evidence of prolonged increases in mental health prescriptions for mothers with school-aged children beyond the initial post-loss period. These enduring elevations underline that the health impact of bereavement is not merely a transient spike but

can involve a protracted period of increased morbidity. They also hint that a subset of survivors suffers from chronic or complicated grief responses that manifest in long-term health needs. Epidemiological research estimates that around 10–20% of bereaved individuals may develop prolonged grief or chronic depression following the loss of their partner (Boelen & Lenferink, 2020; Djelantik et al., 2017), and the sustained effects seen in the data are most likely driven by that subset of people who continue to struggle for years, even though many others recover more quickly.

6.5 Gendered Patterns and Caregiving Burdens

Across all the domains included in the analysis, the gender differences are rather striking. Fathers consistently face the largest relative losses in employment and income, whereas mothers bear more of the mental health burden. Surviving fathers, who pre-loss were more likely to be full-time employed, see employment and high-wage rates plummet (e.g. ∼–17.8 p.p. in employment by year 6). Mothers, in contrast, experience more modest employment declines (peak –7.0 p.p.) but remain more likely to receive benefits and show higher medication use. For instance, while both fathers and mothers increase antidepressant use after bereavement, the baseline level was higher for mothers, and their increase is somewhat smaller in magnitude. Mothers also have higher baseline benefit receipt, and though their use initially rises less than fathers', it eventually falls to below baseline as many fathers continue claiming aid. One plausible interpretation is that bereavement amplifies pre-existing gender roles: men, unaccustomed to caregiving, may completely withdraw from the labour market and lean on state support; women, already in caregiving roles, have less room to reduce work further but accumulate stress from increased duties, hence their greater mental health care needs.

These gendered outcomes echo international evidence. Halleröd (2013) shows that after marital dissolution, men's economic well-being declines more steeply than women's in the Swedish context. Similarly, Matthews et al. (2022) found in their sample of injury survivors that compensation systems failed to substitute for men's lost earnings. In the data, the pattern may also reflect bargaining dynamics within households (Becker, 1965): a husband's death disproportionately removes the higher earner, whereas a wife's death often cuts the lower earner. Thus, a surviving father sacrifices more total family income than a surviving mother (who likely earned less), which helps explain why fathers suffer larger absolute losses. At the same time, surviving mothers may have stronger informal support networks (as suggested by Freak-Poli et al. (2022)) and may also be more comfortable seeking mental health care. Anderson et al. (2022) emphasise that surviving mothers tend to prioritise

children's needs, sometimes at the expense of their own health. The finding that mothers have elevated mental health treatment uptake is consistent with this, as they may be more likely to seek help for depression or anxiety that could affect their parenting. In contrast, fathers may under-report distress and rely more on financial remedies, aligning with evidence that single fathers often exhibit high levels of stress and unmet support needs (Freak-Poli et al., 2022). Studies in different countries also find that single fathers can experience greater psychological distress and social isolation compared to single mothers, suggesting they may struggle to cope with caregiving demands on their own (Dhungel et al., 2023; Hallerbäck et al., 2025). Bereaved fathers in particular may be less inclined to seek help or counselling due to gender norms around emotional expression, potentially leading to the under-treatment of mental health issues. Another consideration is men's health-related behaviours: without a partner's influence, widowed fathers might be less likely to maintain healthy routines or attend regular medical check-ups, contributing to deteriorating physical health (e.g. weight gain, unchecked hypertension) . In contrast, mothers may be more proactive in managing health and accessing care, which could mitigate some risks. These behavioural differences are difficult to observe in the data but likely contribute to the gender gap in outcomes.

The intensity of caregiving, proxied by the age of the youngest child, further differentiates these dynamics. When the youngest child is under five years old, both parents face the steepest labour market penalties, but in different ways. Fathers of young children see an anticipatory employment spike pre-loss (possibly as they try to earn more ahead of becoming sole caregivers) followed by a catastrophic fall of –28.3 p.p. in year 1, suggesting they were trying to maximise pre-loss labour income before childcare duties overwhelmed them post-loss. Mothers of young children have a more gradual drop (–10.1 p.p. in year 1), but a much sharper decline in benefit receipt (–10.6 p.p. by year 2) and a continued, steep decline in overall benefit receipt in the following years, reaching levels far below baseline by years 5–6. These patterns are consistent with studies showing that widowed parents of infants often face a "double bind" of intensive childcare and income loss (Dias, Docherty, & Brandon, 2017; Holmgren, 2021). By contrast, families with older children experience smaller shocks: fathers with school-aged kids had roughly a 10.5 p.p. dip in employment by year 2, and mothers' benefit use remained near baseline. Taken together, the evidence strongly indicates that the younger the dependent children, the greater the sacrifice required of the surviving parent. This aligns with both economic theory and qualitative accounts of caregiving strain (Dias, Docherty, & Brandon, 2017; Lancaster & Johnson, 2020). Younger children demand more hands-on care and cannot contribute to household tasks, so the surviving parent's time constraints are most severe. Furthermore, widowed parents of very young children may also face higher childcare costs or difficulties finding suitable care, compounding the pressure to

leave work. In contrast, older children can offer some self-care or household help, potentially alleviating the burden slightly and enabling the parent to maintain more of their routine.

Overall, the analysis reveals a gender division between mothers and fathers in the post-bereavement window: fathers incur greater economic losses and withdraw more from the labour force, whereas mothers endure more of the prolonged mental health strain (though both genders experience both types of challenges to varying degrees). This suggests that interventions must account for these differences. From a social policy standpoint, widowed fathers might benefit from programmes that assist with childcare and encourage engagement with support services, whereas widowed mothers might need enhanced mental health resources and flexible work arrangements to balance earning with caregiving. Such policy implications are discussed in the next section.

6.6 Policy Implications

The duration and extent of the impacts observed in the analysis stress significant policy considerations. New Zealand's existing post-bereavement supports, including temporary statutory leave, child support payments, means-tested benefits, and ACC grants, provide some cushioning, but results suggest they fall short of ensuring long-term well-being for those affected. The fact that six years post-loss, many survivors are still earning far less and claiming welfare implies that recovery is protracted. Policymakers should consider enhancing earlier interventions, such as extending the statutory bereavement leave for parents (to allow them to adapt to their new lives without a loss in income) or better subsidising childcare for newly bereaved parents. Extended leave, which is analogous to parental leave, could grant surviving parents the necessary time to handle childcare responsibilities and manage the immediate corresponding legal and financial matters without immediately sacrificing their jobs. Targeted job training or counselling could aid surviving partners in gradually re-entering the workforce at their previous skill levels, once their acute grief and childcare needs stabilise more. Furthermore, support programmes should be tailored to the gendered gaps observed in the study: outreach to recently bereaved fathers might focus on career transition assistance and psychosocial support (perhaps through dedicated men's support groups or workplace referral programmes), while programmes for recently bereaved mothers might focus on mental health services (e.g., accessible counselling, respite childcare, stress management programmes) alongside work reintegration.

The sharp increases in prescription use highlight an urgent need for integrated health responses. Primary care providers and mental health practitioners should proactively check

on bereaved patients, as many may be at risk of depression or cardiovascular events. Coordinated care models that combine psychological counselling with medical monitoring could mitigate the longer-term health burdens observed in the data. These findings resonate with evidence from the NZ mental health strategy (Government Inquiry into Mental Health and Addiction, 2018) to improve access to support for vulnerable groups. The evidence suggests that rather than treating bereavement as a one-time crisis, it should be treated as a chronic condition. Interventions could include grief support services, sleep and stress management programmes (Lancel, Stroebe, & Eisma, 2020), and community groups that help the bereaved to reintegrate into social communities (Scott et al., 2020). Strengthening community support is especially important, as evidence indicates that bereaved individuals in New Zealand greatly value family, friend and community outreach in their coping with their loss (Bellamy et al., 2014). Widowed parents' support organisations or school-based resources for affected families can help survivors feel less isolated in their situation and potentially more inclined to seek help.

Internationally, some countries have begun to recognise the need for specialised support for bereaved families. For example, the United Kingdom and Canada have community programmes for grieving children and parents (Malpass et al., 2025; Thrower et al., 2023) and several European countries provide survivor pensions or extended bereavement leave for widows with young children (Hanemann & Rausch, 2020; Rabaté & Tréguier, 2024). New Zealand could draw lessons from these approaches by considering bereavement a significant life-course risk factor, and policymakers can justify more robust interventions. In practice, this might involve multi-agency cooperation, as employers, health services, and social development agencies could work together to identify widowed parents early and provide a package of support (counselling, job protection, financial planning advice, childcare subsidies, etc.) to stabilise the family unit. This comprehensive support in the immediate years following the loss could potentially shorten the duration of negative impacts documented by the results.

6.7 Limitations and Future Directions

While comprehensive, it is acknowledged that this analysis has several limitations that suggest avenues for future work. First, administrative data capture formal outcomes but not the full lived experience of bereavement, as measures of informal work or unpaid labour are lacking, and the unreported health issues or psychosocial coping strategies cannot be observed. Administrative records are invaluable for objective outcomes at scale (Jutte, Roos,

& Brownell, 2011), but they provide limited insight into how individuals adjust emotionally or the day-to-day challenges. In-depth interviews with survivors, along with other qualitative evidence, could help shed light on the patterns seen in the findings. For example, interviews might discover common coping strategies utilised, the extent of reliance on family or community support, or personal reasons for scaling back work that are not evident in the data. Such insights would help interpret whether observed behaviours, such as exiting employment, stem primarily from necessity (through lack of childcare or poor health) or choice (by reprioritising family or avoiding trauma). Qualitative data could also identify unmet needs that the quantitative indicators in this analysis miss.

Second, the study focuses on aggregate effects; there is likely important heterogeneity by subgroup (e.g. ethnicity, region, and cultural background) that remains unexplored. New Zealand's population is diverse, and different communities may have distinct post-bereavement experiences and support systems. Future studies could examine whether, for example, Māori or Pasifika families experience different trajectories, or whether strong local community networks buffer some of the negative outcomes. The cultural norms around bereavement and childcare might mitigate the impact of partner loss: for instance, collectivist cultures could provide more informal support, potentially reducing reliance on government assistance or mitigating mental health issues. By understanding these differences, practical implications could be uncovered that tailor specific support programmes in culturally appropriate ways. Socioeconomic status is another important factor: families with greater financial resources might withstand the shock more easily than low-income families, a hypothesis that future research could test by stratifying results by pre-loss income or wealth.

Third, although a rigorous CSDiD design was used that accounts for dynamic treatment timing, unmeasured time-variant confounders (such as coincident economic shocks or unobserved family circumstances) could still bias estimates. This analysis assumes that, conditional on controls and pre-trends, the timing of the partner's death is as good as random. In reality, there may be subtle forms of selection at play. For instance, certain high-risk occupations increase the likelihood of accidental death and also influence family outcomes (though a restriction to exogenous causes was intended to minimise such links). Further work could include robustness checks to ensure that the main effects are not driven by differential pre-trends. Replicating this analysis in other contexts, such as using administrative data from another country, could confirm whether similar magnitudes appear, increasing the confidence that a general causal effect of bereavement is isolated rather than a phenomenon of New Zealand itself.

Fourth, because the sample was restricted to sudden partner deaths, the estimates may reflect

an upper-bound scenario of impact severity. Sudden and accidental losses tend to lead to more acute shock and trauma, whereas deaths attributed to chronic illness or ageing might allow individuals to adjust in anticipation; unexpected bereavements often elicit more intense grief reactions and higher risk of PTSD-like symptoms than expected losses (Bottomley, Campbell, & Neimeyer, 2022). Families facing a loved one's terminal illness often have more time to prepare mentally, financially, and socially before the loss, potentially softening the aftereffects. Future research should examine outcomes after anticipated partner deaths (e.g., due to chronic illness) to assess how the trajectory differs when there is forewarning. It could be that some effects are muted or shorter-lived in those cases, or conversely, that extended caregiving before death leaves survivors equally strained. Understanding the role of anticipation would also benefit interventions; families anticipating a loss might benefit from pre-bereavement services (counselling, hospice support, financial planning) that could, in turn, influence post-loss outcomes.

Fifth, while critical to the analysis, outcomes for children of the bereaved parents were not examined. The death of a parent is itself a profoundly impactful event for children, potentially affecting their psychological well-being, educational achievement, and long-term outcomes. This study focuses solely on the surviving partner; therefore, an important avenue for future research is to link bereaved parents to data on their children. International studies suggest that losing a parent can lead to poorer academic performance and elevated mental health risks for children (Andriessen et al., 2020), and a register study found that early parental death is associated with lower educational attainment and earnings in the children's adulthood, indicating intergenerational effects (Böckerman, Haapanen, & Jepsen, 2023). Research that investigates outcomes of children of bereaved parents in the New Zealand context would undoubtedly help provide more of a holistic picture of family-level repercussions. It could also help policymakers determine the necessary means of targeted support in aiding children in their own bereavement periods.

Finally, as health was proxied with medication uptake, clinical health outcomes or mortality among the surviving partners were not directly measured. The elevated drug dispensing implies greater disease burden, but linking this to actual diagnoses or health events (such as heart attacks, strokes, or hospitalisations for mental illness) would provide a more complete picture of physical and mental health trajectories. It is possible that increased medication use prevented some adverse events through proactive treatment, or it may indicate that many events occurred and required medical intervention. Future research could integrate hospital records or mortality data to examine whether the increased prescriptions correspond to higher incidence of diagnosed conditions (e.g., new cases of hypertension, clinical depression) or even

excess mortality among surviving partners (the so-called excess bereavement mortality). Some studies on older widows/widowers have identified elevated mortality risks in the first months to years after spouse loss (Elwert & Christakis, 2008; Kaprio, Koskenvuo, & Rita, 1987; Moon et al., 2014); it would be insightful to see if a similar, albeit perhaps smaller, effect exists in this younger cohort of parents. Additionally, unravelling the role of caregiving stress versus financial strain as drivers of these outcomes would be valuable. The findings suggest both pathways matter, but studies that include more detailed measures (such as time use surveys or biomarkers of stress) could help isolate how much of the health impact is due to pure emotional stress of grief versus practical and economic hardship.

Despite the limitations of the study, findings clearly indicate that sudden and exogenously-attributed partner death is a major shock with enduring socioeconomic and health consequences for the affected families. Experiencing bereavement in one's younger years, especially when caring for young children, can place survivors on a different rehabilitation trajectory: one of reduced economic productivity, increased reliance on support systems, and increased health needs. These outcomes shed light on the importance of recognising bereaved parents as a vulnerable population in New Zealand. Future research should further unpack and address the ripple effects of partner loss (especially the intergenerational effects). By developing evidence-based interventionary measures and improving existing social safety nets, New Zealand can better support surviving partners and their children in the long journey of adapting to grief and rebuilding their lives.

7 Conclusion

This thesis aimed to investigate the long-term physical health and socioeconomic repercussions of sudden partner loss among younger adults in Aotearoa New Zealand. The evidence presented throughout this analysis indicates that the death of a partner in one's life creates a profound disruption of their life course with long-lasting consequences. Furthermore, the results show that bereavement is not a transient shock in nature; instead, it leads to persistent disruptions for survivors' employment, income, and health that endure for years. Surviving partners in the study experienced significant and lasting declines in their participation in the labour market, earnings, as well as an increased reliance on social support systems and prescription medications for both mental and physical health conditions. In line with previous literature, these multifaceted effects emphasise that sudden bereavement echoes across multiple domains of life, and expand this phenomenon to a younger parental population. The results align with the classic "widowhood effect" observed among older individuals (Moon et al., 2014) and reveal that the loss of a partner can compromise survivors' health and social wellbeing through a combination of economic and stress pathways.

This study detailed how partner loss translates into both economic and health risks for surviving partners. Survivors, especially fathers, experienced sharp declines in employment rates in the immediate aftermath of losing their partner. Many bereaved fathers effectively withdrew their participation from the workforce and relied on governmental assistance, which persisted throughout the post-loss six-year window. Bereaved mothers likewise reduced their labour force participation, albeit to a lesser extent, as many had been juggling work and childcare even before the loss. However, mothers exhibited a significant rise in health needs, as evidenced by a significant increase in their usage of mental health medications in the post-loss years. These gendered patterns indicate that pre-existing social roles shape the recovery path of individuals: fathers, often the primary "breadwinners", suffered larger financial and employment challenges upon being thrust into sole parenthood, whereas mothers, who typically assumed an even greater portion of the caregiving burden, experienced a heavier psychological and health toll. In sum, the fathers suffered more reductions in income, while mothers faced increased mental health strains, corresponding with findings in other contexts (Halleröd, 2013).

The consequences of partner loss showed little sign of fading, even six years after the event, giving evidence to the idea that bereavement can have durable consequences for survivors' life trajectories. Beyond the immediate shock of losing a partner's earnings to maintain their livelihood, bereaved partners experienced sustained reductions in their own earning potential

due to interrupted careers or to downshift to accommodate their greater caregiving burden. A single tragic event thus can lead families to follow a lower economic path, increasing their risk of financial insecurity and poverty over time. These economic struggles create a direct connection with health risks. Substantial increases in the usage of medications that typically treat depression, anxiety, and cardiovascular conditions were observed among surviving partners. This pattern suggests that the chronic stress and overload following the death of one's partner translate into tangible health burdens. Although the data did not capture the clinical diagnoses or mortality among observed individuals, the increase in medication usage serves as a warning indicator of elevated morbidity in the bereaved population. In other words, the shock of partner death is both a socioeconomic and a health shock, which potentially leads to a cycle wherein financial stress and psychological stress compound on one another and hinder a survivor's rehabilitation.

The persistent effects documented in this study create clear implications for social policy in New Zealand. In its current form, bereavement supports (such as three days of statutory leave, limited survivor benefits, and one-off ACC grants) appear insufficient to prevent the long-term hardship that the bereaved can experience. The finding that many bereaved parents remain economically disadvantaged signals a need for more robust and sustained support systems. Policymakers might consider expanding support for bereaved families, for example, providing longer paid leave or financial assistance to recently bereaved parents, subsidising childcare to ease the load on sole parents, and offering career guidance programmes to help survivors re-enter the workforce. The evidence of gender-specific outcomes also suggests that support should be tailored. An outreach programme that encourages engagement with support services, help with childcare, and flexible work arrangements may benefit bereaved fathers. Additionally, bereaved mothers may benefit from enhanced access to mental health services and respite care. Widowed fathers may benefit from outreach that encourages engagement with support services, help with childcare, and flexible work arrangements, while widowed mothers might need enhanced access to mental health services and respite care. A comprehensive support system that combines financial aid with childcare support and health services would provide bereaved parents with better tools to achieve stability and protect their wellbeing after losing a loved one.

The results also highlight issues of both health equity and possible intergenerational impacts. A shock like partner loss can widen pre-existing inequalities; families with more resources may manage the fallout more easily, whereas low-income families are at risk of falling into persistent poverty when a primary earner dies. A surviving parent whose health and income are severely compromised may lead their children to face reduced life opportunities,

which would not just serve as a personal tragedy, but a vector of disadvantage transferred to the next generation. Although not expanded upon by this research, New Zealand's diverse communities manage bereavement through various cultural approaches. Māori and Pasifika families often utilise their strong communal ties in tandem with cultural bereavement customs (such as tangihanga in Māori tradition) to handle grief. These networks can provide vital emotional and practical support, but they do not address the economic and health challenges that bereaved families face. Formal systems should work in conjunction with cultural structures to ensure that services are accessible and sufficient for all bereaved families. Ultimately, this study highlights a broader point about institutional sufficiency: a society's social safety nets and health services must be developed to recognise bereavement as a major life event requiring extended support, so that a tragic loss does not cause further damage to a family's future.

This study suggests several directions for future investigations related to this topic. One avenue is to integrate administrative data with qualitative or mixed-method approaches. A study that conducts in-depth interviews with widowed parents could shed light on the coping strategies, social support networks, and decision-making processes that accompany the quantitative patterns observed. The analysis focused on average effects, but future studies could examine how impacts vary across different groups (by ethnicity, region, or available family support) to pinpoint vulnerable subpopulations or unobserved protective factors. It would also be useful to investigate other bereavement contexts and longer study windows. Future work could compare sudden and exogenous losses (as in the study) with deaths preceded by long chronic illness to see how preparation and caregiving beforehand mitigate the impact, and extend the follow-up beyond six years to determine whether survivors eventually recover baseline outcomes or if some effects persist in life. Linking administrative records to external health data or surveys would enable the observation of definite health endpoints, such as hospitalisations or mortality, to distinguish between the contributions of psychological stress and financial strain on adverse outcomes. Future research can utilise these suggestions to build on this thesis's foundation, allowing for a more nuanced and detailed understanding of how family bereavement changes life courses.

In conclusion, the loss of a partner during adulthood creates a life-altering event that has ramifications for the surviving partner, their children, and society at large. This thesis has shown that sudden and exogenously-attributed partner loss precipitates an enduring decline in financial security and health for surviving partners, stressing that bereavement is not merely a tragedy for the affected family, but also a public issue with economic and health features. This research provides a robust empirical foundation for recognising younger

bereaved parents as a vulnerable group in need of targeted intervention. These outcomes should not be inescapable for the affected families, as they can be mitigated through thoughtful social policies, workplace practices, and community support that acknowledge the unique challenges of bereavement in one's younger years. The findings further underscore that supporting bereaved parents represents not only a matter of compassion but an investment in public health and social equity as a whole. A society aiming to be inclusive must ensure that those who experience a tragic family loss are not permanently left behind. By treating bereavement as a significant life course contingency, one that combines cultural elements and institutional frameworks, New Zealand can better uphold the wellbeing of its families in the face of adversity, thus transforming enduring hardships into a more manageable life transition.

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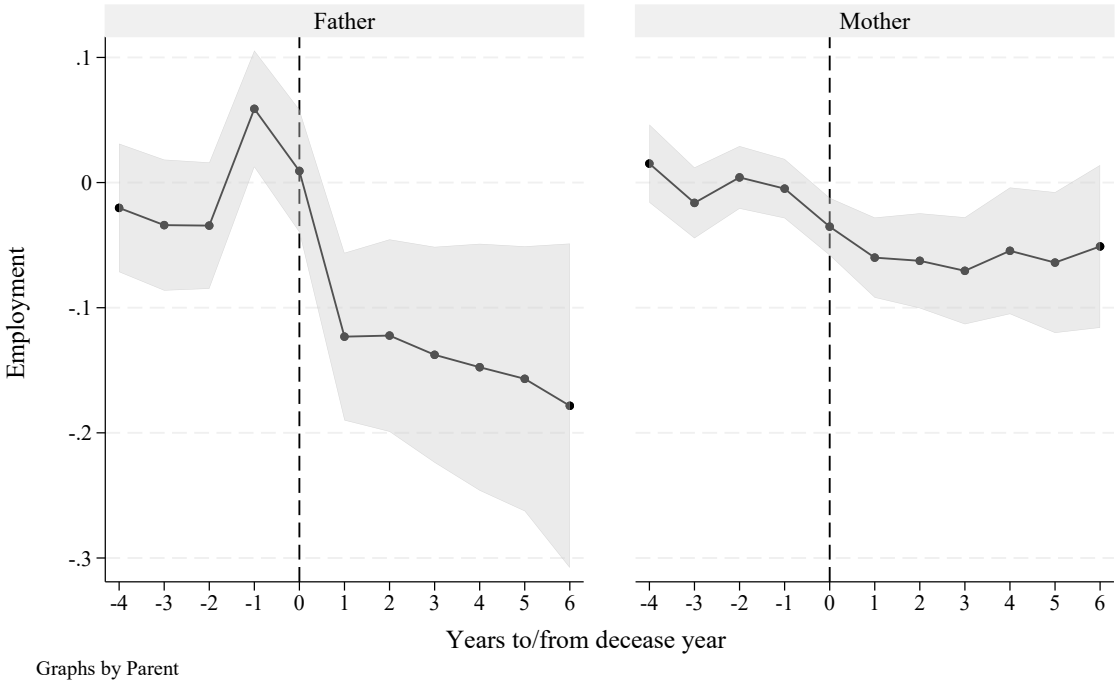
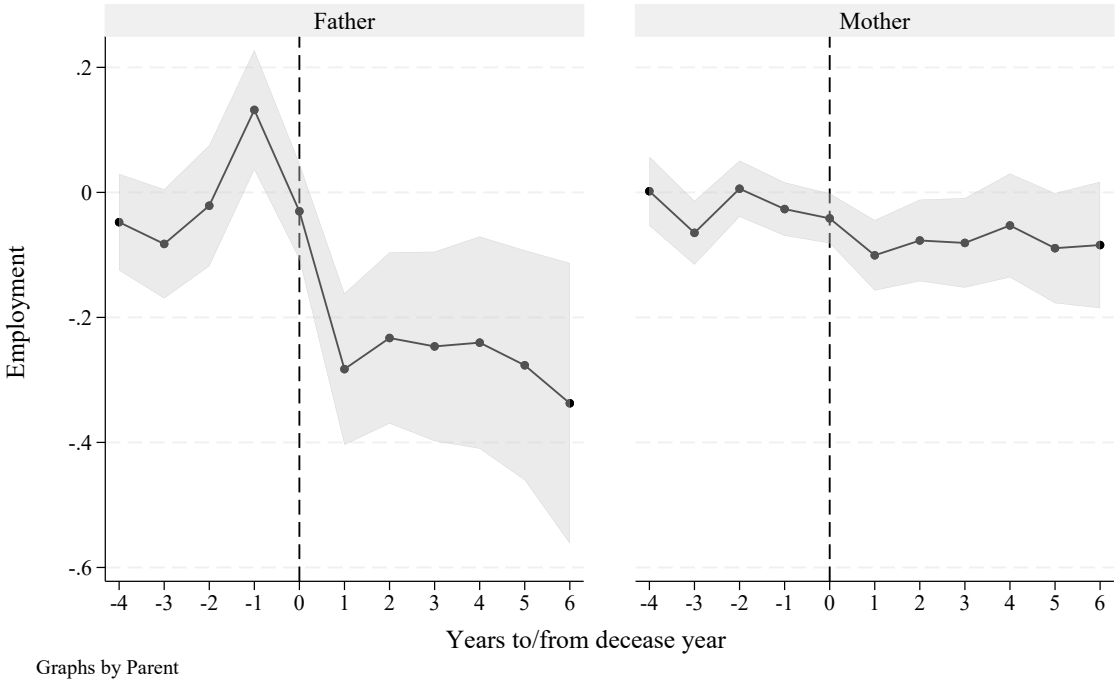
A Employment Effects

Figure A.1: Estimated effects of partner loss on employment: All ages



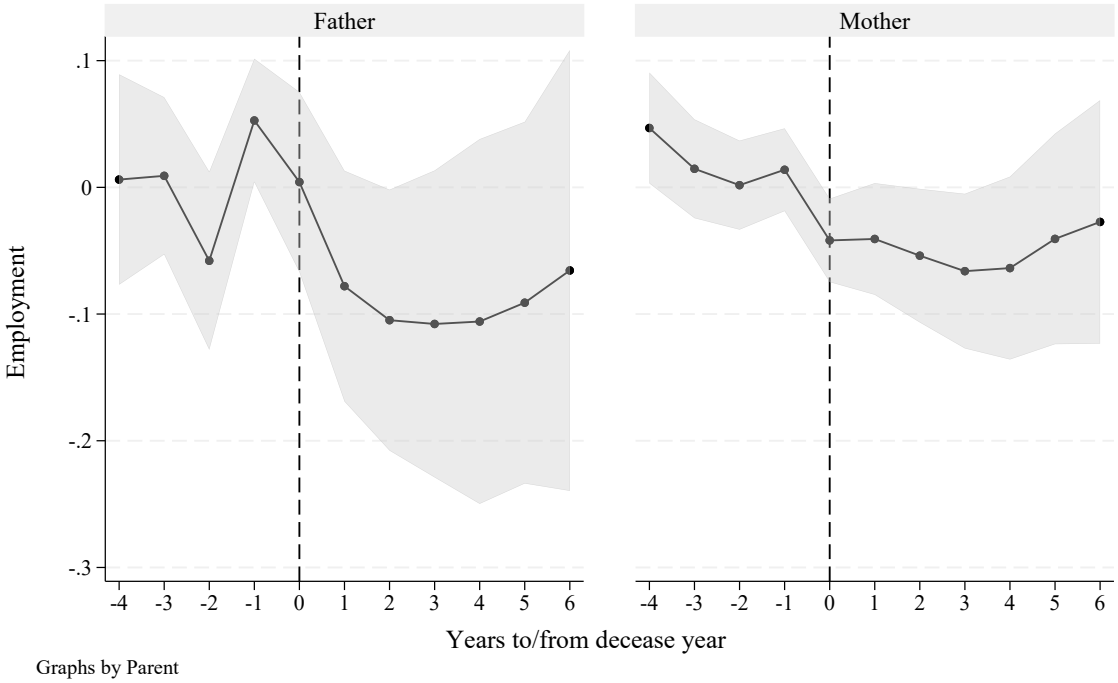
Notes: Estimates are based on New Zealand administrative data from the Integrated Data Infrastructure (IDI), and are the author's own calculations. Figure reports average treatment effects on the treated (ATT) from Callaway & Sant'Anna Difference-in-Differences models. The outcome is a binary indicator for employment. Event time is measured in years relative to the partner's death ($t = 0$). Error bars represent 95% confidence intervals. Statistical significance is denoted by: *p<0.05, **p<0.01, ***p<0.001.

Figure A.2: Estimated effects of partner loss on employment: Child aged 0–4



Notes: See Figure A.1 notes. Sample restricted to bereaved parents whose youngest child was aged 0–4 at the time of partner's death.

Figure A.3: Estimated effects of partner loss on employment: Child aged 5–14



Notes: See Figure A.1 notes. Sample restricted to bereaved parents whose youngest child was aged 5–14 at the time of partner's death.

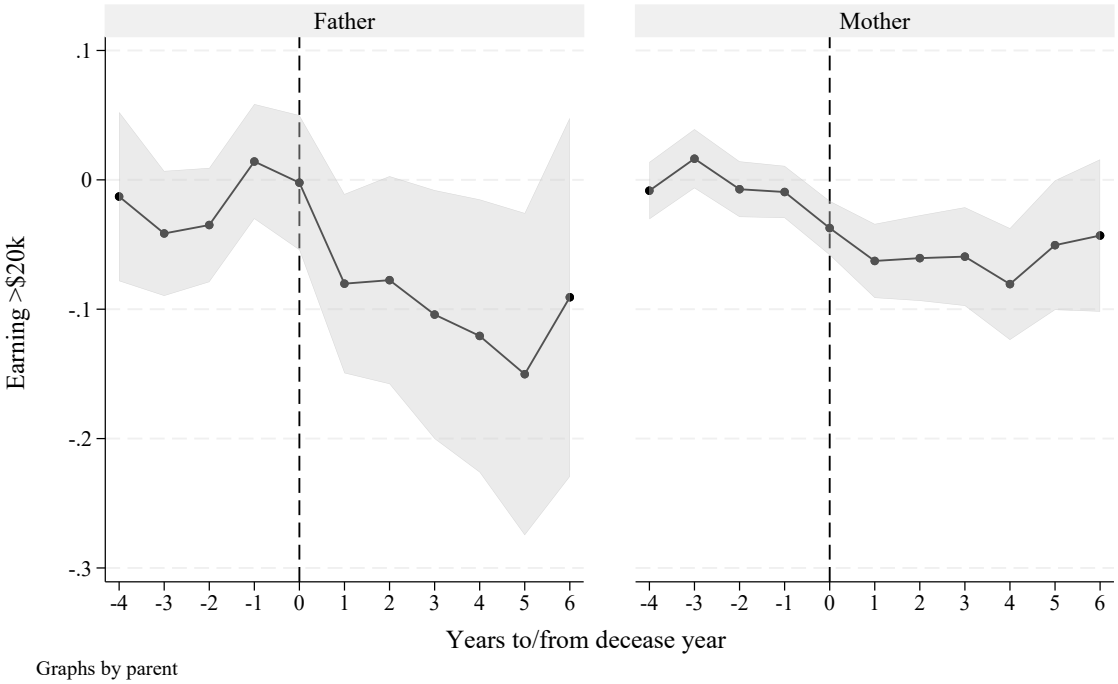
Table A.1: Employment Effects After Partner Loss, by Gender and Age of Youngest Child

Event Year	All Ages		Child Aged 0–4		Child Aged 5–14	
	Father	Mother	Father (< 5)	Mother (< 5)	Father (5–14)	Mother (5–14)
-4	-0.020 (0.026)	0.015 (0.016)	-0.048 (0.039)	0.002 (0.028)	0.006 (0.042)	0.047 (0.022)
-3	-0.034 (0.027)	-0.016 (0.014)	-0.082 (0.045)	-0.065 (0.026)	0.009 (0.032)	0.015 (0.020)
-2	-0.034 (0.026)	0.004 (0.013)	-0.021 (0.049)	0.006 (0.023)	-0.058 (0.036)	0.002 (0.018)
-1	0.059 (0.024)**	-0.005 (0.012)	0.132 (0.049)***	-0.027 (0.022)	0.053 (0.025)*	0.014 (0.017)
0	0.009 (0.025)	-0.035 (0.012)**	-0.030 (0.039)	-0.042 (0.020)*	0.004 (0.036)	-0.042 (0.017)*
1	-0.123 (0.034)***	-0.060 (0.016)***	-0.283 (0.062)***	-0.101 (0.029)***	-0.078 (0.046)	-0.041 (0.022)
2	-0.122 (0.039)**	-0.063 (0.019)***	-0.233 (0.070)***	-0.077 (0.033)*	-0.105 (0.053)*	-0.054 (0.027)*
3	-0.138 (0.044)**	-0.071 (0.022)***	-0.246 (0.077)***	-0.081 (0.037)*	-0.108 (0.062)	-0.066 (0.031)*
4	-0.148 (0.050)**	-0.055 (0.026)*	-0.240 (0.087)**	-0.053 (0.042)	-0.106 (0.073)	-0.064 (0.037)
5	-0.157 (0.054)**	-0.064 (0.029)*	-0.277 (0.094)**	-0.089 (0.045)*	-0.091 (0.073)	-0.041 (0.042)
6	-0.178 (0.066)**	-0.051 (0.033)	-0.337 (0.115)**	-0.084 (0.052)	-0.066 (0.089)	-0.027 (0.049)
Observations	312	1,380	111	552	144	636

Notes: All estimates are average treatment effects on the treated (ATT) from Callaway & Sant'Anna DiD models. Data is from the IDI and are the author's own calculations. Robust standard errors in parentheses. Significance: *p<0.05, **p<0.01, ***p<0.001. Sample stratified by gender and age of youngest child at time of partner's death.

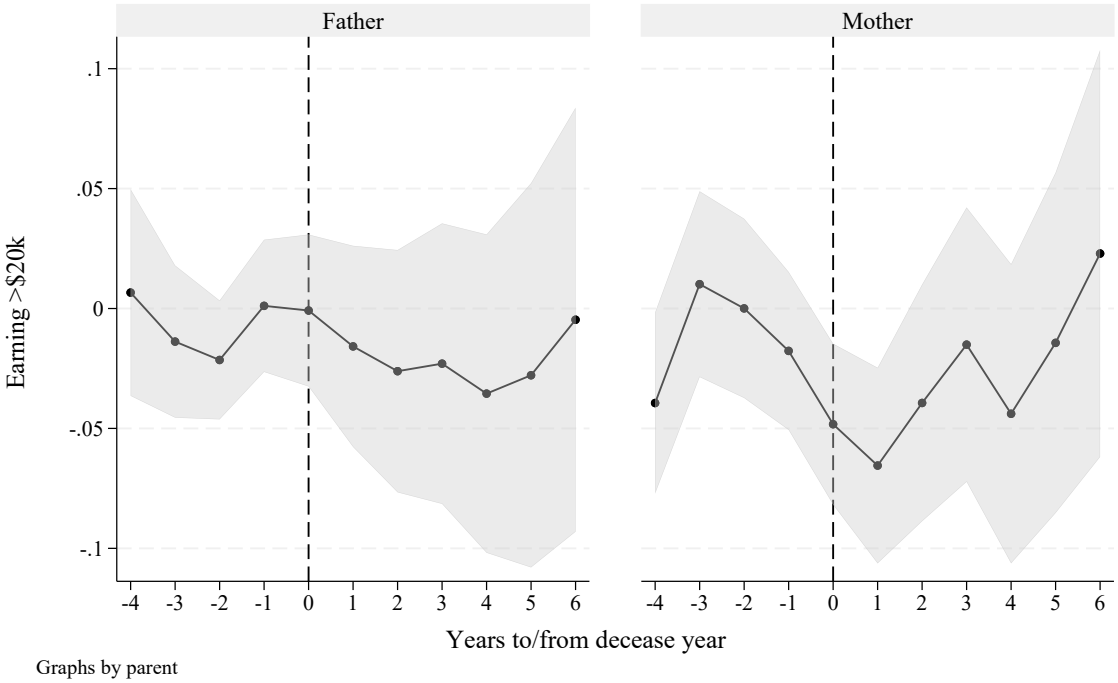
B Wages and Salaries

Figure B.1: Estimated effects of partner loss on wage and salary income: All ages



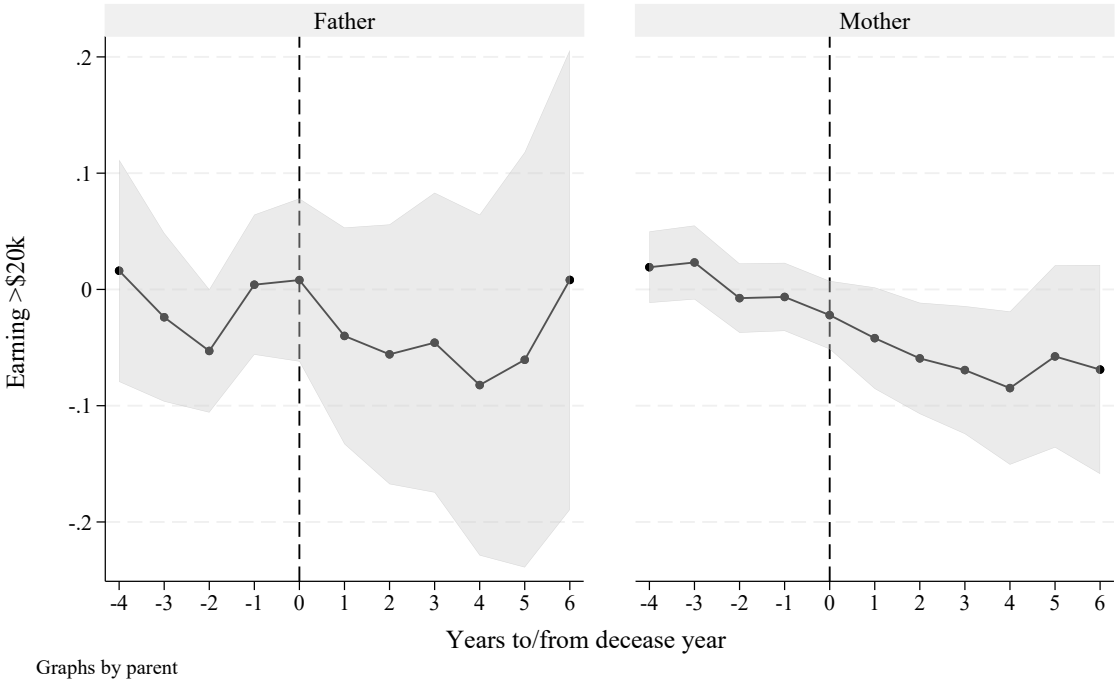
Notes: Estimates are based on New Zealand administrative data from the Integrated Data Infrastructure (IDI), and are the author's own calculations. Figure reports average treatment effects on the treated (ATT) from Callaway & Sant'Anna Difference-in-Differences models. The outcome is a binary indicator equal to 1 if the individual earned more than $20,000 NZD in wages or salary income during the calendar year, and 0 otherwise. Event time is measured in years relative to the partner's death ($t = 0$). Error bars represent 95% confidence intervals. Statistical significance is denoted by: *p<0.05, **p<0.01, ***p<0.001.

Figure B.2: Estimated effects of partner loss on wage and salary income: Child aged 0–4



Notes: See Figure B.1 notes. Sample restricted to bereaved parents whose youngest child was aged 0–4 at the time of partner's death.

Figure B.3: Estimated effects of partner loss on wage and salary income: Child aged 5–14



Notes: See Figure B.1 notes. Sample restricted to bereaved parents whose youngest child was aged 5–14 at the time of partner's death.

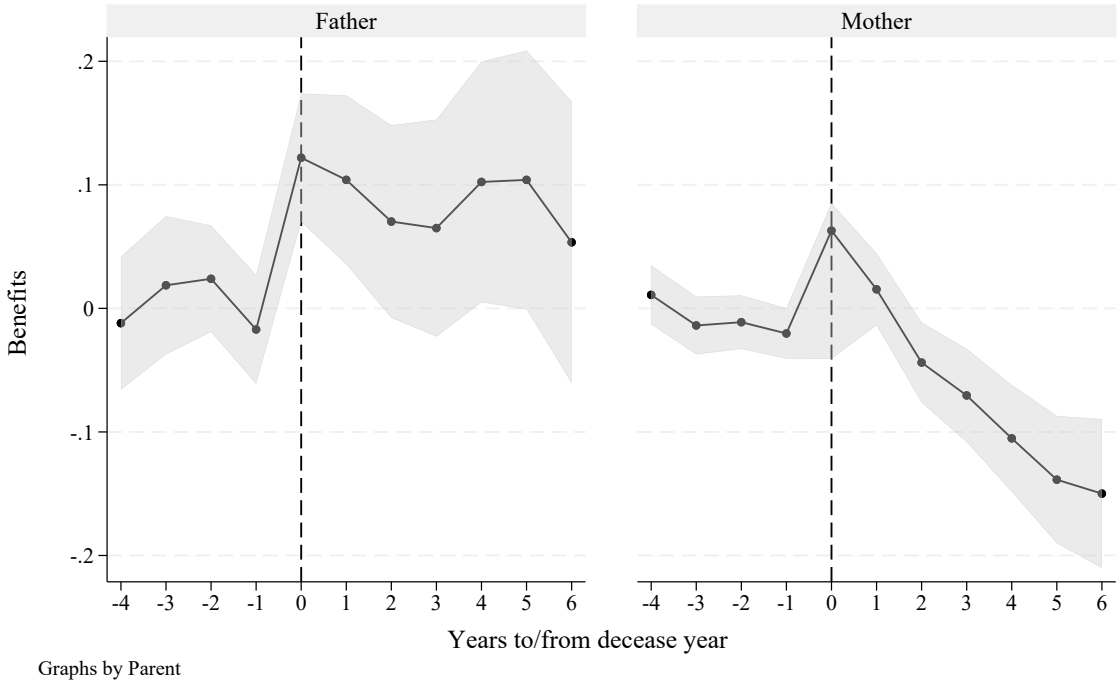
Table B.1: Wages and Salaries Effects After Partner Loss, by Gender and Age of Youngest Child

Event Year	All Ages		Child Aged 0–4		Child Aged 5–14	
	Father	Mother	Father (< 5)	Mother (< 5)	Father (5–14)	Mother (5–14)
-4	-0.013 (0.033)	-0.008 (0.011)	-0.048 (0.054)	-0.037* (0.018)	0.016 (0.049)	0.019 (0.016)
-3	-0.041 (0.025)	0.016 (0.012)	-0.043 (0.038)	0.012 (0.020)	-0.024 (0.037)	0.023 (0.016)
-2	-0.035 (0.022)	-0.007 (0.011)	0.037 (0.041)	-0.007 (0.019)	-0.053* (0.027)	-0.007 (0.015)
-1	0.014 (0.023)	-0.009 (0.010)	0.045 (0.040)	-0.010 (0.017)	0.004 (0.031)	-0.006 (0.015)
0	-0.002 (0.027)	-0.037*** (0.011)	-0.088 (0.045)	-0.048** (0.017)	0.008 (0.036)	-0.022 (0.015)
1	-0.080* (0.035)	-0.063*** (0.015)	-0.211*** (0.063)	-0.089*** (0.020)	-0.040 (0.048)	-0.042 (0.022)
2	-0.078 (0.041)	-0.060*** (0.017)	-0.219** (0.077)	-0.058* (0.024)	-0.056 (0.057)	-0.059* (0.024)
3	-0.104* (0.049)	-0.059** (0.019)	-0.259** (0.088)	-0.007 (0.030)	-0.046 (0.066)	-0.069* (0.028)
4	-0.121* (0.054)	-0.081*** (0.022)	-0.204 (0.090)	-0.035 (0.034)	-0.082 (0.075)	-0.085* (0.034)
5	-0.150* (0.064)	-0.050* (0.026)	-0.247* (0.098)	-0.009 (0.040)	-0.061 (0.091)	-0.058 (0.040)
6	-0.091 (0.071)	-0.043 (0.030)	-0.110 (0.099)	0.027 (0.045)	0.008 (0.101)	-0.069 (0.046)
Observations	312	1,380	111	552	144	636

Notes: All estimates are average treatment effects on the treated (ATT) from Callaway & Sant'Anna DiD models. Data is from the IDI and are the author's own calculations. Robust standard errors in parentheses. Significance: *p<0.05, **p<0.01, ***p<0.001. Sample stratified by gender and age of youngest child at time of partner's death.

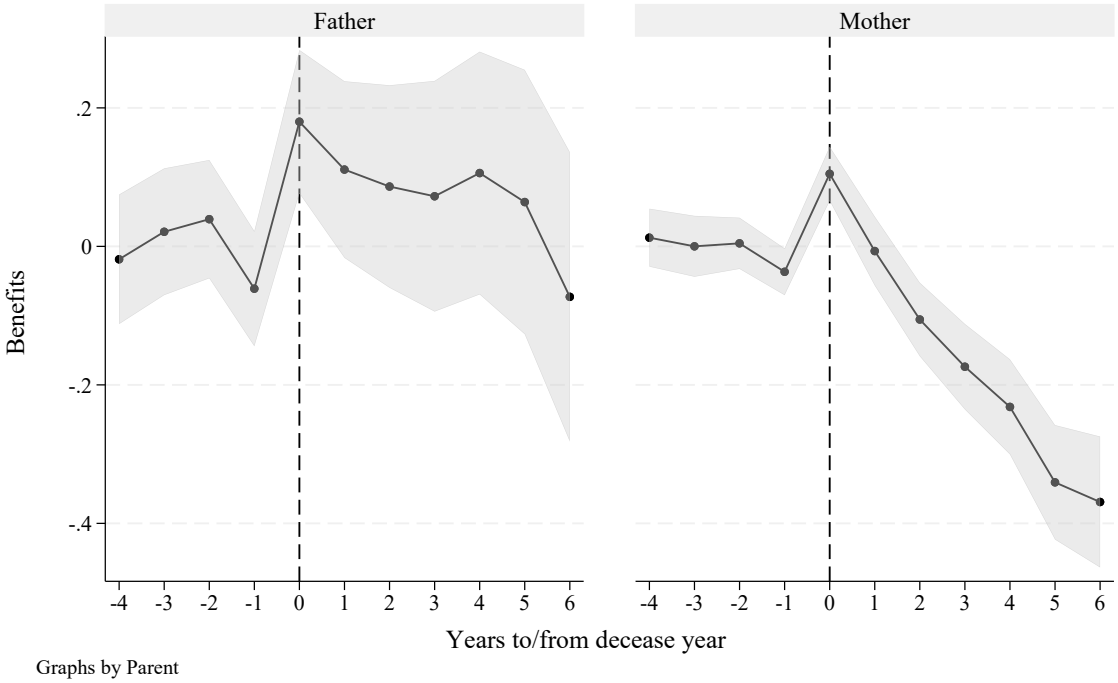
C Benefit Receipt

Figure C.1: Estimated effects of partner loss on benefit receipt: All ages



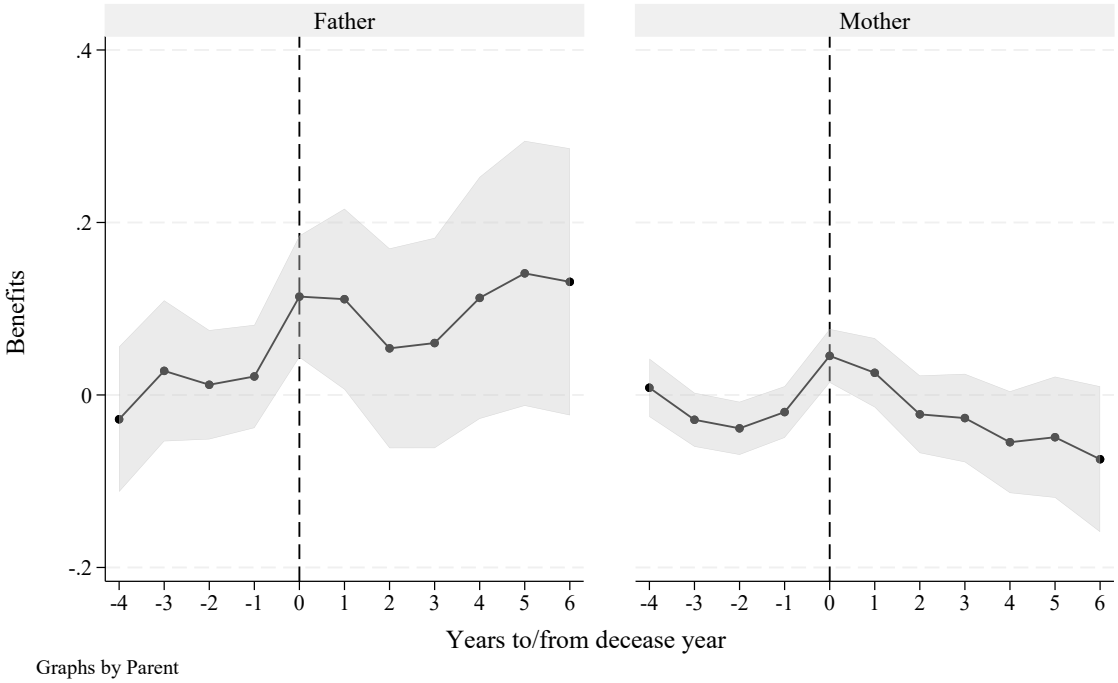
Notes: Estimates are based on New Zealand administrative data from the Integrated Data Infrastructure (IDI), and are the author's own calculations. Figure reports average treatment effects on the treated (ATT) from Callaway & Sant'Anna Difference-in-Differences models. The outcome is a binary indicator for receipt of any taxable government benefit. Event time is measured in years relative to the partner's death ($t = 0$). Error bars represent 95% confidence intervals. Statistical significance is denoted by: *p<0.05, **p<0.01, ***p<0.001.

Figure C.2: Estimated effects of partner loss on benefit receipt: Child aged 0–4



Notes: See Figure C.1 notes. Sample restricted to bereaved parents whose youngest child was aged 0–4 at the time of partner's death.

Figure C.3: Estimated effects of partner loss on benefit receipt: Child aged 5–14



Notes: See Figure C.1 notes. Sample restricted to bereaved parents whose youngest child was aged 5–14 at the time of partner's death.

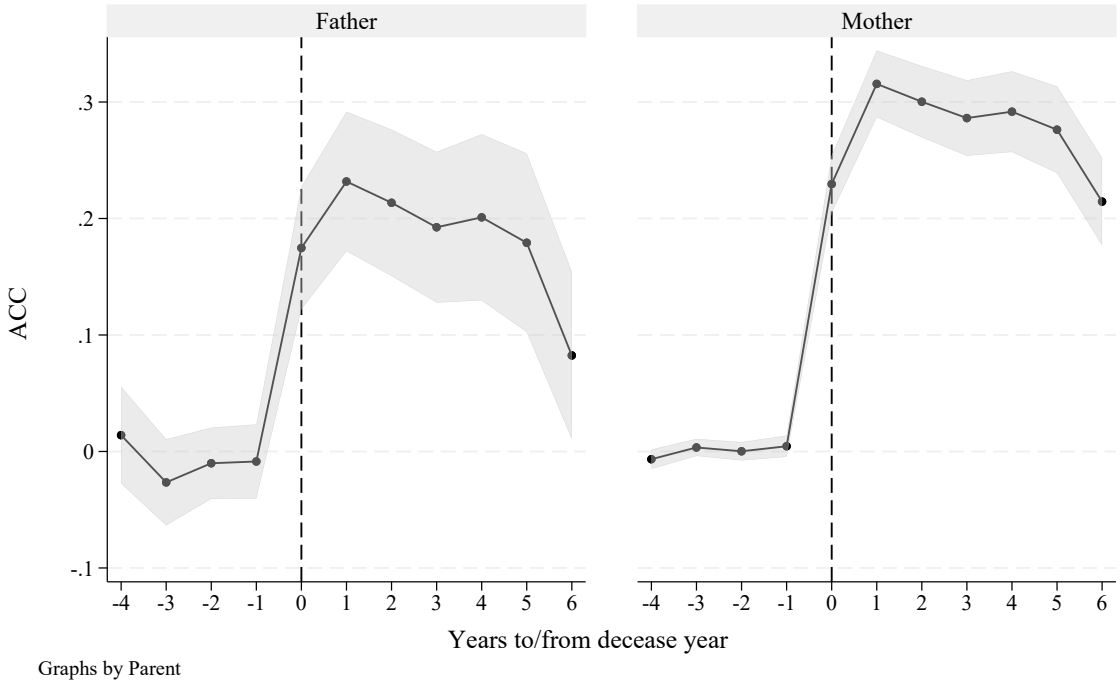
Table C.1: Benefit Receipt Effects After Partner Loss, by Gender and Age of Youngest Child

Event Year	All Ages		Child Aged 0–4		Child Aged 5–14	
	Father	Mother	Father (< 5)	Mother (< 5)	Father (5–14)	Mother (5–14)
-4	-0.012 (0.027)	0.011 (0.012)	-0.019 (0.048)	0.013 (0.021)	-0.028 (0.043)	0.008 (0.017)
-3	0.019 (0.029)	-0.014 (0.012)	0.021 (0.047)	0.000 (0.022)	0.028 (0.042)	-0.029 (0.016)
-2	0.024 (0.022)	-0.011 (0.011)	0.039 (0.044)	0.004 (0.019)	0.012 (0.032)	-0.039* (0.016)
-1	-0.017 (0.022)	-0.020 (0.010)	-0.061 (0.042)	-0.037* (0.017)	0.021 (0.030)	-0.020 (0.015)
0	0.122*** (0.027)	0.063*** (0.011)	0.180*** (0.053)	0.105*** (0.020)	0.114** (0.036)	0.045** (0.016)
1	0.104** (0.035)	0.015 (0.015)	0.111 (0.065)	-0.007 (0.025)	0.111* (0.053)	0.026 (0.020)
2	0.070 (0.040)	-0.044** (0.017)	0.086 (0.075)	-0.106*** (0.027)	0.054 (0.059)	-0.022 (0.023)
3	0.065 (0.045)	-0.070*** (0.019)	0.072 (0.085)	-0.174*** (0.032)	0.060 (0.062)	-0.027 (0.026)
4	0.102* (0.050)	-0.105*** (0.022)	0.106 (0.089)	-0.232*** (0.035)	0.113 (0.072)	-0.055 (0.030)
5	0.104 (0.053)	-0.139*** (0.026)	0.064 (0.097)	-0.341*** (0.042)	0.141 (0.078)	-0.049 (0.036)
6	0.054 (0.058)	-0.150*** (0.031)	-0.073 (0.107)	-0.369*** (0.048)	0.131 (0.079)	-0.075 (0.043)
Observations	312	1,380	312	1,380	144	636

Notes: All estimates are average treatment effects on the treated (ATT) from Callaway & Sant'Anna DiD models. Data is from the IDI and are the author's own calculations. Robust standard errors in parentheses. Significance: *p<0.05, **p<0.01, ***p<0.001. Sample stratified by gender and age of youngest child at time of partner's death.

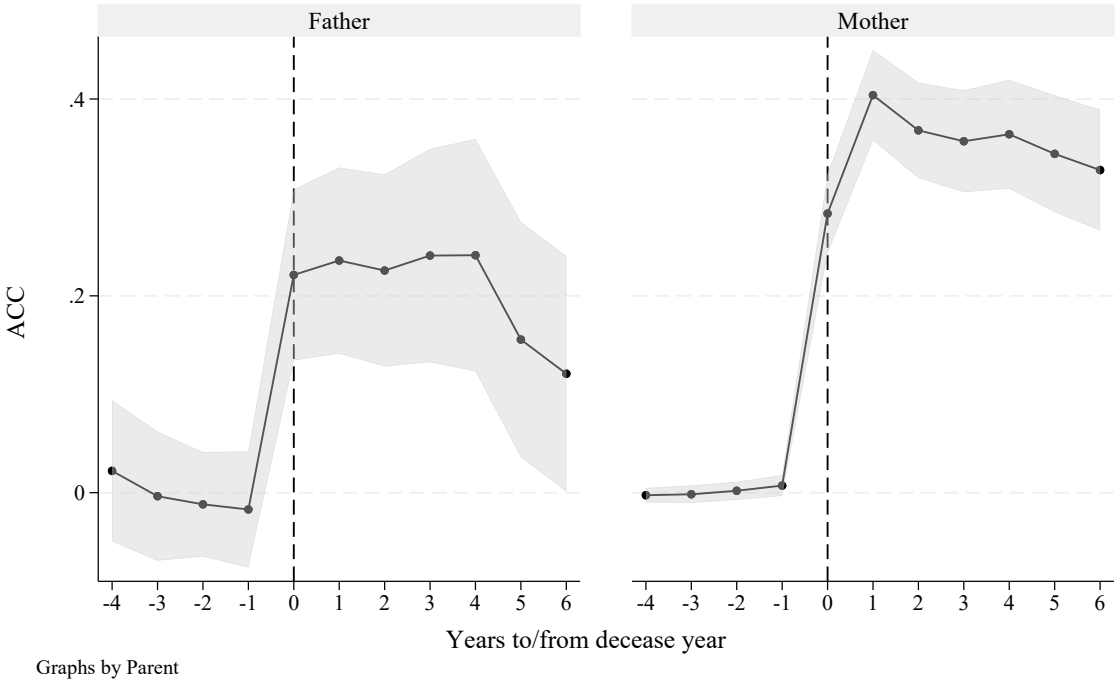
D ACC Receipt

Figure D.1: Estimated effects of partner loss on ACC receipt: All ages



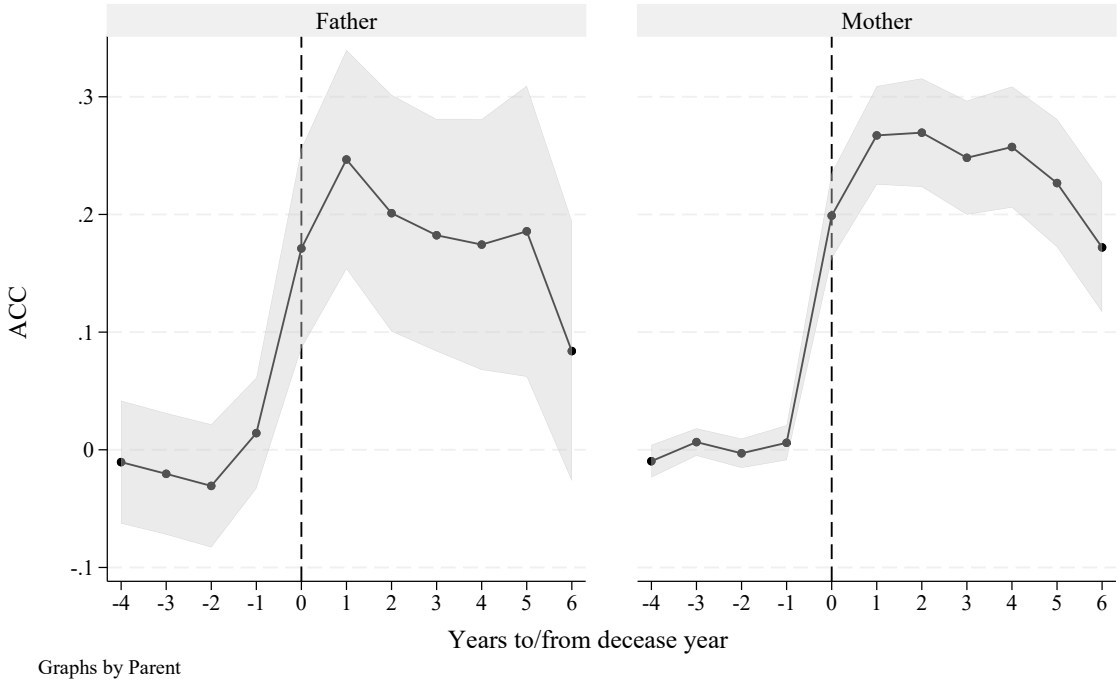
Notes: Estimates are based on New Zealand administrative data from the Integrated Data Infrastructure (IDI), and are the author's calculations. Figure reports average treatment effects on the treated (ATT) from Callaway & Sant'Anna Difference-in-Differences models. The outcome is a binary indicator for receiving any ACC income in a given calendar year. Event time is measured in years relative to the partner's death ($t = 0$). Error bars represent 95% confidence intervals. Statistical significance is denoted by: *p<0.05, **p<0.01, ***p<0.001.

Figure D.2: Estimated effects of partner loss on ACC receipt: Child aged 0–4



Notes: See Figure D.1 notes. Sample restricted to bereaved parents whose youngest child was aged 0–4 at the time of partner's death.

Figure D.3: Estimated effects of partner loss on ACC receipt: Child aged 5–14



Notes: See Figure D.1 notes. Sample restricted to bereaved parents whose youngest child was aged 5–14 at the time of partner's death.

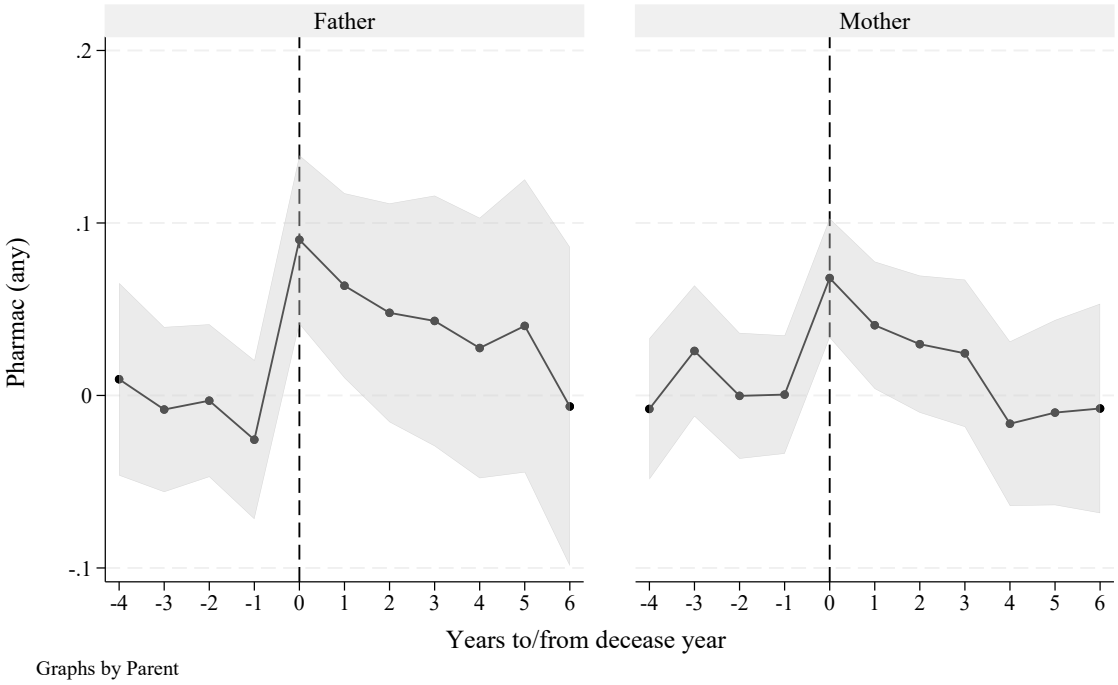
Table D.1: ACC Effects After Partner Loss, by Gender and Age of Youngest Child

Event Year	All Ages		Child Aged 0–4		Child Aged 5–14	
	Father	Mother	Father (< 5)	Mother (< 5)	Father (5–14)	Mother (5–14)
-4	0.014 (0.021)	-0.007 (0.004)	0.022 (0.037)	-0.003 (0.004)	-0.010 (0.027)	-0.010 (0.007)
-3	-0.027 (0.019)	0.003 (0.004)	-0.004 (0.033)	-0.002 (0.005)	-0.020 (0.026)	0.007 (0.006)
-2	-0.010 (0.016)	0.000 (0.004)	-0.012 (0.027)	0.002 (0.005)	-0.031 (0.027)	-0.003 (0.006)
-1	-0.009 (0.016)	0.004 (0.005)	-0.017 (0.030)	0.007 (0.005)	0.014 (0.024)	0.006 (0.008)
0	0.175^{***} (0.027)	0.230^{***} (0.013)	0.221^{***} (0.044)	0.284^{***} (0.021)	0.171^{***} (0.043)	0.199^{***} (0.019)
1	0.232^{***} (0.031)	0.316^{***} (0.015)	0.236^{***} (0.048)	0.404^{***} (0.023)	0.247^{***} (0.047)	0.267^{***} (0.021)
2	0.214^{***} (0.032)	0.300^{***} (0.016)	0.226^{***} (0.050)	0.368^{***} (0.025)	0.201^{***} (0.051)	0.270^{***} (0.024)
3	0.192^{***} (0.033)	0.286^{***} (0.017)	0.241^{***} (0.055)	0.357^{***} (0.026)	0.182^{***} (0.050)	0.248^{***} (0.025)
4	0.201^{***} (0.036)	0.292^{***} (0.018)	0.241^{***} (0.060)	0.364^{***} (0.028)	0.174^{***} (0.054)	0.257^{***} (0.026)
5	0.179^{***} (0.039)	0.276^{***} (0.019)	0.156^{*} (0.061)	0.344^{***} (0.030)	0.186^{**} (0.063)	0.227^{***} (0.028)
6	0.082^{*} (0.037)	0.215^{***} (0.019)	0.121^{*} (0.061)	0.328^{***} (0.031)	0.084 (0.056)	0.172^{***} (0.028)
Observations	312	1,380	312	1,380	144	636

Notes: All estimates are average treatment effects on the treated (ATT) from Callaway & Sant'Anna DiD models. Data is from the IDI and are the author's own calculations. Robust standard errors in parentheses. Significance: *p<0.05, **p<0.01, ***p<0.001. Sample stratified by gender and age of youngest child at time of partner's death.

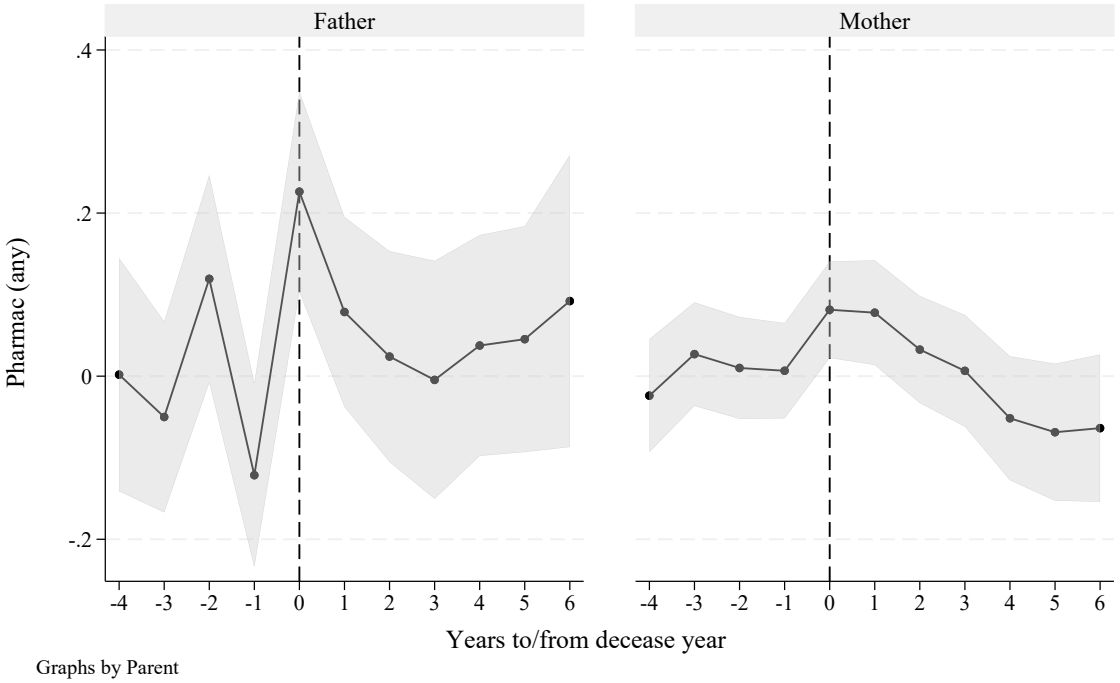
E PHARMAC Medication

Figure E.1: Estimated effects of partner loss on pharmaceutical dispensing: All ages



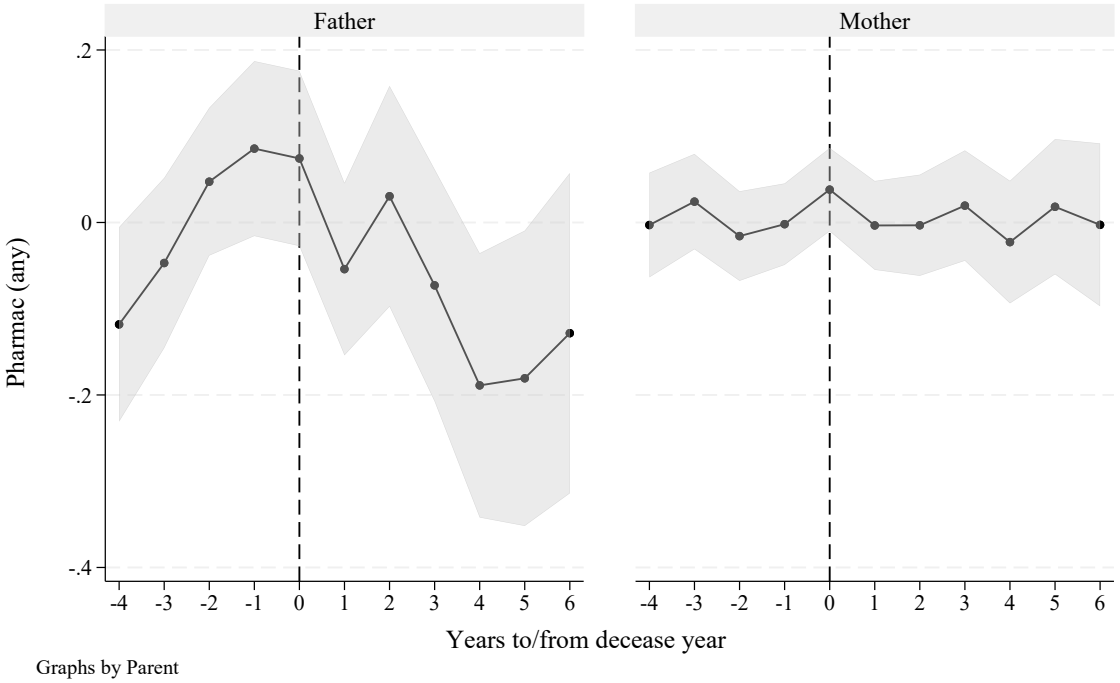
Notes: Estimates are based on New Zealand administrative data from the Integrated Data Infrastructure (IDI), and are the author's own calculations. Figure reports average treatment effects on the treated (ATT) from Callaway & Sant'Anna Difference-in-Differences models. The outcome is a binary indicator for whether at least one subsidised mental health or cardiovascular medication was dispensed in each year. Event time is measured in years relative to the partner's death ($t = 0$). Error bars represent 95% confidence intervals. Statistical significance is denoted by: *p<0.05, **p<0.01, ***p<0.001.

Figure E.2: Estimated effects of partner loss on pharmaceutical dispensing: Child aged 0–4



Notes: See Figure E.1 notes. Sample restricted to bereaved parents whose youngest child was aged 0–4 at the time of partner's death.

Figure E.3: Estimated effects of partner loss on pharmaceutical dispensing: Child aged 5–14



Notes: See Figure E.1 notes. Sample restricted to bereaved parents whose youngest child was aged 5–14 at the time of partner's death.

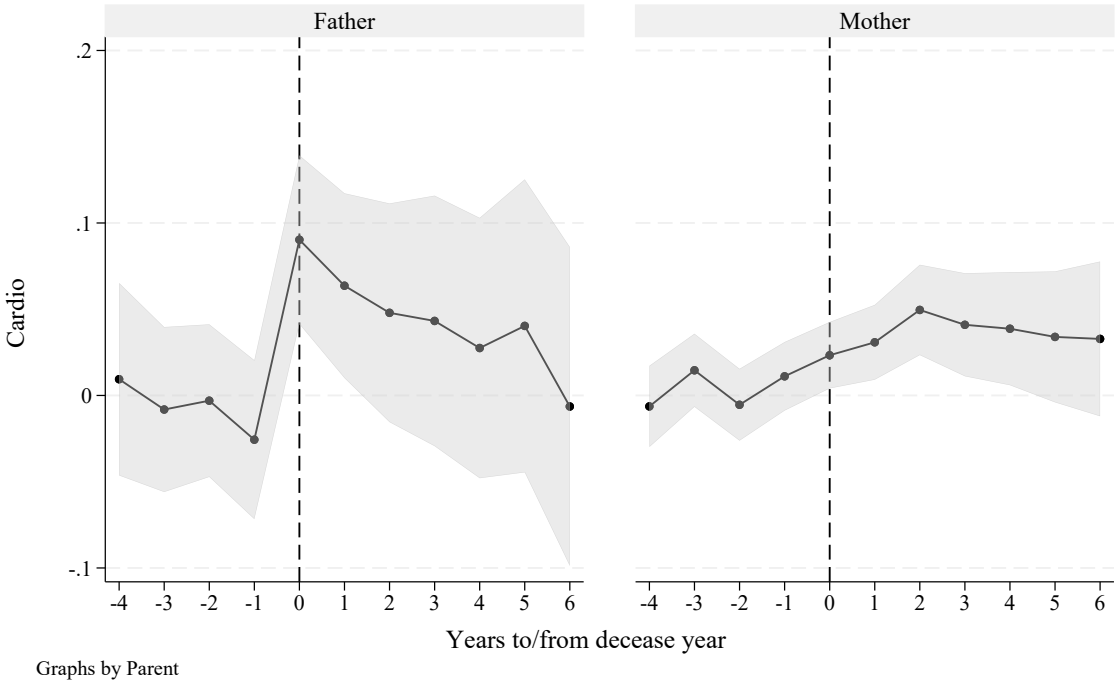
Table E.1: PHARMAC Medication Intake After Partner Loss, by Gender and Age of Youngest Child

Event Year	All Ages		Child Aged 0–4		Child Aged 5–14	
	Father	Mother	Father (< 5)	Mother (< 5)	Father (5–14)	Mother (5–14)
-4	0.009 (0.028)	-0.008 (0.021)	0.002 (0.073)	-0.024 (0.035)	-0.118* (0.058)	-0.003 (0.031)
-3	-0.008 (0.024)	0.026 (0.019)	-0.050 (0.060)	0.027 (0.032)	-0.047 (0.050)	0.024 (0.028)
-2	-0.003 (0.023)	-0.000 (0.019)	0.119 (0.065)	0.010 (0.032)	0.047 (0.044)	-0.016 (0.027)
-1	-0.026 (0.024)	0.001 (0.017)	-0.121* (0.058)	0.007 (0.030)	0.086 (0.052)	-0.002 (0.024)
0	0.090*** (0.025)	0.068*** (0.018)	0.226*** (0.063)	0.082** (0.030)	0.074 (0.052)	0.038 (0.025)
1	0.064* (0.027)	0.041* (0.019)	0.079 (0.059)	0.078* (0.033)	-0.054 (0.051)	-0.003 (0.026)
2	0.048 (0.032)	0.030 (0.020)	0.024 (0.066)	0.033 (0.034)	0.030 (0.065)	-0.003 (0.030)
3	0.043 (0.037)	0.024 (0.022)	-0.005 (0.074)	0.007 (0.035)	-0.073 (0.069)	0.020 (0.033)
4	0.028 (0.039)	-0.016 (0.024)	0.038 (0.069)	-0.052 (0.039)	-0.189* (0.078)	-0.023 (0.036)
5	0.040 (0.043)	-0.010 (0.027)	0.045 (0.071)	-0.069 (0.043)	-0.181* (0.087)	0.018 (0.040)
6	-0.006 (0.047)	-0.008 (0.031)	0.092 (0.091)	-0.064 (0.046)	-0.128 (0.095)	-0.003 (0.048)
Observations	312	1,380	312	1,380	144	636

Notes: All estimates are average treatment effects on the treated (ATT) from Callaway & Sant'Anna DiD models. Data is from the IDI and are the author's own calculations. Robust standard errors in parentheses. Significance: *p<0.05, **p<0.01, ***p<0.001. Sample stratified by gender and age of youngest child at time of partner's death.

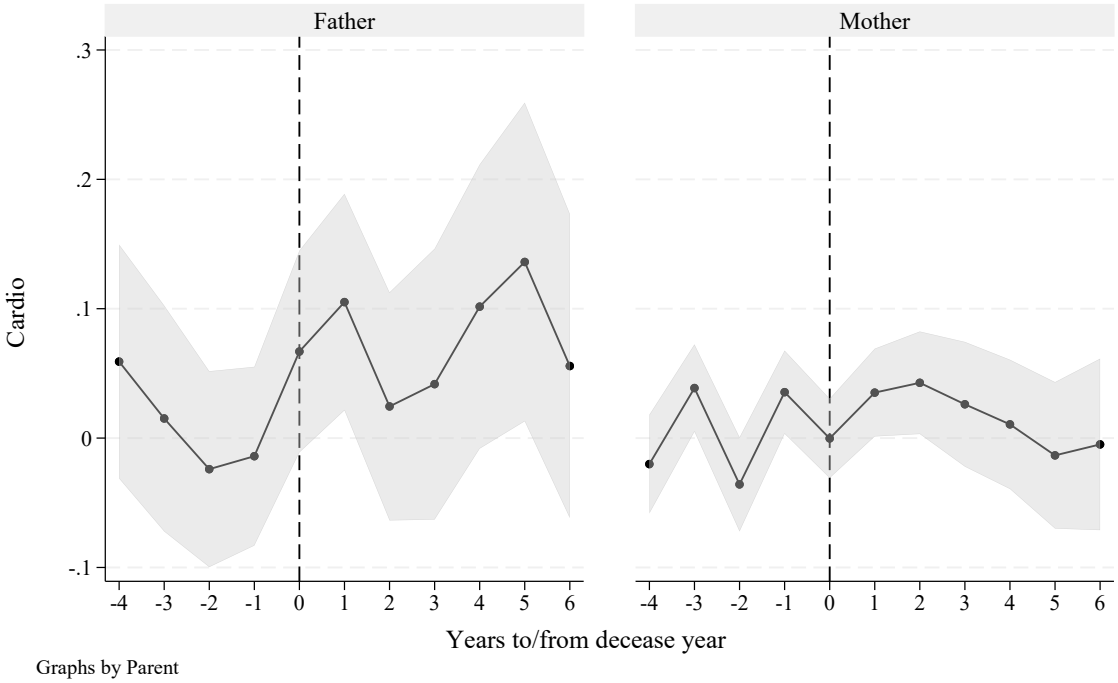
F Cardiovascular Medication

Figure F.1: Estimated effects of partner loss on cardiovascular medication intake: All ages



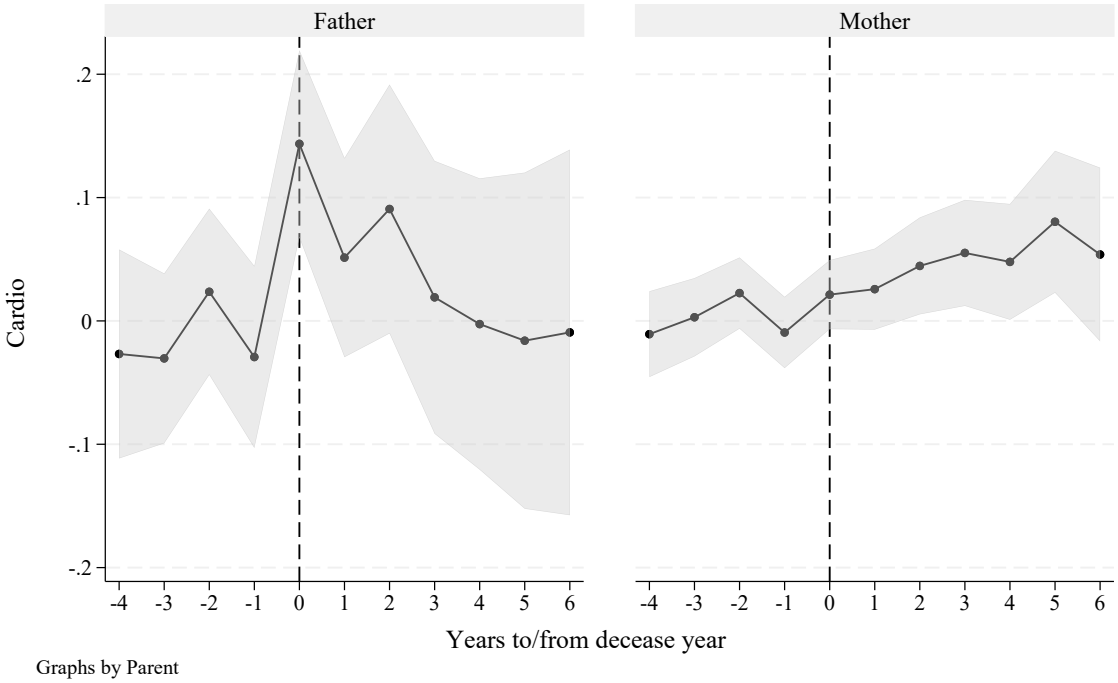
Notes: Estimates are based on New Zealand administrative data from the Integrated Data Infrastructure (IDI), and are the author's own calculations. Figure reports average treatment effects on the treated (ATT) from Callaway & Sant'Anna Difference-in-Differences models. The outcome is a binary indicator for whether at least one cardiovascular medication was dispensed in a given calendar year. Includes beta-adrenoceptor blockers, antihypertensives (e.g., ACE inhibitors, ARBs), alpha-adrenoceptor blockers, and beta-adrenoceptor agonists. Event time is measured in years relative to the partner's death ($t = 0$). Error bars represent 95% confidence intervals. Statistical significance is denoted by: *p<0.05, **p<0.01, ***p<0.001.

Figure F.2: Estimated effects of partner loss on cardiovascular medication intake: Child aged 0–4



Notes: See Figure F.1 notes. Sample restricted to bereaved parents whose youngest child was aged 0–4 at the time of partner's death.

Figure F.3: Estimated effects of partner loss on cardiovascular medication intake: Child aged 5–14



Notes: See Figure F.1 notes. Sample restricted to bereaved parents whose youngest child was aged 5–14 at the time of partner's death.

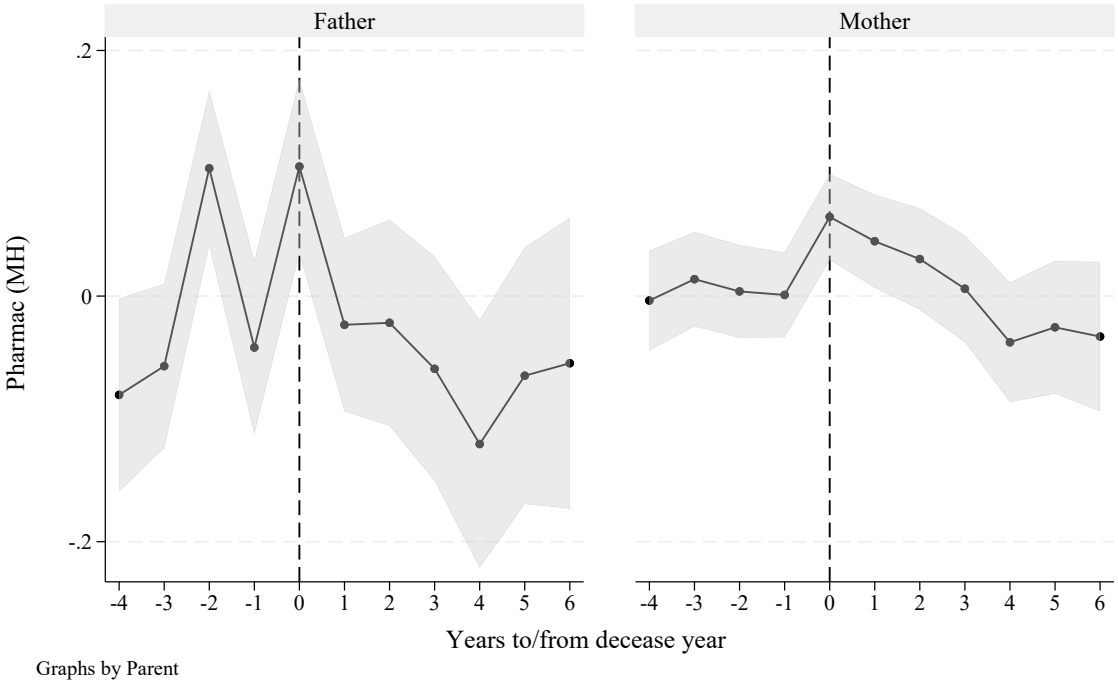
Table F.1: Cardiovascular Medication Intake After Partner Loss, by Gender and Age of Youngest Child

Event Year	All Ages		Child Aged 0–4		Child Aged 5–14	
	Father	Mother	Father (< 5)	Mother (< 5)	Father (5–14)	Mother (5–14)
-4	0.009 (0.028)	-0.006 (0.012)	0.059 (0.046)	-0.020 (0.019)	-0.027 (0.043)	-0.011 (0.018)
-3	-0.008 (0.024)	0.015 (0.011)	0.015 (0.045)	0.039* (0.017)	-0.030 (0.035)	0.003 (0.016)
-2	-0.003 (0.023)	-0.005 (0.011)	-0.024 (0.039)	-0.036 (0.019)	0.024 (0.034)	0.023 (0.015)
-1	-0.026 (0.024)	0.011 (0.010)	-0.014 (0.035)	0.035* (0.016)	-0.029 (0.038)	-0.009 (0.015)
0	0.090*** (0.025)	0.023* (0.010)	0.067 (0.040)	0.000 (0.016)	0.144*** (0.039)	0.021 (0.014)
1	0.064* (0.027)	0.031** (0.011)	0.105* (0.043)	0.035* (0.017)	0.051 (0.041)	0.026 (0.017)
2	0.048 (0.032)	0.050*** (0.013)	0.024 (0.045)	0.043* (0.020)	0.091 (0.052)	0.045* (0.020)
3	0.043 (0.037)	0.041** (0.015)	0.042 (0.053)	0.026 (0.025)	0.019 (0.056)	0.055* (0.022)
4	0.028 (0.039)	0.039* (0.017)	0.102 (0.056)	0.011 (0.026)	-0.003 (0.060)	0.048* (0.024)
5	0.040 (0.043)	0.034 (0.019)	0.136* (0.063)	-0.013 (0.029)	-0.016 (0.070)	0.080** (0.029)
6	-0.006 (0.047)	0.033 (0.023)	0.056 (0.060)	-0.005 (0.034)	-0.009 (0.076)	0.054 (0.036)
Observations	312	1,380	312	1,380	144	636

Notes: All estimates are average treatment effects on the treated (ATT) from Callaway & Sant'Anna DiD models. Data is from the IDI and are the author's own calculations. Robust standard errors in parentheses. Significance: *p<0.05, **p<0.01, ***p<0.001. Sample stratified by gender and age of youngest child at time of partner's death.

G Mental Health Medication

Figure G.1: Estimated effects of partner loss on mental health medication intake: All ages



Notes: Estimates are based on New Zealand administrative data from the Integrated Data Infrastructure (IDI), and are the author's own calculations. Figure reports average treatment effects on the treated (ATT) from Callaway & Sant'Anna Difference-in-Differences models. The outcome is a binary indicator for whether at least one mental health medication was dispensed in a given calendar month. Includes antidepressants, anxiolytics, antipsychotics, and sedatives/hypnotics. Event time is measured in years relative to the partner's death ($t = 0$). Separate estimates are shown for surviving mothers and fathers. Error bars represent 95% confidence intervals. Statistical significance is denoted by: *p<0.05, **p<0.01, ***p<0.001.

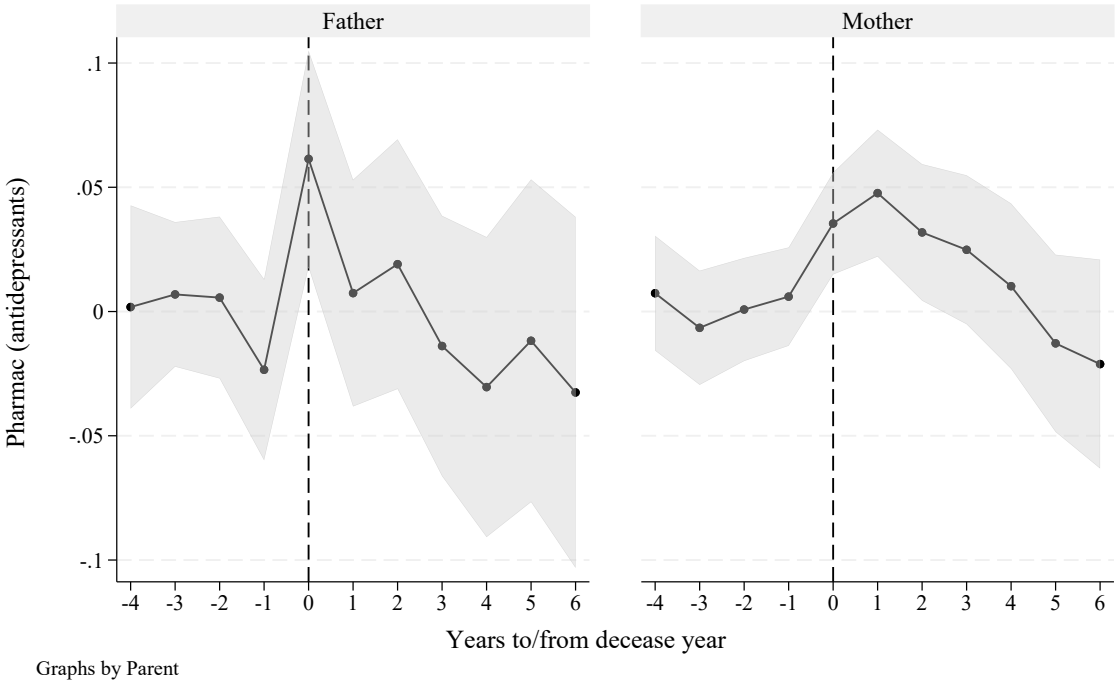
Table G.1: Mental Health Medication Intake After Partner Loss

Event Year	**Father**	**Mother**
-4	-0.080* (0.040)	-0.004 (0.021)
-3	-0.057 (0.034)	0.014 (0.020)
-2	0.104** (0.032)	0.004 (0.019)
-1	-0.042 (0.036)	0.001 (0.018)
0	0.106** (0.036)	0.064*** (0.018)
1	-0.023 (0.036)	0.045* (0.019)
2	-0.022 (0.043)	0.030 (0.021)
3	-0.059 (0.047)	0.006 (0.022)
4	-0.120* (0.051)	-0.038 (0.025)
5	-0.065 (0.053)	-0.025 (0.028)
6	-0.055 (0.060)	-0.033 (0.031)
Observations	312	1,380

Notes: All estimates are average treatment effects on the treated (ATT) from Callaway & Sant'Anna DiD models. Data is from the IDI and are the author's own calculations. Robust standard errors in parentheses. Significance: *p<0.05, **p<0.01, ***p<0.001. Sample stratified by gender and age of youngest child at time of partner's death.

H Antidepressant Medication

Figure H.1: Estimated effects of partner loss on antidepressant dispensing: All ages



Notes: Estimates are based on New Zealand administrative data from the Integrated Data Infrastructure (IDI), and are the author's own calculations. Figure reports average treatment effects on the treated (ATT) from Callaway & Sant'Anna Difference-in-Differences models. The outcome is a binary indicator for whether at least one antidepressant was dispensed in a given calendar month. Event time is measured in years relative to the partner's loss ($t = 0$). Separate estimates are shown for surviving mothers and fathers. Error bars represent 95% confidence intervals. Statistical significance is denoted by: *p<0.05, **p<0.01, ***p<0.001.

Table H.1: Antidepressant Medication Intake After Partner Loss

Event Year	**Father**	**Mother**
-4	0.002 (0.021)	0.007 (0.012)
-3	0.007 (0.015)	-0.007 (0.012)
-2	0.006 (0.017)	0.001 (0.011)
-1	-0.023 (0.019)	0.006 (0.010)
0	0.061^{**} (0.022)	0.035^{***} (0.010)
1	0.007 (0.023)	0.048^{***} (0.013)
2	0.019 (0.026)	0.032^{*} (0.014)
3	-0.014 (0.027)	0.025 (0.015)
4	-0.030 (0.031)	0.010 (0.017)
5	-0.012 (0.033)	-0.013 (0.018)
6	-0.033 (0.036)	-0.021 (0.021)
Observations	312	1,380

Notes: All estimates are average treatment effects on the treated (ATT) from Callaway & Sant'Anna DiD models. Data is from the IDI and are the author's own calculations. Robust standard errors in parentheses. Significance: *p<0.05, **p<0.01, ***p<0.001. Sample stratified by gender and age of youngest child at time of partner's death.